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Articles

MONOS AULLADORES (*ALOUATTA PALLIATA*), ESCARABAJOS COPRÓFAGOS Y LA FRAGMENTACIÓN DE LAS SELVAS EN LOS TUXTLAS, VERACRUZ, MÉXICO

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Introducción

En las selvas neotropicales, las heces frescas de mamíferos selváticos, especialmente de monos aulladores, constituyen una importante fuente de alimento y un recurso indispensable para ovipositar para un amplio número de especies de escarabajos coprófagos (Hanski y Cambefort, 1991). Un segmento de esta comunidad de escarabajos se ha especializado en explotar las heces de los aulladores casi exclusivamente (Estrada *et al.*, 1993). Al localizar las heces, los escarabajos proceden a enterrarlos rápidamente, ya sea en el lugar de deposición o a cierta distancia de éste. Esto último se logra haciendo una pelota que es rodada sobre el piso de la selva y posteriormente enterrada. La relocalización de las heces y la rapidez para enterrarlas es una estrategia que han desarrollado los escarabajos coprófagos para enfrentarse a la fuerte competencia con otros insectos coprófagos por este tipo de recurso (Halffter y Mathews, 1966).

En las selvas de Los Tuxtlas tropas de *Alouatta palliata* utilizan cerca de 78 especies de árboles como fuente de hojas y frutos a través del año (Estrada, 1984; Jiménez-Huerta, 1992; Serio-Silva, 1992; Juan, 1997), participando así en el reciclaje de materia y energía en el ecosistema. Cerca del 50% de estas especies constituyen la fuente de frutos en la dieta de estos primates y las semillas de la mayoría de esta especie son ingeridas accidentalmente por los aulladores quienes, debido a sus movimientos diarios (200-1500 m) y al lento pasaje del alimento por su tracto digestivo (18-20 hrs), las dispersan en estado viable y a distancias variables de su lugar de origen (Estrada y Coates-Estrada, 1991). Al dispersar la semillas, los aulladores le prestan dos servicios importantes a las plantas. Primero, permiten que muchas semillas escapen de una muerte segura bajo la sombra de la copa del árbol madre, incrementando así el éxito reproductivo de la planta. Segundo, permiten que las plantas colonicen sitios que de otra manera no les serían accesibles. Así, las plantas de las selvas húmedas están atrapadas en una íntima dependencia con mamíferos frugívoros como *A. palliata* y éstos, a su vez, dependen de los frutos de las plantas como una fuente importante de alimento a través del año (Estrada y Coates-Estrada, 1986).

Al enterrar las heces, los escarabajos también entierran a

las semillas dispersadas por los monos aulladores, hasta a 12 cm bajo la superficie del suelo. Experimentos de campo en Los Tuxtlas demostraron que los roedores son incapaces de localizar la mayoría de las semillas enterradas por los escarabajos de esta manera y que estas semillas logran germinar y establecerse. Aquellas semillas que no son enterradas por los escarabajos son depredadas casi en un 80% por los roedores. Así, en el proceso de regeneración de las selvas, en el cual están involucrados los monos aulladores a través de sus interacciones con un amplio espectro de plantas, los escarabajos coprófagos juegan un papel estratégico en el éxito reproductivo de la planta (Estrada y Coates-Estrada, 1991).

Debido a que la abundancia general de los mamíferos selváticos establece los niveles de disponibilidad de recursos para los escarabajos coprófagos (Hanski y Cambefort, 1991) y a que mamíferos no voladores, como *A. palliata*, son especialmente sensibles a la destrucción, fragmentación y aislamiento de sus hábitats (Offerman *et al.*, 1995; Estrada *et al.*, 1994), las poblaciones de escarabajos coprófagos se verán afectadas negativamente por estos cambios (Klein, 1989). Sin embargo, la poca evidencia de campo existente hasta el momento sólo indica que en el caso de los escarabajos coprófagos existen efectos negativos sobre sus poblaciones como resultado de pérdida de área del hábitat (Howden y Nealis, 1975; Peck y Forsyth, 1982; Klein, 1989), pero no hay datos que evalúen los efectos de cambios en la abundancia relativa de mamíferos como resultado de la fragmentación de la selva sobre las poblaciones de escarabajos coprófagos.

El objeto del presente trabajo es describir la relación existente entre la presencia y la abundancia relativa de una población fragmentada de *A. palliata* y la presencia y abundancia relativa de las poblaciones de 11 especies de escarabajos coprófagos que manifiestan una clara preferencia por las heces de este primate (Estrada *et al.*, 1993). Para lograr lo anterior, entre febrero y noviembre de 1996 se censaron los grupos existentes de *A. palliata* y las poblaciones de escarabajos coprófagos en 24 fragmentos de selva en un paisaje fragmentado de la región de Los Tuxtlas, Veracruz, México.

Metodología

El área de estudio con una extensión aproximada de 31 km², consiste en un paisaje dominado por pastizales para la ganadería y en el que se presentan fragmentos aislados de la selva que hasta hace 30-40 años cubría la totalidad del paisaje. Este paisaje se localiza en las inmediaciones de la Estación de Biología "Los Tuxtlas" del Instituto de Biología de la Universidad Nacional Autónoma de México en la región de Los Tuxtlas al sur de Veracruz, México (95° 00' W, 18° 25' N). El rango de área de los 24 fragmentos investigados varió de 0.5 a 113 hectáreas y en el caso de la distancia de aislamiento (la distancia en línea recta más corta al fragmento más cercano) fue de 200 a 800 m.

Censos de *A. palliata*: Cada uno de los fragmento de selva fue visitado tres veces durante el periodo de 10 meses que duró la investigación de campo. Los aulladores detectados fueron contados y se determinó su sexo y edad aproximada (Anzures, 1997). Con datos provenientes de la literatura se estimó el peso promedio de cada clase de individuo en las tropas y la producción media de heces por día por individuo (Estrada, 1982; Estrada y Coates-Estrada, 1991). Esto permitió una estimación de la biomasa de *Alouatta* y de la producción total diaria de heces para cada sitio.

Muestreo de escarabajos coprófagos: Los escarabajos coprófagos con afinidad a las heces de *Alouatta* fueron capturados utilizando trampas ('pitfall traps') cebadas con 50 g de una mezcla homogeneizada de heces de *Alouatta*, vaca y caballo (Anzures, 1997). Se montaron 35 trampas en el interior de cada fragmento de selva ≤ 30 ha a lo largo de una ruta más o menos lineal. En fragmentos > 30 ha se montaron dos grupos de 35 trampas separados por aproximadamente 200 m. Las trampas, colocadas a intervalos de 10 m se dejaron en el interior del fragmento por un periodo de 24 horas, después del cual fueron recogidas y su contenido examinado en la Estación de Biología "Los Tuxtlas". Los escarabajos capturados se contaron e identificaron a nivel de especie con una colección de referencia existente en la Estación. Para estimar la biomasa representada por los escarabajos capturados, se usó la longitud promedio del cuerpo en mm (Klein 1989). Posteriormente los escarabajos fueron liberados en el sitio de captura.

Resultados

Detectamos la presencia de *A. palliata* en el 58% de los 24 fragmentos investigados, registrando un total de 132 individuos agrupados en 24 tropas y dos machos solitarios. En el caso de las tropas, el 30% de los individuos fueron machos, el 39% hembras, el 15% juveniles (>1 año) y el 16% infantiles (<1 año). El tamaño medio de las tropas fue 6.0 (D.S. ± 2.0) individuos. El número medio de tropas de aulladores por fragmento fue de 1.5 (D.S. ± 0.9) con un rango de 1 a 4 tropas. El número medio de aulladores por fragmento fue de 8.4 (D.S. ± 5.9) individuos con un rango de 1-25 individuos. La biomasa media de aulladores y la producción media de heces por día por fragmento fue de 49 kg (D.S. ± 40) y 439 gr (D.S. ± 313) respectivamente. La producción media estimada de copro de *Alouatta* por hectárea por sitio fue de 59.6 gr (D.S. ± 71.1 ; rango 4-300 gr). Se determinó una relación positiva entre la biomasa de aulladores en los sitios investigados y el área de estos últimos ($r_s = 0.60$, $p = 0.0001$). La producción estimada total de heces de *Alouatta* por sitio y de heces por hectárea por sitio estuvieron fuertemente correlacionadas con la biomasa de *Alouatta* en los fragmentos estudiados ($r_s = 0.98$, $p < 0.0001$ y $r_s = 0.72$, $p < 0.001$ respectivamente).

Capturamos un total de 2754 escarabajos representando a las 11 especies de interés. El número medio de escarabajos y de especies capturados por trampa por fragmento fue de

2.5 (rango 0.03-17) y de 0.12 (D.S. ± 0.08) respectivamente. La biomasa media estimada por trampa por fragmento fue de 24 mm (rango 0.3-16 mm). La tasa media de captura por trampa por sitio y la biomasa media de escarabajos por trampa por sitio estuvieron significativamente asociados al área del fragmento ($r_s = 0.45$, $p = 0.01$ y $r_s = 0.50$, $p = 0.006$, respectivamente).

En los fragmentos de selva con presencia de *Alouatta*, la tasa media de captura de escarabajos por trampa por sitio ($X = 3.73 \pm 4.7$) y la biomasa media ($X = 34.6 \text{ mm} \pm 43.2$) por trampa por sitio fueron significativamente mayores ($z = 2.29$, $p = 0.01$ y $z = 2.16$, $p = 0.01$) que en los fragmentos en los que *Alouatta* no estuvo presente ($X = 0.85 \pm 1.1$ y $X = 8.84 \text{ mm} \pm 11.3$, respectivamente) (Fig. 1).

La tasa media de captura de escarabajos por trampa por sitio y la biomasa media de escarabajos por trampa por sitio estuvieron significativamente relacionadas a la producción estimada de heces de aulladores por hectárea por sitio ($r_s = 0.48$, $p = 0.008$ y $r_s = 0.38$, $p = 0.03$ respectivamente). Estas dos variables también estuvieron correlacionadas con la biomasa total de aulladores estimada para cada sitio ($r_s = 0.51$, $p = 0.005$ y $r_s = 0.50$, $p = 0.005$).

Un análisis de correlación parcial mostró una relación positiva y significativa entre la tasa media de captura y la biomasa media de escarabajos por trampa por sitio y la tasa de producción de heces de aullador por hectárea por sitio ($r_s = 0.40$, $p = 0.02$ y $r_s = 0.36$, $p = 0.03$), mientras que la relación de estas variables con el área del fragmento resultó no significativa ($r_s = 0.11$, $p = 0.29$ y $r_s = 0.07$, $p = 0.29$).

Discusión

Los resultados de este estudio indican que reducciones en área de selva disponible tanto para los monos aulladores como para los escarabajos coprófagos resultan en disminuciones importantes en las poblaciones de ambos organismos. Estas observaciones son congruentes con resultados de otras investigaciones sobre poblaciones

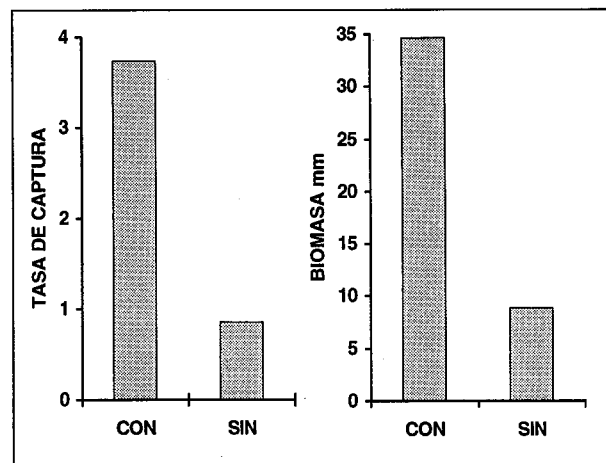


Figura 1. Diferencias en la tasa media de captura de escarabajos coprófagos por trampa por sitio en fragmentos de selva con aulladores y sin aulladores presentes.

silvestres de primates y de escarabajos coprófagos en selvas Amazónicas (Rylands y Keuroghlian, 1988; Klein, 1989) y en Los Tuxtlas (Estrada y Coates-Estrada, 1996).

Nuestros resultados claramente indican que en los fragmentos de selva ocupados por monos aulladores habita un mayor número de escarabajos coprófagos en comparación con aquellos fragmentos en que los aulladores no están presentes y los resultados del análisis de correlación parcial sugieren un mayor efecto del volumen existente de materia fecal de *Alouatta* por unidad de área por día sobre el tamaño de las poblaciones de las 11 especies de escarabajos coprófagos investigados, que el efecto que ejerce el área del fragmento. Entre más bajo el volumen, más bajas, al parecer, son las poblaciones de escarabajos, independientemente del área del fragmento.

Esto sugiere que la desaparición de los monos aulladores de remanentes de selva en el Neotrópico puede resultar en la extinción local y/o disminuciones importantes en las poblaciones de especies de escarabajos coprófagos que manifiestan una cierta especialización hacia el recurso producido por este primate. Por otro lado, la desaparición y/o reducciones en el tamaño de las poblaciones de *Alouatta* puede resultar en disminuciones importantes en la dispersión y postdispersión de un gran número de semillas de un amplio espectro de plantas en las selvas neotropicales, cuya supervivencia se favorece por las interacciones entre este primate con los escarabajos coprófagos (Estrada y Coates-Estrada, 1993; Kinzey, 1997). Esto último tendrá un impacto importante sobre la capacidad de regeneración de la selva.

Nuestro estudio sugiere que para lograr una conservación efectiva y a largo plazo de los monos aulladores en Los Tuxtlas, es indispensable atenuar los efectos negativos del área y aislamiento sobre los segmentos aislados de la población original de *Alouatta*. Esto podría lograrse, inicialmente, a través de la creación de unidades de conservación formadas por archipiélagos de fragmentos de selva que podrían ser unidos entre sí por medio de corredores de vegetación a lo largo de ríos y arroyos. La conexión física y biótica podría intensificarse a través del establecimiento de cercas vivas conformadas no sólo por las dos especies arbóreas (*Bursera simaruba* Burseraceae y *Gliricidia sepium* Leguminosae) usadas tradicionalmente por los campesinos y rancheros para delimitar sus parcelas, sino también con especies de árboles que usan los monos aulladores. De este modo las tropas de monos aulladores aisladas podrían restablecer el flujo génico y conformar una población genéticamente viable. Tal escenario, facilitaría también la supervivencia de escarabajos coprófagos especialistas y generalistas en hábitos alimenticios y que dependen de las heces de mamíferos como *Alouatta* para alimento y reproducción, resultando en el sostenimiento de la interacción primate-planta-escarabajo, con efectos positivos importantes sobre el proceso de regeneración natural de la selva.

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- carried out from May to August 1998 at the Zoobotanical Park of the Federal University of Acre (UFAC) (9°56'30"-9°57'19"S, 67°52'08"-67°53'00"W; 100 ha), Rio Branco, state of Acre, Brazil.
- The Peruvian trapping method has been used by Bicca-Marques and colleagues (Bicca-Marques *et al.*, 1997; Calegario-Marques and Bicca-Marques, 1994; Santos *et al.*, 1995) to capture tamarins in several parts of the Rio Branco study site since 1994. More than 80 tamarins were captured in the following periods: April-June 1994, October-November 1994, February 1995, August-October 1997, December 1997, March 1998, and May 1998. Although titi monkeys are found throughout the study site, and were often observed near or on the capture platform, prior to May 1998 they were only once observed entering the trap and eating the bait (February 1995; M. A. Azevedo-Lopes, pers. comm.).
- During the last capture period (May 1998) a group of titi monkeys comprised of four individuals (one adult female and three immature males; the adult male of this group died in January 1998) were observed to enter the traps and eat the bananas. This group was very well habituated to the researchers' presence. It was observed on 115 days from 22 September 1997 to 29 January 1998 and was often observed eating bananas on experimental feeding platforms (30 cm x 45 cm) located 1.5 m above the ground. These platforms were being used for a study on primate foraging decisions (see Bicca-Marques *et al.*, 1998). Members of the titi monkey group were first observed entering the trap on 18 May. From 18 to 21 May, all individuals fed inside the trap at the same time. On 26 May, two immature males were captured (Fig. 1). Both were anaesthetized with a mixture of Tiletamine hydrochloride and Zolazepam hydrochloride (Telazol[®] by Elkins-Sinn, Inc., Cherry Hill, NJ 08003, U.S.A.; diluted in 10 ml distilled water; doses=0.06 ml and 0.10 ml) (Fig. 2), weighed, measured, sexed, and fitted with color-coded collars for individual recognition. The other two group members (the adult female and an immature male) could be distinguished by their physical traits. The oldest individual captured weighed 745 g and measured 287 mm head and body length and 435 mm tail length. His left testicle was approximately 8.0 mm long and 5.6 mm wide. The youngest individual weighed 590 g and measured 280 mm head

ON THE CAPTURE OF TITI MONKEYS (*CALLICEBUS CUPREUS*) USING THE PERUVIAN METHOD

Guilherme Silveira
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Titi monkeys are shy and difficult to capture using baited traps. This note reports the capture of two red titi monkeys (*Callicebus cupreus cupreus*) using a so-called "Saguinus trap" by the Peruvian Method (see details of the method in Encarnación *et al.*, 1990). The capture was part of an experimental field study on feeding competition among sympatric groups of tamarins (*Saguinus imperator imperator* and *Saguinus fuscicollis weddelli*) and titi monkeys (*C. c. cupreus*) conducted by G. Silveira and supervised by J. C. Bicca-Marques. The research was

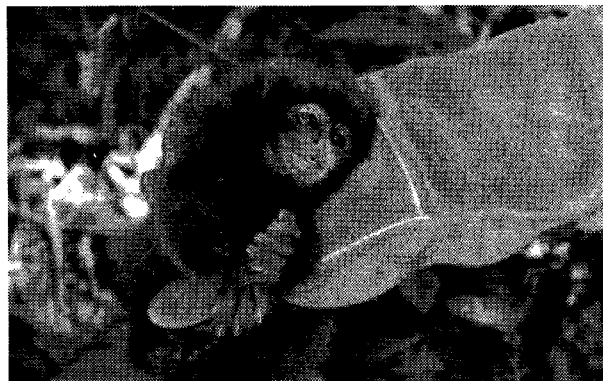


Figure 1. Immature red titi monkey before being anaesthetized.

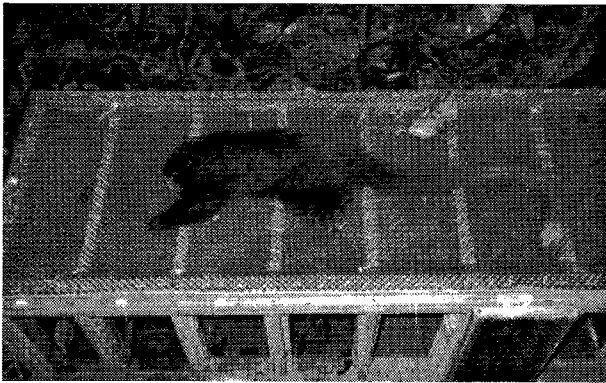


Figure 2. Anaesthetized immature red titi monkey over the "Saguinus trap".

and body length and 365 mm tail length. Testicles of this individual were very small and were not measured. Following capture, the group spent eight days without returning to the Feeding Station where it was captured. However, the monkeys returned to feed on 4 June and revisited the platforms on a daily basis until the end of the study (8 August).

In conclusion, the Peruvian Method proved useful in capturing titi monkeys. Its efficacy, however, is low and seems to depend strongly on the animals' habituation. We believe that widening the individual compartments of the trap, putting the traps in a shady place, for example, close to lianas, and having a detailed knowledge of the group's range would greatly increase the facility with which titi monkeys can be captured using this trapping method.

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PROXIMITY AND GROOMING INTERACTIONS AS INDICATORS OF THE SOCIAL ORGANIZATION OF BROWN HOWLING MONKEYS (*ALOUATTA FUSCA CLAMITANS*)

Dilmar A. G. de Oliveira
César Ades

The frequency of social behaviors is much lower in howling monkeys (genus *Alouatta*) than in other primate species (Neville *et al.*, 1988); a feature believed to be related to a strategy of reduced energy expenditure (Crockett and Eisenberg, 1987; Neville *et al.*, 1988; Milton, 1980, 1981). Our own field data indicate that brown howling monkeys (*Alouatta fusca clamitans*), observed at the Cantareira State Park, São Paulo, spend less than 5% of their day in explicit social activities (Oliveira and Ades, 1993; Oliveira, 1997). The scarcity of social interactions makes the assessment of aspects of group structure and organization time-consuming and difficult.

Besides displays and ostensible interactive behaviors, howlers communicate and organize their behavior as members of a group through *indirect* signals, such as approaches, retreats, following bouts, and huddling (Jones, 1980, 1983). Spatial relationships among howlers may constitute, as in other primates (Rowell and Olson, 1983), an important indication of how they relate to each other in the group and of the prevailing social organization (Jones, 1980).

The main aim of this research, which was part of a study of vocal communication (Oliveira, 1997), was to evaluate aspects of the social organization of brown howlers using records of inter-individual distances and, as supplementary information, data on grooming episodes (Mendes, 1989; Chiarelli, 1995). The observation method adopted is simple, reliable and relatively economic in terms of the time spent in the field.

Our research site, the Cantareira State Park, is a large urban reserve (7,900 ha) in the middle of the metropolitan region of São Paulo. It is comprised predominantly of secondary forest and, besides *A. fusca clamitans*, the primate community there includes capuchins (*Cebus apella nigritus*), marmosets (*Callithrix aurita*) and masked titi monkeys (*Callicebus personatus nigrifrons*).

Howlers at Cantareira spend about 60% of the day resting, about 18% and 15% foraging and travelling, respectively, and the remaining, short time in social and other

activities (Oliveira, 1997). These figures do not differ markedly from previous assessments of time allocation in the same species (Mendes, 1989; Chiarello, 1993, 1994; Oliveira and Ades, 1993; Marques, 1996). At Cantareira, mature leaves predominate in the howler's diet, probably as a result of the low supply of other preferred food items, such as immature leaves and fruits (Oliveira and Ades, 1993; Oliveira, 1997).

Several groups of howlers were included in the study. They were studied opportunistically. Behavioral quantification was by scan sampling (Altmann, 1974), with scans of three minutes at intervals of 10 minutes. The duration of the scan established a limit on the number of focal group members sampled at each opportunity.

The following data were recorded for every sampled individual: (a) identity - adult male (AM), adult female (AF), juvenile (JU), infant (IN); (b) social behavior - social play, grooming; (c) distance to nearest individual - in contact, from 0 to 1 m, from 1 to 2 m; from 2 to 3 m, more than 3 m, and 'isolated'; (d) identity of nearest individual - sex and age category of nearest individual. Indeterminate (IND) was recorded whenever the identity of the nearest individual could not be ascertained. When sex and age categories of a sampled individual could not be determined with certainty, it was necessary to use compound categories - adult (AD), adult or juvenile (AJ), male or juvenile (MJ), female or juvenile (FJ) and juvenile or infant (JI). With the exception of the FJ category, such cases are, however, responsible for a very small number of the records and were not taken into account.

The distance to the nearest individual (Fig. 1) depended significantly upon sex and age categories ($\chi^2 = 246.2$; $df = 12$; $p < 0.001$). All binary comparisons between sex and age categories were significant (AM x AF, $\chi^2 = 15.7$; AM x JU, $\chi^2 = 71.2$; AM x IN, $\chi^2 = 23.8$; AF x IN, $\chi^2 = 59.9$; JU x IN, $\chi^2 = 76.8$; in all cases, $df = 4$; $p < 0.001$). Adult males were most distant from other members of the group (high levels of ISOLATED), infants predictably were nearest to other members of the group. Juveniles and adult females occupied intermediary spatial positions (Fig. 1). The identity of the nearest individual also depended significantly on sex and age category of the sampled animals ($\chi^2 = 516.1$; $df = 12$; $p < 0.001$). Differences remained significant when FJ records were discarded ($\chi^2 = 423.8$, $df = 9$, $p < 0.001$).

The association patterns for adult females were less spe-

Table 1: Number of grooming episodes. Left column indicates the identity of the groomer, top row indicates the groomee.

	AM	AF	FJ	JU	Total
AM	0	0	0	0	0
AF	10	4	1	8	23
FJ	9	2	2	1	14
JU	2	9	0	1	12
Total	21	15	3	10	49

AM = adult male, AF = adult female, FJ = female or juvenile, JU = juvenile. Infants were not included because they were never observed grooming and only once were groomed.

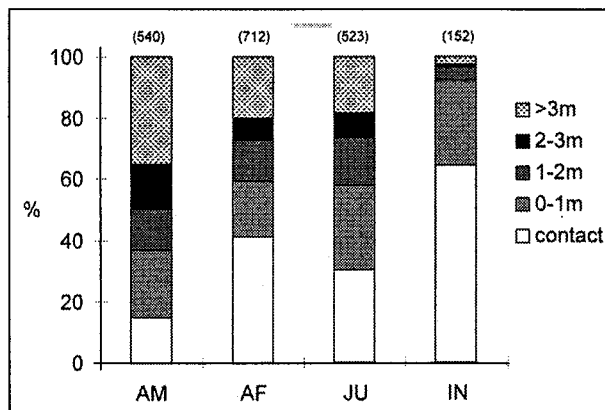


Figure 1. Distance to nearest individual (%). AM = adult male, AF = adult female, JU = juvenile, IN = infant. Total number of observations in parentheses.

cific: they were seen with males, other females, juveniles and, predictably, infants. Juveniles and infants were most often associated with adult females. Adult males kept to themselves most of the time, but were otherwise in association with adult females (Fig. 2).

An analysis of 49 grooming episodes revealed a significant asymmetry between groomers and groomed individuals ($\chi^2 = 29.98$, $df = 3$, $p < 0.0001$). Males acted significantly more as groomees than as groomers (Fisher test, AM x AF, $p < 0.0001$; AM x FJ, $p < 0.0001$; AM x JU, $p < 0.0001$). No other asymmetries were significant (AF x FJ, $p > 0.05$; AF x JU, $p > 0.05$; FJ x JU, $p > 0.05$). Adult females were responsible for most of the grooming. Infants were almost never groomed (see Neville [1972] who also noted very little grooming of infants in *A. seniculus*).

Play episodes were quite rare. We observed six (five dyadic and one triadic episode) involving eight juveniles, two infants, two females or juveniles, and an adult female. In all cases, at least one of the participants was immature (infant or juvenile).

Analyses of proximity and grooming reveal some relevant aspects of the social organization in *Alouatta fusca clamitans*. One interesting feature is the males' spatial relationship to the rest of the group. The adult males were habitually the most distant from all other members of the group; a feature which has also been observed for *Alouatta*

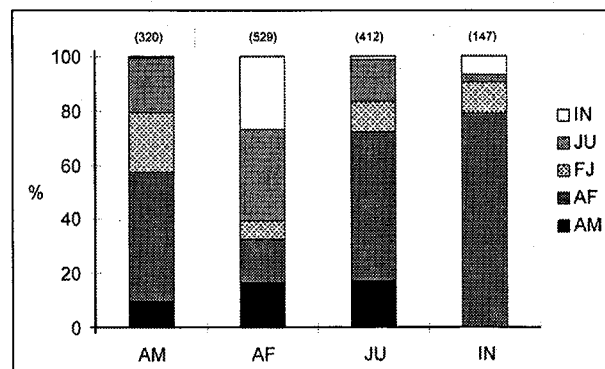


Figure 2. Identity of nearest individual (%). AM = adult male, AF = adult female, FJ = female or juvenile, IN = infant. Total number of observations in parentheses.

seniculus. Neville (1972) noted that males of this species were loosely attached to their groups, and Neville *et al.* (1988) also remarked that male howlers very rarely participated in the daily social interactions of other group members. The distancing of males in *A. f. clamitans* does not seem to us, however, to be a basis for inferring less influence on group organization. The groomer/groomee asymmetry, favoring adult males as recipients, would appear to be a clear indication of such an influence.

Adult females, on the other hand, also play an important role in the social dynamics of brown howler groups. By associating more equitably with other group members and by acting as the principal groomers (as was also related by Mendes [1989] and Chiarello [1995]), they can most effectively mediate social exchanges. Neville (1972) likewise noted the relevance of adult females in *A. seniculus* groups, giving emphasis to the grouping of females with their offspring.

It is usually assumed that subordinate primates groom dominants more than vice versa. This is indeed what occurs in black howler monkeys, *Alouatta caraya* (see Jones, 1983). In mantled howling monkeys, *Alouatta palliata*, however, Jones (1979) observed that the dominant individuals were the ones preferentially engaged in grooming. It seems to us that grooming interactions in brown howlers, at least those that occur among members of different gender/age classes, follow the usual primate pattern. The social structure of *A. f. clamitans* groups would appear to differ from that of *A. palliata*, while more similar to *Alouatta seniculus* and *A. caraya* (Neville *et al.*, 1988).

Inter-individual distances can be analysed with more precision using identified individuals as references (see Jones, 1982, for example). Using age and gender categories only, as in this study, however, can also provide important information for comparing *Alouatta* species, or the assessment of habitat and seasonal influences on group structure in a particular group or species.

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NEW DATA AND A HISTORICAL SKETCH ON THE GEOGRAPHICAL DISTRIBUTION OF THE KA'APOR CAPUCHIN, *CEBUS KAAPORI* QUEIROZ, 1992

José de Sousa e Silva Júnior
Rui Cerqueira

According to Lopes (1993), Lopes and Ferrari (1993, 1996), Ferrari and Queiroz (1994) and Ferrari and Lopes (1996), the Ka'apor capuchin, *Cebus kaapori* Queiroz, 1992, should be considered as the rarest and most endangered primate from eastern Amazonia. Rylands *et al.* (1995) considered this taxon as "vulnerable", following the Mace-Lande system criteria for the determination of its conservation status. This is, however, one of the least known of the Neotropical primates.

The rarity of the taxon has contributed to an insufficient knowledge about its original and current geographical distribution, being based as it is on only a few confirmed localities (Figure 1). A review of the literature showed that, from a historical perspective, the presence of an "untufted" *Cebus* form in Maranhão and eastern Pará was not known to the old naturalists (Abbéville, 1876 [1614]; Evreux, 1929 [1615, 1874]; Lisboa, 1967 [1625-1631]; Prazeres, 1891, see also Frade, 1966; Ávila-Pires, 1989, 1992), nor to XXth century zoologists who studied the mammals of the region (Thomas, 1920; Sneath, 1926; Krumbiegel, 1940; Vieira, 1957; Ávila-Pires, 1958; Carvalho, 1960; Carvalho and Tocheton, 1969; Pine, 1973; Fernandes and Aguiar, 1993), nor to those who carried out collections for biomedical research (Deane and Martins, 1952; Travassos and Kloss, 1958; Deane and Damasceno, 1961; Ferreira *et al.*, 1970).

Goeldi and Hagmann (1906), however, drew attention to the existence of "*Cebus capucinus*" in the region of Rios Capim and Acará, in the State of Pará. This record remained forgotten, however, until Queiroz (1992) identified and described *Cebus kaapori*. Queiroz (1992) restricted the current geographical distribution of the new taxon to western Maranhão, in the region located between the Rios Gurupi (in the west) and Pindaré (in the east). The limits of its range would coincide, as such, with the borders between Amazonian forest and the "Zona dos Cocais" (dominated by *Orbignya* palm tree) in the north/north-east, and savannah (*cerrado*) environments to the south. Queiroz (1992) considered the possibility that the species might also occur in some localities immediately adjacent to these limits.

Subsequently, Lopes (1993), Lopes and Ferrari (1996) and Ferrari and Lopes (1996) enlarged the geographical range, extending it to the northwest, based on direct observations and secure information on the occurrence of *C. kaapori* in five further localities: four from eastern Pará and a fifth from the Gurupi Biological Reserve, west of the Rio Gurupi in the state of Maranhão. The western limit was fixed as the right bank of the lower Rio Tocantins.

The southern limit was established to the north of the 4°S, due to the absence of the species in the faunistic inventory of the area affected by the Tucuruí dam (Mascarenhas and Puerto, 1988). The northern limit, in that case, would coincide with the borders between the forest and the coastal formations in Pará and Maranhão (Ferrari and Lopes, 1996, Fig.2b, p.56). Ferrari and Souza Júnior (1994) also suggested the existence of an "untufted" *Cebus* form in the Tocantins-Xingu interfluvium. This would discard the hypothesis of allopatry between taxa of this species group in the eastern Amazon, although this possibility remains to be confirmed.

New data on the geographical distribution of *Cebus kaapori* were obtained by M. A. Lopes and O. de Carvalho Júnior (see Carvalho Júnior *et al.*, in prep., for a preliminary census) during observations in eastern Pará, and through a compilation of the faunistic inventory results that have been conducted in Maranhão since 1989. The data come from direct observations and also accounts by local inhabitants.

In Pará, the species has been observed in the Fazenda Amanda, near the village of Japiim, municipality of Vizeu, in a well preserved primary forest fragment (about 6,000 ha, including areas from nearby ranches; M. A. Lopes, pers. comm.), and in primary forest in the Fazenda Cauaxi, municipality of Paragominas (O. Carvalho Jr., pers. com.). *Cebus apella* was also recorded in both localities.

In Maranhão, *C. kaapori* was observed twice (in 1994 and 1997) in the Fazenda MAPISA, about 60 km south-east from Buriticupu (minimum of one and three individuals together with a group of *Chiropotes satanas*, respectively). *C. kaapori* was also recognized as occurring locally by several informants in this and another two localities near to Santa Luzia. The informants commented spontaneously on its rarity. *C. apella*, on the other hand, was easily observed in all these localities. The observations of *C. kaapori* occurred in *terra firma* forest, with some history of logging and hunting pressure. A captive specimen was observed in Pio XII. The origin of the animal was attributed to the region of the lower Rio Grajaú, in the vicinity of the Lago Açu. Information from four people in Bacabal and Lago Verde also indicated the occurrence of *C. kaapori* in the region of the Rio Grajaú. This suggests that the geographical distribution of the taxon is wider than previously supposed. Queiroz (1992), Lopes (1993) and Lopes and Ferrari (1996) considered that the "Zona dos Cocais" could be a limiting factor, an ecological barrier to the species north and eastwards from the border established by Queiroz (1992). While this may be largely true, the evidence reported here suggests that its range may extend more to the north-east and south, along the patches of remnant forests of the Amazonian part of the "Zona dos Cocais" in the Pindaré-Grajaú interfluvium. The lower/middle Grajaú-Mearim and Mearim-Itapecuru interfluvia have been systematically inventoried. All other Amazonian primate forms that occur in Maranhão have distributions that reach as far as at

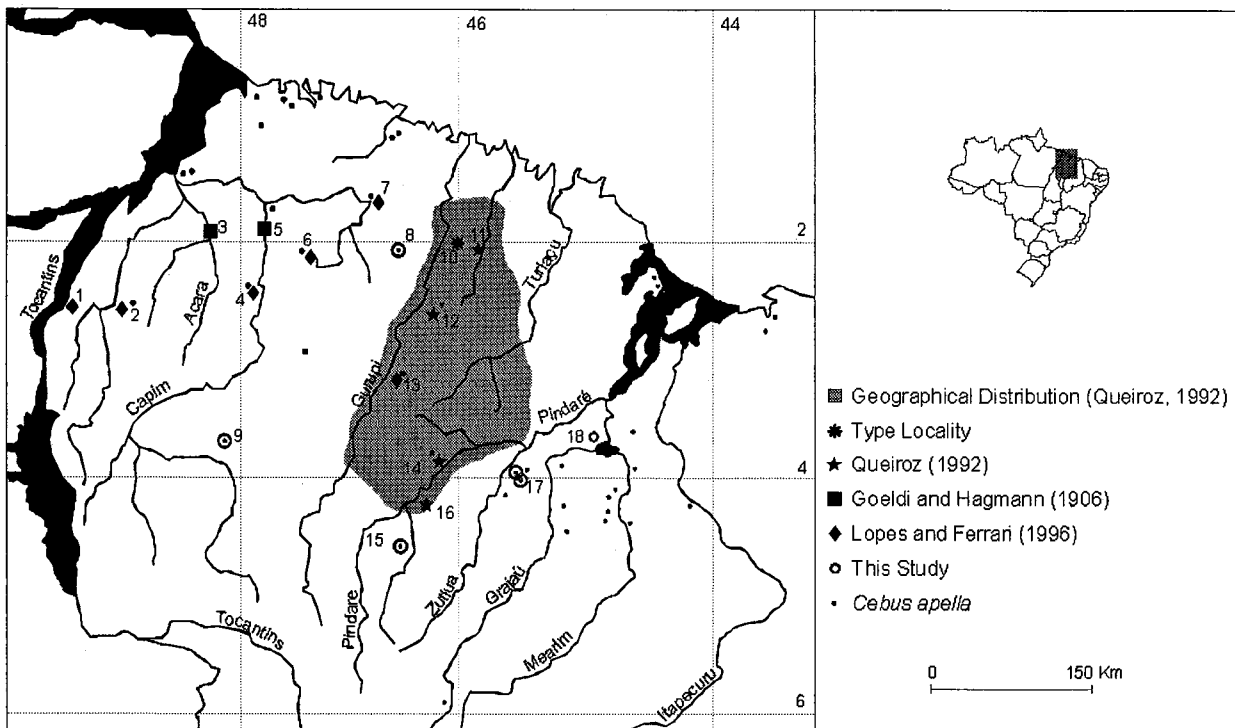


Figure 1. Localities for *Cebus kaapori* in eastern Pará and middle-western Maranhão. PARÁ: 1. Mocajuba, 02°35'S, 49°30'W; 2. CRAI Dendê, municipality of Tailândia, 02°30'S, 48°50'W; 3. Rio Acará (arbitrarily restricted to 01°54'S, 48°15'W); 4. Fazenda Badajós, municipality of São Domingos do Capim, 02°33'S, 47°47'W; 5. Rio Capim (arbitrarily restricted to 01°53'S, 47°45'W); 6. Fazenda São Marcos, municipality of Irituia, 02°13'S, 47°20'W; 7. Fazenda São Sebastião, municipality of Garrafão do Norte, 01°52'S, 47°00'W; 8. Fazenda Amanda, municipality of Vizeu, around of 02°05'S, 46°30'W; 9. Fazenda Cauaxi, municipality of Paragominas, 03°45'S, 48°10'W; MARANHÃO: 10. Garimpo Chega-Tudo, municipality of Carutapera, 02°30'S, 47°30'W (type locality); 11. Garimpo Limão, about 02°15'S, 46°41'W; 12. Aldeia Gurupiúna, Reserva Indígena Alto Turiaçu, 02°40'S, 46°20'W; 13. Reserva Biológica de Gurupi, 03°25'S, 46°45'W; 14. Posto Indígena Awá (paratype locality), Reserva Indígena Caru, about 03°54'S, 46°35'W (from Queiroz, 1992); 15. Fazenda MAPISA, municipality of Buriticupu, about 04°36'S, 46°30'W; 16. Fazenda Varig, about 47°03'S, 04°39'W (from Queiroz, 1992); 17. Santa Luzia, two localities around of 03°58'S, 45°31'W; 18. Lower Rio Grajaú, near to Lago Açu, about 03°43'S, 44°58'W.

least part of the Mearim-Itapecuru interfluvium. While *Cebus apella* was observed relatively easily in many localities (using a variety of habitats, including highly degraded areas), *C. kaapori* can be considered practically absent, from the right bank of the Rio Grajaú, eastwards. However, more surveys will be carried out in the southernmost parts in order to check this. The two *Cebus* species are sympatric in almost all of *C. kaapori* localities, although actual syntopy has not been verified.

The taxonomic status of *C. kaapori* has been questioned due to its close relationship with *C. olivaceus* populations from the north bank of the Rio Amazonas and the island of Caviana (Anon., 1993; Harada, 1994; Harada *et al.*, 1995; Masterson, 1996). This is an issue for further discussion (Silva Júnior and Cerqueira, in prep.). However, whether a species or subspecies, the Ka'apor capuchin continues as a valid taxon.

The enlargement of the range which was suggested by Queiroz (1992) and Ferrari and Lopes (1996) does not improve its conservation status as it involves highly degraded areas in both of the states. It is important that mammalogists with access to the region continue to accumulate data that will aid in the reconstruction of the original and current geographical distribution of this taxon in

order to contribute to the establishment of monitoring programs for the remnant populations.

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INTERGROUP INFANT TRANSFER AMONG RED HOWLERS, *ALOUATTA SENICULUS*, IN VENEZUELA: ADOPTION OR KIDNAPPING?

Govindasamy Agoramoorthy

Episodes of infant adoptions have been reported in several species of primates (Thierry and Anderson, 1986). Infant kidnapping has also been reported for a number of free-ranging Old World primate species including *Papio anubis* (v. Ownes, 1975), *Presbytis entellus* (v. Sugiyama, 1965, 1966; Hrdy, 1978; Mohnot, 1980), *Macaca fuscata* (v. Itani, 1959), *Macaca radiata* (v. Rahamann and Parthasarathy, 1962), *Cercopithecus aethiops* (v. Lancaster, 1971), *Pan troglodytes* (v. Goodall, 1968), and *Gorilla gorilla* (v. Fossey, 1976). Although infant adoptions have been previously reported among howlers (Agoramoorthy and Rudran, 1992), no information is available on the behavior of infant kidnapping and its consequences among group living New World cebids in the wild. A field study on red howler (*Alouatta seniculus*) social behavior was carried out by the author during 1989-94 at Hato Masaguaral, Venezuela (Agoramoorthy, 1994, 1995, 1997) and several cases of male invasions followed by infanticide were observed (Agoramoorthy and Rudran, 1995), as well as three cases of infant adoptions (Agoramoorthy and Rudran, 1992). This paper describes an unusual case of intergroup infant transfer among red howlers.

Two red howler social groups numbered '6' and '7' were neighbors, and their home ranges overlapped. During the first week of April 1994, group 7 was comprised of 11 individuals, with two adult males, three adult females, one subadult female, two large juvenile males, one medium-sized juvenile male, one small juvenile male and one male infant (approximately 3 months old). On 10 April 1994, female #3 of group 7 was captured with her infant (#3.5) using chemical immobilization methods described previously by Agoramoorthy and Rudran (1994). Both mother and infant were marked with color-coded tags on both ears for visual identification. The female was an old adult, aged approximately 11 years. During early April 1994, group 6 was comprised of 12 individuals, with one adult male, four adult females, one large juvenile male, one large juvenile female, two small juvenile males, one small juvenile female, and a pair of approximately four month-old male infant twins. An adult female #4, approximately four years old was observed with these new born twins on 10 December 1993. According to the life history data, the female #3 of group 7 and female #4 of group 6 were not related.

On the morning of 20 April 1994 at 0830, groups 6 and 7 were seen in nearby trees within 20 meters of each other, and howled at each other for 25 minutes. Subsequently individuals of group 6, including female #4 with her infant twins, chased group 7. As a result, group 7 individuals were forced to move away from the area, and group 6 stayed and fed in the tree. The observation ended at mid-day. On the next morning when group 7 was contacted again, the infant #3.5 of female #3 was missing. After two hours of searching, the infant was found in the neighboring group 6 with female #4. How and why the infant was adopted or kidnapped by female #4 of group 6 was not known. Infant #3.5 was carried dorsally by female #4 of group 6, while her infant twins were carried ventrally. A large juvenile female was also observed to carry the adopted/kidnapped infant on a few occasions. No other individuals of group 6 participated in transporting or handling the infant. Although female #4 allowed the new infant to stay in body contact with her, it was not observed suckling.

From the morning of 21 April, the mother of infant #3.5 was seen wandering alone on the periphery of her group's range but moving towards the direction of group 6. She was not involved in the social activities in her group. On the next day, in the evening, she twice attempted to approach female #4, but she was chased away by the females. On both occasions, female #3 was alone and her group was not in the vicinity. At dusk, group 7 individuals were seen near group 6 and they later settled down to sleep with no apparent aggressive encounters. On the morning of 23 April at 0725, groups 6 and 7 were observed 15 meters apart and howling at each other. Ten minutes later, adult males and females of group 7, led by female #3, approached group 6 individuals and chased them away. A moment later, infant #3.5 was seen unattended by members of group 6 and it was vocalizing mildly. The mother approached the infant, and sniffed its head, body and genitals, and the infant immediately clung to the belly of its mother. It appeared to be weak and had probably been starved for the last two days.

Although it has been suggested that lactating young adult females with infants are most likely to adopt or kidnap infants than females without infants (Silk, 1980), the involvement of a mother of twin infants in adopting or kidnapping has never been reported previously for any non-human primate. Several hypotheses have been proposed regarding the causes and function of infant kidnapping, but the costs and benefits of such behavior are almost impossible to measure quantitatively (Hrdy, 1976). A number of benefits, including improved foraging for the mother after losing the infant to the kidnapper were suggested by Hrdy (1976). The female in this study, however, did not evidently gain any extra time for feeding or grooming. In fact, she isolated herself and did not participate in any social activities. This may have been due to psychological trauma and stress after losing her infant. A female long-tailed macaque was also reported to have shown high stress

levels after frequent kidnapping of her infant (Schaik *et al.*, 1991). After losing their infants due to infanticide red howler females have been observed to isolate themselves from other group members (Agoramoorthy and Rudran, 1992, 1995). Furthermore, in rhesus macaques, an adult female became ill after persistent attempts by another female to kidnap her infant (Hinde and Spencer-Booth, 1967). Lack of maternal intervention to retrieve kidnapped infants has been recorded in a number of captive as well as free-ranging primates (Maestriperi, 1993). The red howler female in this study, however, attempted unsuccessfully to retrieve her infant on at least two occasions.

In Hanuman langurs at Jodhpur, frequent interactions with neighboring social groups increase the frequency of infant kidnapping in cases where a large part of the groups' home ranges overlap (Mohnot, 1980). All 38 cases of langur infant kidnapping reported by Mohnot (1980) occurred during intergroup interactions in areas of home range overlap. Similar to Hanuman langurs, the home ranges of the red howler groups at Hato Masaguaral also overlap extensively (Agoramoorthy and Rudran, 1992, 1993, 1995), but the frequency of infant kidnapping appears to be low since no cases have been reported previously. This may be due to vigilance by the females, which are observed to defend their infants aggressively from attacking males (Agoramoorthy and Rudran, 1992, 1995; Agoramoorthy, unpubl. data).

A large juvenile female also carried the new infant on a few occasions and probably gained some experience in practicing mothering, an advantage cited for Hanuman langurs (Mohnot, 1980). The adopted/kidnapped infant was not physically harmed by members of group 6, but it was not observed to suckle, and after two days became weak and unable to move properly until it was picked up by its mother. This indicates that the adoptee/kidnapper had neglected the infant. The implications of the adoption/kidnapping described here are difficult to ascertain, but it appears that competition among females between groups may have played a role. Furthermore, in red howlers, both males and females routinely disperse and immigrate into new social groups (Crockett, 1984; Pope, 1992; Agoramoorthy and Rudran, 1993, 1995). Thus competition among females as well as males is severe among red howlers and this might have contributed, and deserves attention for future research.

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neotropical primates in "Chapter XXV. On the little monkey cats" (*Capítulo XXV. De los Gatos Monillos*). In this, he described how monkeys throw objects such as branches and stones at the "Christians", and recounts their variety in colors and shapes, from ones as small as a human hand to some as large as a Great Dane (Fernández de Oviedo, 1996). He also reported that monkeys use tools as follows "Some of these cats (monkeys) are so astute that many things they see men do, they imitate and also do. In particular, there are many that when they see how to smash a nut or a nutpine with a stone, do it in the same way and, when leaving a stone where the cat (monkey) can take it, smash all that are given to them. They also throw a small stone, of the size and weight of their strength, as would be thrown by a man" [*Algunos de estos gatos (monos) son tan astutos, que muchas cosas de las que ven hacer a los hombres, las imitan y hacen. En especial hay muchos que así como ven partir una almendra o piñón con una piedra, lo hacen de la misma manera, y parten todos los que les dan, poniéndole una piedra donde el gato (mono) la pueda tomar. Asimismo tiran una piedra pequeña, del tamaño y peso que su fuerza basta, como la tiraría un hombre*] (Fernández de Oviedo, 1996).

This is probably the first report (1526) of tool use by New World monkeys. Since Fernández de Oviedo traveled mainly in the Darien region, it would seem likely that the specific reference could have been to *Cebus capucinus*, a neotropical primate of a genus with the greatest potential to manipulate objects. This historic occurrence agrees with recent known examples of tool use by *Cebus* in the wild, including that of Fernandes (1991) to open oysters, and nut-cracking using stones reported by Langguth and Alonso (1997), and specifically for *Cebus capucinus*, with the use of stones to open oyster shells by J. Hernández-Camacho and R. Cooper (in Moynihan, 1976), the use of a club against a snake (Boinski, 1988), and the recent report of object-use for extractive foraging (Panger, 1998).

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AN EARLY REPORT ON TOOL USE BY NEOTROPICAL PRIMATES

Bernardo Urbani

Some of the early reports of tool use in *Cebus*, dating from the 18th and 19th Century, were summarized by Visalberghi (1990). Here I bring attention to probably the earliest report of such behavior, coming from the writings of Gonzalo Fernández de Oviedo y Valdés (1478-1557), born in Madrid, Spain. He first arrived in the New World with the expedition of Pedrarias Dávila (Miranda, 1996) and lived mainly in the Darien region (today Panama and northwestern Colombia). For his services to the Spanish Crown, Fernández de Oviedo was appointed Chronicler of the Indies by King Carlos V, who ordered him to "rest and write". This was a satisfactory arrangement for Fernández de Oviedo who in his retreat in Santo Domingo (today the Dominican Republic) occupied his time writing the "General and Natural History of the Indies" (*Historia General y Natural de Indias*), the first part of which was published in 1535 (Miranda, 1996).

Another, poorly known but no less important, work of his, the "Summary of the Natural History of the Indies" (*Sumario de la Natural Historia de las Indias*), was also written by order of King Carlos V, who requested a book on zoological and botanical aspects of the New World. The first edition was published in Toledo, Spain, on 15 February, 1526, and contains one of the first accounts of

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VERTEBRATE PREDATION IN COMMON MARMOSETS

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Cláudio Embirussu Barreto

Marmosets are sometimes characterized as "gumivores" or "gumivore-insectivores" (Rylands and de Faria, 1993). This is a fitting description given that some species may spend as much as 70% of their feeding budget on gums and maintaining tree gouges (*Callithrix penicillata*; Fonseca and Lacher, 1984, *C. jacchus*; unpubl. data). Similarly, marmoset species spend between 24-30% of their overall activity budget foraging for insects (Rylands and de Faria, 1993). However, in addition to these key food items, marmosets exploit a wide variety of different food sources, including fruits, seeds, flowers, fungi, nectar, spiders, snails, and vertebrate prey (Stevenson and Rylands, 1984; Ferrari *et al.*, 1996). It is the ability to adopt an opportunistic and varied diet that, in part, allows marmosets to survive in such habitats as the highly unpredictable *caatinga* (dry thorn scrub) and *cerrado* (bush savanna), in addition to rich coastal and Amazonian forests.

Here we focus on the role of vertebrate prey in the diet of the common marmoset (*Callithrix jacchus*). Three common marmoset groups were studied for a total of 36 "group-months" at EFLEX-IBAMA, an experimental forestry station at Nísia Floresta, Rio Grande do Norte, Brazil. Two groups occupied ranges in a 70 ha Atlantic forest reserve, while the third lived in a plantation area. Data were collected using both 30-minute focal-animal samples (during periods when there were no infants less than 2 months old) and all-day scan sampling using a 5-minute interval (when infants were present). Rare behaviors, including vertebrate predation, were recorded *ad libitum* (for details see Digby and Barreto, 1993).

Vertebrate predation was rare in common marmosets, resulting in less than 0.1% of all feeding records (0.6% of all animal prey records). Nevertheless, marmosets were seen eating a wide variety of vertebrate prey, including lizards (n = 1), tree frogs (n = 1), bird's eggs (n = 2 nests), nestlings (n = 1), and infant mammals (n = 1).

The predation of an infant mammal is of particular note as it is the only case reported, that I am aware of, in the wild. It was flesh colored, almost hairless, and estimated to have been 3-4cm long, not including its long tail, and was probably a rodent, but more specific identification was impossible as the head had already been consumed when first sighted. The remainder of the corpse was eaten within a couple of minutes of the first sighting. During the consumption of this prey item, other group members vocalized excitedly and tried, without success, to steal a part of the infant mammal for themselves. Though this is the first mammalian predation by a callitrichid reported for a free ranging marmoset group, at least three captive studies have noted that callitrichids will readily eat infant mice that are fed to them (*C. jacchus* - Stevenson and Poole, 1976; *L. rosalia*: Brown and Mack, 1978; *Callimico goeldii*: Heltne, 1981). Both the wild and captive marmosets eat the head of the prey item first. Craniocervical bites are the typical method of killing used by marmosets (and most mammals) to subdue relatively large prey (Steklis and King, 1978; pers. obs.).

The consumption of lizards and frogs is widespread among callitrichids (see Table 1), but the extent to which they are preyed upon varies between species. Neyman (1978) observed a single predation on a frog in 750 hours of observation of the cotton-top tamarin, *Saguinus oedipus*, and Yoneda (1984) recorded saddle-backed tamarins, *S. fuscicollis*, eating just one frog and one lizard over the course of six months. Similarly, lizards and frogs are only rarely eaten by common marmosets. Alonso and Langguth (1989) observed predation on lizards on three occasions over 13 months, and Maier *et al.* (1982) a single lizard predation during 100 hours of observation. In contrast, frogs and lizards constitute almost 16% of the animal diet of the buffy-headed marmosets, *C. flaviceps* (Ferrari 1988; n = 195 lizards and frogs over a 13 month period). Terborgh's (1983) study of tamarins in Peru indicates that interspecific variation in predation can occur even in sympatric species which presumably have similar access to prey items. He reported that 13% of the saddle-back tamarin diet was comprised of frogs and lizards compared to only 2% for the emperor tamarin, *S. imperator*. Stephen Ferrari (pers. comm.) is currently making a detailed analysis of interspecific variation in vertebrate predation by marmosets and tamarins.

The consumption of lizards, frogs, and small mammals appears to be rare and opportunistic in common marmosets. In contrast, the hunting of bird's eggs and nestlings, though also rare, appears to be more deliberate. Marmosets were seen on 10 different occasions to seek out and inspect bird nests (typically those of caciques, *Cacicus cela*, and kiskadees, *Pitangus sulphuratus*). On several occasions, one group member after another would approach and inspect a nest, sometimes manipulating openings in order to look inside. Kiskadees, caciques, gnatcatchers (*Poliophtila plumbea*), and other birds were observed mobbing marmoset groups on at least seven occa-

Table 1. Vertebrate Predation in Callitrichid Primates.

Species	Frogs	Lizards	Nestling birds	Bird's eggs	Mammals	Reference
<i>Callithrix jacchus</i>	x	x	x	x	x	This study, Alonso & Langguth (1989), Maier <i>et al.</i> (1982)
<i>C. flaviceps</i>	x	x	x	x		Ferrari (1988)
<i>C. kuhlii</i>	x	x				Rylands (1989)
<i>C. intermedia</i>	x	x				Stevenson & Rylands (1988)
<i>C. aurita</i>				x		Muskin (1984)
<i>Saguinus fuscicollis</i>	x	x				Terborgh (1983), Yoneda (1984), Peres (1993)
<i>S. mystax</i>		x				Peres 1993
<i>S. f. illigeri</i>	x	x				Soini (1987)
<i>S. imperator</i>	x					Terborgh (1983)
<i>S. oedipus</i>	x					Neyman (1978)
<i>S. geoffroyi</i>		x				Dawson (1976) in Sussman & Kinzey (1984)
<i>Leontopithecus rosalia</i>	x	x		x		Coimbra-Filho & Mittermeier (1973), Dietz <i>et al.</i> (1997)

sions, suggesting that the marmosets were recognized predators of the eggs and young of these species. Predation upon bird's eggs and nestlings appears to be less widespread across the Callitrichidae, with only buffy-headed marmosets, buffy-tufted ear marmosets (*C. aurita*) and golden lion tamarins reported as consuming this type of prey (Ferrari, 1988; Muskin, 1984; Dietz *et al.*, 1997).

Vertebrate predation has been described for a number of primate species (Butynski, 1982) and appears relatively widespread among the callitrichids (Table 1), although its importance in terms of their diet is not currently understood. A more thorough reporting and description of vertebrate predation (and its possible correlates) will contribute yet another important piece to the callitrichid puzzle. The ability to exploit a wide range of food sources, again exemplifies the impressive flexibility of the marmosets and tamarins.

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News

FEEDING ECOLOGY OF *CALLITHRIX AURITA* IN A FOREST FRAGMENT OF MINAS GERAIS

A Master's thesis entitled "Feeding Ecology of the Buffy-Tufted-Ear Marmoset, *Callithrix aurita* (Callitrichidae, Primates) in a Forest Fragment" was defended on 5 August 1998, by Milene Moura Martins at the Paulista State University (UNESP/Rio Claro). The study was supervised by Dr. Nivar Gobbi and Dr. Eleonore Z. F. Setz. It was sponsored by the Brazilian Higher Education Authority (CAPES), Brasília, and Fundação MB/FUNCAMP, Campinas. The following is a summary of the thesis.

This study, carried out from October 1994 to September 1995, focused on the seasonality of feeding behavior of a group of four buffy-tufted-ear marmosets (*Callithrix aurita*). The study site was a semideciduous 17-ha forest fragment located in Fazenda Lagoa, in the municipality of Monte Belo, in the south of the state of Minas Gerais (21°23'S, 46°15'W). Two physiognomically distinct regions were found in the fragment: the northeast (flat, sunny and dry) and the south (steep, shadowy and moist). Each region was divided in two sub-regions: edge and interior. The edge was defined as the outermost 40m strip and the

interior the remaining area. Data on feeding behavior were collected by scan sampling at five-minute intervals. Each scan lasted one minute. The identity and activity of each visible individual and the location of the group were recorded. Invertebrate abundance was estimated monthly using sweep nets (about 120m) and pit-fall traps (n = 5) in each sub-region.

A total of 79 days (305.4 hours) was spent in direct observation of the group. A total of 8,240 records were obtained in 3,416 scans. Average annual activity pattern was: traveling (41%), resting (33%), foraging (8%), feeding (6%) and social activities (12%). There was no significant difference between seasons. The main foods were gums (46%), invertebrates (22%) and fruits (11%). Leguminosae, Meliaceae, Moraceae and Cactaceae were the main plant families in the diet. *Acacia paniculata* (Leguminosae), an abundant liana, was the main gum source, representing 83% of gum feeding time. Of 12 fruiting species, the highest ranking consumed was *Maclura tinctoria* (Moraceae), a small, many-seeded berry. Caterpillars were the invertebrate item most preyed upon, followed by katydids. Among food resources, only fruits were consumed significantly more in the wet season than in the dry season. The monthly predation rate on caterpillars was positively correlated with the availability of large larvae (>2 cm long). Associations between marmosets and *Labidus* sp. (Ecitoninae, Formicidae) army ants were recorded only during the drier months.

The group occupied a home range of 16.5 ha and traveled a mean daily distance of 986 meters. There was no seasonal variation in either. The northeast region was used more in comparison to the southern region, with a higher concentration of quadrats with >2% of occupation records in both seasons. Spatial distribution of foraging records was not associated with invertebrate abundance. Sub-regions presenting high invertebrate abundance (moist interior in the wet season and moist edge in the dry season) were not used more for foraging than others with lower abundance. The spatial distribution of the small number of fruiting trees had little influence on the pattern of space use while the distribution of *Acacia paniculata* (n = 67 and 61) seemed to be the main factor determining ranging.

The study demonstrated the buffy-tufted-ear marmoset's ability to exploit abundant (*Acacia* gum) and temporary (fruits, insects) foods. Edge habitats presented higher invertebrate biomass, corroborating other studies (Buskirk and Buskirk, 1976; Fowler *et al.*, 1983), but, in this study, it was not associated with the spatial distribution of foraging activities. Furthermore, local environmental conditions are very important in the definition of intra-specific differences in feeding ecology of *C. aurita* groups (see Ferrari *et al.*, 1996).

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An association was noted between affiliative behaviour and births (the presence of infants was found to increase group cohesiveness, even amongst unrelated individuals) and between agonistic behaviour and changes in the group composition. Social structure and stability was highly variable between and within groups, even though all groups were found to maintain a regular food supply throughout the year through their tree-gouging and gum-feeding.

* In collaboration with Dr. Christopher Faulkes and his team at the Institute of Zoology, Zoological Society of London.

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PRIMATES IN THE DESENGANO STATE PARK, RIO DE JANEIRO, BRAZIL

The Desengano State Park of 22,400 ha in the north of the state of Rio de Janeiro (21°46'-21°58'S, 41°37'-41°58'W), protects montane Atlantic forest in the municipalities of Santa Maria Madalena, São Fidélis and Campos (Fig. 1). It was created in 1970, and is now the largest remaining forest remnant in the region. The predominant vegetation there is dense, humid, evergreen, upland forest, between altitudes of 500 to 1,500 m above sea level. The flora is extremely diverse and rich, including ferns, orchids, bromeliads, palms, and such species as the jequitibá (*Cariniana*), maçaranduba (*Persea*), paineira (*Chorisia*), angelim (*Andira*), and bicufba (*Virola*).

Three primate species have been recorded for the Park over the last 16 years, the brown howler monkey, *Alouatta fusca clamitans*, the miquiqui, *Brachyteles arachnoides*,

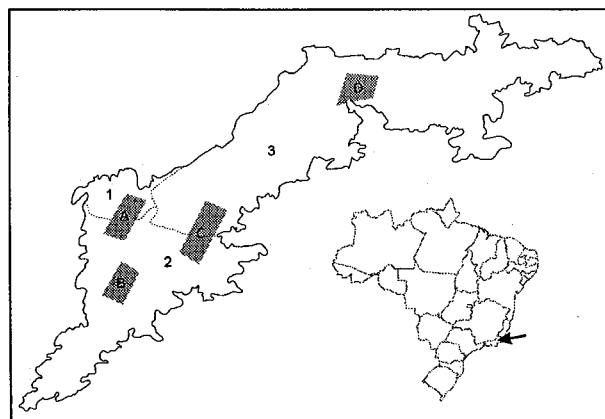


Figure 1. Map of the Desengano State Park. The areas indicated are those where *Brachyteles* has been observed in the past. A - Morumbeca; B - Ribeirão Vermelho; C - Forquilha; D - Mocotó; 1 - São Fidélis; 2 - Santa Maria Madalena; 3 - Campos.

COMMON MARMOSETS AT TAPACURÁ, PERNAMBUCO, BRAZIL

On 18 June 1998, Maria Adélia Oliveira Monteiro da Cruz, defended her doctoral thesis "Reproductive Dynamics of a Population of Common Marmosets (*Callithrix jacchus*) at the Ecological Station of Tapacurá, Pernambuco" at the Institute of Psychology of the University of São Paulo, São Paulo. Her supervisor was Prof. César Ades, and the study was supported by the Higher Education Authority (CAPES), FACEPE, the Brazilian National Science Council (CNPq), and PIBIC of the Federal Rural University of Pernambuco, Recife. The following is an abstract of the thesis.

The study of the reproductive dynamics of a population of common marmosets (*Callithrix jacchus*) in the Alto da Buchada forest patch in the Ecological Station of Tapacurá, Pernambuco, was carried out over 30 months, from January 1994 to May 1996. Records were maintained of body weights, births, migrations and the social behaviour of five target groups, four peripheral groups and two temporary groups. The genetic relatedness of the group members was studied using skin samples through mitochondrial DNA sequencing*. Body weights were higher in the dry season. Births (59% twins) occurred throughout the year, although fewer were recorded during transitions between seasons. Births were not synchronised among the groups. The reproductive females were receptive throughout the year. There was little fluctuation in group size. Mean group size for the five target groups was 6.95 individuals, containing in all cases at least one adult female and two adult males. Migration between groups was solitary or in pairs, both apparently forced as well as spontaneous, and in some cases individuals later returned to their original groups. Migrations occurred in both the dry and wet seasons. Females dispersed more than males. Genotype diversity was relatively high, which suggested that genetic divergence may be a criteria for mate selection.

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and the brown capuchin, *Cebus apella nigratus*. *A. fusca* is the best known species and the most widespread in the region. In May 1982, a group of five individuals were observed eating fruits and young leaves of *Cecropia* sp. *C. apella*, although considered common, is rarely seen. On 11 August 1985, I observed two dead capuchin monkeys in a hunters camp at the locality of Ribeirão Vermelho. Aguirre (1971, p. 49) estimated a population of 150-170 *B. arachnoides* in the Desengano State Park, in the area referred to as "Matas Morumbeca". Today local people are unanimous in confirming that it has disappeared from the Desengano State Park as well other localities nearby including, for example, Ribeirão Vermelho, Forquilha, and Mocotó. This, however, does not necessarily mean that they are extinct in the region. There are a number of areas, visible when flying over the Park by helicopter, which are remote, of difficult access due to gorges and steep and narrow valleys, and which maintain relatively intact forest, where *B. arachnoides* may still survive. Surveys, and research and environmental education programs, are urgently needed for this important Atlantic forest refuge.

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THE STATUS OF THE PIED TAMARIN, *SAGUINUS BICOLOR*

Rosana Junqueira Subirá defended her Master's thesis on a survey of the distribution and status of the pied tamarin, *Saguinus bicolor bicolor*, for the postgraduate program in Ecology at the University of Brasília, on 24 September 1998. Her supervisors were Prof. Cléber J. R. Alho and Dr. Claudio Valladares-Padua, and the thesis was supported by the Brazilian Science Council (CNPq), the Fundação O Boticário de Proteção à Natureza, and the "Working Group for *Saguinus bicolor*" of the Brazilian Institute for the Environment (Ibama). The following is an abstract of the thesis.

The pied tamarin (*Saguinus bicolor bicolor*) is considered one of the most endangered of the New World primates. It is threatened due to the expansion of the rapidly-growing city of Manaus, capital of the state of Amazonas, and due to its very restricted distribution. The aim of the study was to survey the populations within the metropolitan region of Manaus, and examine the extent of its geographic range. With the help of satellite images, all forest fragments were visited in the city of Manaus, and existing threats were evaluated. Its status in Manaus is highly precarious due to urban expansion, and the few remaining populations are becoming increasingly reduced, fragmented and isolated. However, the metropolitan region of Manaus (377.4 km²) comprises only 5.03% of its

geographic range, and was not considered to represent the major threat to the subspecies as a whole, this coming principally from the evidently expanding distribution of the golden-handed tamarin, *Saguinus midas*, which now occupies large areas where *S. b. bicolor* existed in the past, as evidenced by the surveys of Silvia Egler and José Márcio Ayres in the early 1980s (Ayres *et al.*, 1980, 1982; Egler, 1983, 1986). A total of 173 localities were investigated in order to delimit its geographic distribution. The current range extends from the Rio Negro, as far north as the left bank tributary, the Rio Cuieiras, east to the Rio Urubú, and only as far north as Km 35 on the BR174 highway. The total geographic range was estimated at 7.500 km².

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ECOLOGY OF THE BLACK LION TAMARIN

Fernando de Camargo Passos defended his doctoral thesis, entitled "Activity patterns, diet and range use in a group of black lion tamarins (*Leontopithecus chrysopygus*) in the Ecological Station of Caetetus, São Paulo", in the Postgraduate Program in Ecology and Natural Resources, at the Federal University of São Carlos (UFSCar), São Carlos, São Paulo, Brazil. His supervisor was Prof. Clebér José Rodrigues Alho, and the study was supported by the World Wide Fund for Nature (WWF-Brazil), Brasília, the Fundação O Boticário de Proteção à Natureza, São José do Pinhais, Paraná, the Jersey Wildlife Preservation Trust (JWPT), Jersey, and the Lincoln Park Zoo Scott Neotropic Fund, Chicago, Illinois, the Brazilian Higher Education Authority (CAPES) and the São Paulo State Research Support Foundation (FAPESP). The following is a summary of the thesis.

The activity patterns, diet and range use were studied in a group of black lion tamarins (*Leontopithecus chrysopygus*)

in the Ecological Station of Caetetus (22°15'-22°33'S, 49°30'-49°45'W, 2,178 ha), in the central-west of the state of São Paulo, during 15 months from August 1993 to September 1996. The group was followed using radiotelemetry over 15 months, totalling 550 hours of direct observation. Five categories of behavior were quantified through scan sampling: traveling, resting, foraging for animal prey, feeding, and "others". There were significant differences in the time spent in these behaviors between the wet and dry seasons. Fruits were the most important item in the plant part of the diet in the wet season. Of the 46 plant species providing fruits, five contributed the majority throughout the year: *Syagrus romanzoffiana*, *Rhamnidium elaeocarpum*, *Celtis pubescens*, *Ficus trigona*, and a *Ficus* sp. In the dry season exudates were more important. Of the 18 species providing exudates, that of *Euterpe edulis* was eaten most frequently. The group's home range was estimated at 276.5 ha. (all 50 x 50 m quadrats entered) or 394 ha (estimated from the periphery).

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Reference

Passos, F. de C. 1997. Padrão de atividades, dieta e uso de espaço em um grupo de mico-leão-preto (*Leontopithecus chrysopygus*) na Estação Ecológica dos Caetetus, SP. Doctoral thesis, Universidade de São Carlos, São Carlos. 114pp.

THREATENED SPECIES LISTS FOR BRAZILIAN STATES

The Secretary of the Environment of the state of Rio de Janeiro has published the "Official List of Species Threatened with Extinction in the State of Rio de Janeiro" (Edict of the State Secretariat for the Environment [SEMA], No.1, 4 June 1998: *Diário Oficial do Estado do Rio de Janeiro*, 24 (102 - Part 1): 9-16, 5 June 1998). The Rio de Janeiro state list includes 257 species of: Cnidaria (3), molluscs (7), crustaceans (13), insects (47), Diplopoda (1), freshwater fishes (39), sea fishes (9) amphibians (4), reptiles (9), birds (82) and mammals (43). It was drawn up following a workshop held at the Ecology Sector of the State University of Rio de Janeiro in December 1997 which involved the collective brainstorming of more than 60 zoologists.

This workshop also resulted in a major report, as yet unpublished, reviewing the status of the threatened species in Rio de Janeiro, and including suggestions and priorities for their protection (Bergallo *et al.* 1998). In Portuguese, it includes the following chapters: Introduction: Threatened species lists: Regional discrepancies and the importance and meaning of the lists - Helena de G. Bergallo & Carlos F. D. da Rocha; The decline of animal populations, the degradation of their habitats and conservation priorities: Species or habitats? - Carlos F. D. da Rocha; Fragmentation of the Atlantic forest in the state of Rio de Janeiro and the loss of biodiversity - Kenny Tanizaki & Timothy P. Moulton; Conservation status of the fauna of the state of Rio de Janeiro: Methodology for evaluation

- Monique van Sluys *et al.*; Aquatic invertebrates - Timothy P. Moulton *et al.*; Terrestrial invertebrates - Luiz S. Otero *et al.*; Fishes - Rosana Mazzoni *et al.*; Amphibians - Ulysses Caramaschi *et al.*; Reptiles - Carlos F. D. Rocha *et al.*; Birds - Maria Alice S. Alves *et al.*; Mammals - Helena de G. Bergallo *et al.*; Proposal for environmental conservation policy for the state of Rio de Janeiro - Ibsen de G. Câmara & Ademar F. Coimbra-Filho.

This is the fourth Brazilian state to draw up species' lists of threatened animals, the first being Paraná in February 1995 (State Law 11.067, 17 February 1995) (Brazil, Paraná, SEMA, 1995a). The list for Paraná includes 21 mammals, 117 birds, 12 reptiles, and 17 butterflies. Paraná also published its list of threatened plant species in the same year (Brazil, Paraná, SEMA, 1995b). The second state was Minas Gerais (Deliberation of the State Council for Environmental Policy [COPAM], 20 January 04/195, in *Minas Gerais, Orgão Oficial dos Poderes do Estado, Diário Executivo, Legislativo e Publicações de Terceiros*, (14, part 1): 1-4, 20th January 1996; Lins *et al.* 1997; Machado *et al.* 1998). The Minas Gerais state list includes 40 mammals, 83 birds, 10 reptiles, 11 amphibians, three fishes, 27 insects (one bee, 20 butterflies, one beetle, five dragonflies), *Peripatus acacioi* (Onychophora), and three earthworms (Oligochaeta). Finally, the state of São Paulo published its threatened species' list in February, 1998 (State Decree No. 42.838, 4 February 1998; *Diário Oficial do Estado de São Paulo* 108(25):1-7, 5 February 1998), as part of its State Program for the Conservation of Biodiversity (PROBIO/SP). The list, the result of a workshop held in São Carlos in December 1996, includes: Crustacea (1 species); terrestrial invertebrates (45); marine fishes (19); freshwater fish (18); amphibians (5); reptiles (25); birds (163), and mammals (41) (Brazil, São Paulo, SMA, 1998).

The following primates are included in the state lists. Paraná: *Leontopithecus caissara* and *Alouatta fusca clamitans*. Minas Gerais: *Callithrix aurita*, *C. flaviceps*, *C. kuhlii*, *Leontopithecus chrysomelas*, *Alouatta fusca fusca*, *A. f. clamitans*, *Brachyteles hypoxanthus*, *Callicebus personatus personatus*, *C. p. nigrifrons*, *C. p. melanochir* and *Cebus xanthosternos*. São Paulo: *Callithrix aurita*, *C. penicillata*, *Leontopithecus chrysopygus*, *L. caissara*, *Callicebus personatus*, *Alouatta caraya*, *Alouatta fusca* and *Brachyteles arachnoides*. Rio de Janeiro: *Callithrix aurita*, *Leontopithecus rosalia*, *Callicebus personatus* and *Brachyteles arachnoides*.

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Prado, 30.110-130 Belo Horizonte, Minas Gerais, Brazil, Tel: (031) 291-9673, Fax: (031) 291-7658, e-mail: <cddb@gold.horizontes.com.br>. São Paulo - Secretaria do Meio Ambiente (SMA), Centro de Editoração (CED), Avenida Professor Frederico Hermann Jr. 345, 05.489-900 São Paulo, São Paulo, Brazil, Tel: (011) 3030 6200, Fax: (011) 3030 6280, e-mail: <probio.sp@cetesb.br>, Web-site: <www.cetesb.br>.

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THE 1998 HENRY FORD ENVIRONMENTAL CONSERVATION AWARDS



The Henry Ford Environmental Conservation Awards for Brazil (modeled on a similar award scheme in Europe) were begun in 1996, the result of a partnership between the Ford Motor Co. and the Brazil Program of Conservation International (Conservation International do Brasil). This partnership also sponsors a number of major conservation projects in the Brazilian Amazon, the Atlantic forest, and the Pantanal of Mato Grosso. The awards are of four categories: "Lifetime Achievement",

"Annual Conservation Initiative", "Science and Training" and "Conservation and Business". The first lifetime achievement award (1996) was given to Ademar F. Coimbra-Filho, conservationist and founder of the Rio de Janeiro Primate Center (CPRJ/FEEMA). The second award, 1997, was given to Niéde Guidón, President of the NGO Fundação Museu do Homem Americano (FUMDHAM), for her work in the Serra da Capivara National Park in the state of Piauí, Brazil.



At an award ceremony held in the Country Club, Porto Alegre, state of Rio Grande do Sul, on 8 December 1998, **Ângelo Barbosa Monteiro Machado**, neuroanatomist, renowned Brazilian conservationist, world expert on Neotropical dragonflies, member of the Brazilian Academy of Sciences, President of the NGO Fundação Biodiversitas, Professor at the Federal

University of Minas Gerais, Belo Horizonte, and award-winning writer of children's books with conservation and ecological themes, was given the 3rd Henry Ford Environmental Conservation Award for lifetime achievement.

The conservation NGO **Fundação Ecotrópica** (Fundação de Apoio à Vida nos Trópicos), Cuiabá, Mato Grosso, was given the award for the category of "Annual Conservation Initiative" for its work in creating Private Reserves in the Pantanal region of the Mato Grosso (working with ranchowners, and with support from The Nature Conservancy, they purchased three large ranches in the region [including Acurizal, where George Schaller carried out research on jaguar ecology and behavior in the late 1970's], and increased by nearly 45% the protected areas in the region around the Pantanal Matogrossense National Park of 135,000 ha).



PSG member **Cláudio Valladares-Padua**, founder of the NGO IPÊ-Instituto de Pesquisas Ecológicas, based in Nazaré Paulista, São Paulo, and Professor at the University of Brasília, was given the award for "Science and Training", for his work in wildlife conservation and training, benefiting from collaboration with Wildlife Preservation Trust International (WPTI) amongst numerous other international NGOs, and focused especially

on the black lion tamarin, *Leontopithecus chrysopygus*, in the state of São Paulo. The award for the category "Conservation and Business" was given to the "**Projeto Unibanco Ecologia**". Unibanco is a private bank that has financed 231 conservation projects for environmental restoration, benefiting more than 130 municipalities in the north and the south of Brazil.

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BBC PRIMATE SERIES

The BBC Natural History Unit is going to make a major film series devoted to the primates. The series, called "Cousins", will be presented by Charlotte Uhlenbroek, a primatologist in her own right and currently presenter of BBC2's "Chimpanzee Diary". Three one-hour films will focus on the prosimians, the monkeys and the apes (and man), respectively. Filming will take place throughout 1999 and the programs are scheduled to be screened in prime viewing time on BBC1. At this early stage of research we are anxious to cast our net as wide as possible in search of exciting and interesting behaviors or spectacles from the primate world. One of our aims is to compile a list of all habituated primate groups in the world. Obviously not all such groups are study groups - they could be self-habituated or habituated to tourists or researcher's activities in the area, for example. We would be very grateful if you could tell us about primate groups being studied and any other habituated groups you might know of. Our other aim is to discover behaviors that have never been filmed before. Again, if there is anything that you think would be of interest please get in touch. Equally we would like to hear of different settings for the better known behaviors.

As film-makers, we are as ever indebted to scientists working in the field for the most up-to-date information on the current state of knowledge about the primates. If there is anything in this subject area you think we should be committing to film, please get in touch.

Please contact: Daniel Rees, BBC Natural History Unit, BBC Broadcasting House, Whiteladies Road, Bristol BS8 2LR, UK, Tel: 0117 974 7432, Fax: 0117 923 7727, e-mail: <daniel.rees@bbc.co.uk>.

PSG MEMBERS ELECTED TO THE BRAZILIAN ACADEMY OF SCIENCES

Three PSG members were elected to the Brazilian Academy of Sciences (ABC) at its General Assembly held on 16 November 1998. **Horacio Schneider**, geneticist at the Federal University of Pará, Belém, as an Associate Member, and **David J. Chivers** of the Wildlife Research Group at Cambridge University, UK, and **Russell A. Mittermeier**, Chairman of the PSG and President of Conservation International, Washington, D. C., were elected as Corresponding Members. They join two other PSG members at the Academy, Ademar F. Coimbra-Filho and José Márcio Ayres.

Molecular geneticist, Horacio Schneider has made enormous contributions to our understanding of the systematics and evolution of New World primates. He obtained his doctoral degree in 1984 at the Federal University of Rio Grande do Sul (UFRS) under the supervision of Dr. Francisco M. Salzano. In 1990 he took up a post-doctoral position at Stanford University, Stanford, California, under the supervision of Dr. L. Cavalli-Sforza, and from 1992 to 1993 he was a visiting researcher at Wayne State Uni-

versity, Detroit, Michigan, USA. Since 1992, he has acted as Coordinator of the International Co-operation Program between the Brazilian National Research Council (CNPq) and the National Science Foundation (NSF-USA) for the investigation of molecular phylogeny of New World primates. Currently he is an Adjunct Professor at the Department of Genetics of the Federal University of Pará (UFPA). He has held numerous administrative positions at UFPA, including: Head of the Department of Genetics; Vice-Dean for Planning and Development (from 1985 to 1987); Co-ordinator of the Postgraduate Program (M.Sc. and Ph.D.) in Biological Sciences (1997-1998); and Vice Co-ordinator of the UFPA Environmental Institute (1992-1993). At present, he is co-ordinating the new UFPA Campus at Bragança (see below), as well as a co-operative program between Brazil and Germany (CNPq-BMBF) to study Mangrove Dynamics and Management (MADAM). He was Vice-president of the Brazilian Society of Genetics from 1994 to 1996, and President of the Brazilian Society of Primatology from 1991 to 1994. He has supervised four M.Sc. dissertations and three Ph.D. theses, and is currently supervising three Ph.D. students and an M.Sc. student. Since 1973, Horacio Schneider has published more than 60 major papers on the systematics, conservation and molecular evolution of the New World primates.

David Chivers, Lecturer in Veterinary Anatomy, and Head of the Wildlife Research Group, at the Department of Anatomy of the University of Cambridge, UK, began his career with South American monkeys with a study on howling in *Alouatta palliata* on Barro Colorado Island, Panama, in 1967. His talents and dedication were subsequently largely focused on the conservation, ecology and behavior of Asian primates. In the mid-1970s, he set up the Wildlife Research Group, with the mission initially of studying the socio-ecology of sympatric primates - gibbons, langurs and macaques in various parts of South and South-east Asia. In the late 1980s, however, the emphasis shifted to investigating endangered wildlife in protected areas and forest fragments in forested regions of Latin America as well, focussing on plant-animal interactions to elucidate the needs of endangered species in relation to human needs for conservation and sustainable forest management. He has been active in Brazil since the 1980s, when he took on the supervision of the doctoral theses of José Márcio Ayres (behaviour and ecology of white uakaris at Mamirauá) and subsequently Carlos Peres (mixed-species groups of tamarins on the Rio Urucú). Since then he has taken on and promoted the academic careers of numerous other Brazilian students, including: Mauro Galetti Rodrigues (fruits and frugivores in the Atlantic forest, followed by two months in the long-term Bornean study area studying frugivory in hornbills); Adriano Chiarello (effects of forest fragmentation on Atlantic forest mammals); Wilson Spironello (fruiting biology of Amazonian Sapotaceae); Lana Formiga (social and feeding behaviour of lion tamarins in Brasília Zoo); Cecília Kierulff (translocation of golden lion tamarins); and Antônio Rossano Mendes Pontes (frugivore biomass and productivity of dif-

ferent forest types on Maracá Island, Roraima). In addition Andrew Johns was a student of the Wildlife Research Group in 1978-82, carrying out his thesis research on the effects of selective logging on primate populations and other wildlife in west Malaysia. His experience in South-east Asia was later applied to pioneer studies on the effects of logging and forest disturbance on wildlife, especially primates, in the Gurupí Biological Reserve and the region of the Tucuruí hydroelectric dam in Pará, as well as around Lake Tefé, on the upper Rio Solimões. Two other Latin American students, both Mexicans, have also been supervised by David Chivers: Alfredo Cuarón carried out a Ph.D thesis on land cover changes and mammal conservation in Mesoamerica, and Miguel Martinez Morales is currently doing research on the abundance, habitat preference and conservation of the curasow on Cozumel Island.

Last but not least, Russell Mittermeier first visited Brazil in 1971, carrying out field work in the Brazilian Amazon and, with Ademar F. Coimbra-Filho, field research and conservation campaigns for the Atlantic forest lion tamarins. Like David Chivers, his first primate field study was on the mantled howlers (1970) on Barro Colorado Island, Panama. In 1973 he carried out a major survey of primate populations and distributions in the Brazilian Amazon. Until 1976 no primate field studies (year long observations, for example, of behavior and ecology) had been carried out in Brazil, and the research of Coimbra-Filho in the 1960's and, with Russell Mittermeier, in the 1970's was pioneer, and provided the initial stimulus not only for preserving lion tamarins, but also other threatened species, and for Brazilian field primatology in general. In 1977, he completed his doctoral thesis on the primates of Surinam (Harvard University, Cambridge, MA), was appointed Chairman of the Primate Specialist Group, and also Adjunct Assistant Professor at the Department of Anatomical Sciences of the State University of New York, Stony Brook (as from 1990, Adjunct Professor). In 1978, he launched the *Global Strategy for Primate Conservation*, the first international program of its kind, and listing priority projects worldwide. One of the highest priority projects identified was for the conservation of eastern Brazilian primates, including especially the lion tamarins and the muriqui, *Brachyteles*, and resulted in a number of major primate surveys from 1979 to 1985, involving Ademar Coimbra-Filho and the Rio de Janeiro Primate Center and Célio Valle, then Professor of Zoology at the Federal University of Minas Gerais, as key Brazilian counterparts. The second high priority project listed in the *Global Strategy* was the establishment of a center for primate conservation in Rio de Janeiro, supporting the ambitious plans of Ademar Coimbra-Filho which were realized with the inauguration of the Rio de Janeiro Primate Center in 1979. From 1979 to 1989, he was a key figure in the World Wildlife Fund-US, holding a number of positions including Vice-President for Science (from 1987 to 1989). Most important was the WWF Primate Action Fund, created by Mittermeier while Vice-President for Conservation (1986-1989). This fund provided seed money for numerous pri-

mate conservation and research projects and aspiring conservationists in Brazil, but ended in 1989 when he left WWF to become President of Conservation International (CI), Washington, D. C. (The Primate Action Fund was reinstated with the creation of the Margot Marsh Biodiversity Foundation in 1996.) In 1990, he set up CI's Brazil Program, based in Belo Horizonte, through which he has remained as active as ever in research and conservation in Brazil as a central part of his commitment to tropical forest and biodiversity conservation worldwide. Since 1966 he has published six books and more than 250 scientific papers and popular articles on reptiles, primates, tropical forests, and biodiversity.

THE CENTER FOR APPLIED BIODIVERSITY SCIENCE - CONSERVATION INTERNATIONAL

Intel Corporation's co-founder and Chairman Emeritus Gordon Moore and his wife Betty are contributing US\$35 million to Conservation International (CI) to establish a research center - The Center for Applied Biodiversity Science - with the mission of identifying emerging threats to biodiversity to allow for swift action for the protection of the planet's most biologically valuable ecosystems. The creation of this Center was announced by Peter Seligmann, Chairman and Chief Executive Officer of CI, at a ceremony held in São Francisco on 2 October 1998. The Center will take on world leaders in science, technology, economics and conservation to develop action plans to counter imminent global threats. It will work closely with partnership organizations worldwide to tackle, in the field, some of the most pressing threats to biologically rich natural habitats. According to Russell A. Mittermeier, President of CI, "This is the largest, single private gift in the history of international biodiversity conservation and hopefully marks the start of a new era of environmentally-focused philanthropy commensurate with the scale and importance of the biodiversity crisis."

PSG Member, conservation biologist, Professor of Vertebrate Zoology at the Federal University of Minas Gerais, and CI Vice President for the Brazil Program, Gustavo A. B. da Fonseca has been appointed Executive Director. Roberto Cavalcanti, professor at the University of Brasília, has taken over as Director of CI-Brasil.

The Center's management will be based within Conservation International's Washington, D. C., headquarters, but will carry out its mandate throughout the world with a network of global experts and partnership organizations. It will also set up an Advisory Council consisting of outside experts and representatives of partnership organizations. A key aspect of the Center's operations will be the creation of a number of fellowships as well as a strong network of institutional partners. Fellows will be recruited from leaders in many different fields, from industry, universities, and other conservation groups. The Center will provide action plan blueprints for field-testing conservation strategies. It will also organize conferences and work-

shops to bring together top experts to explore trends and opportunities in biodiversity conservation. The Center's efforts will parallel Conservation International's strategic focus of targeting the world's highest priority regions in terms of biodiversity - megadiversity countries, hot spots, tropical wilderness areas and key marine ecosystems. An example of one issue which will be tackled is predatory logging in tropical forests. This threat has escalated rapidly in the recent past, with international logging conglomerates targeting tropical developing nations for huge tracts of pristine forests. In most cases, massive environmental degradation occurs as a result, with little economic return for the developing countries involved. Among other issues the center will also address the interface between conservation biology as a science and field-based conservation, mining and other extractive industries within biologically sensitive regions, as well as the devastating impact of invasive species on natural ecosystems.

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FROM PRODUCT TO PROGRAM: THE RED LIST EVOLVES

The IUCN Red List of Threatened Animals and Plants is widely recognized as the premiere source of scientifically based information regarding the global status of species. It is distinct as a global listing system in that it does not involve a political process, in contrast to the Appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Convention on the Conservation of Migratory Species of Wild Animals (CMS), as well as the global listings made through the United States Endangered Species Act (ESA). The Red List approach has been a cornerstone of IUCN's programs since 1963, and SSC has long been involved in the production of Red Data Books and, later, the Red List proper. In 1989, SSC initiated a process to develop a more quantitative, objective approach to red listing. After extensive consultation, the new Red List Categories and Criteria were developed and adopted by IUCN in 1994.

The adoption of the new system has led to an explosion of interest in red listing, both within SSC and beyond. For example, both the IUCN Red List and national Red Lists inspired by the IUCN approach are increasingly being used in the development of national biodiversity strategies and action plans under the Convention on Biological Diversity. As a result of this growing interest and emerging opportunities, the SSC Steering Committee decided at its 1997 Meeting to develop a coherent, strategic Red List Program.

Program Oversight

The IUCN Red List is overseen by the Red List Program Subcommittee, which reports to the SSC's governing body, the Steering Committee, via Russell Mittermeier. The sub-

committee is currently chaired by Jorgen Thomsen and is responsible for developing the work plan and strategic vision for the Red List Program, as well as fundraising and communications functions. The Program will be supported by a new Red List Officer within the SSC Secretariat.

The Program is to incorporate a formal mechanism for ensuring the quality and standards of the IUCN Red List. A Standards Working Group of the Subcommittee, chaired by Georgina Mace, has been established to serve this function. Listing Authorities responsible for listing groups of species (typically SSC Specialist Groups) will be designated by the Standards Working Group, which will also develop the minimum standards to which all Listing Authorities must adhere. Examples of Listing Authorities would be the Conifer Specialist Group for conifers, and the Primate Specialist Group for primates. BirdLife International will serve as the Listing Authority for birds. The Standards Working Group will also develop and oversee a formal process for handling disputes over the application of the criteria and resulting listings.

The Program will also attempt to respond to the growing interest in applying the categories and criteria at the national level. A National and Regional Application Working Group, chaired by Ulf Gardenfors, will work to develop guidelines to assist national and regional groups in making use of this valuable tool.

Key Activities

1) *The Criteria Review*. Since the Red List now enjoys a much more prominent role, it is important that the standards and procedures used by SSC in its listing process are maintained at the highest levels possible. The adoption of new Red List categories and criteria has reduced the subjectivity in making conservation assessments and has enhanced the authority of the list. To ensure that the system remain at the cutting edge, SSC is undertaking a review of the effectiveness of the current categories and criteria, incorporating Specialist Group input. This process will be completed by the next World Conservation Congress and is being overseen by Georgina Mace.

2) *Documentation of the Red List*. For all species included in the IUCN Red List under the new system, their Red List Category is given and the criteria used to list the species are indicated. However, an objective of the Program is to improve documentation. All current and future listings will have to be documented to provide explanations for the listings and more complete taxonomic information. It is hoped that the Red List can be documented in this manner by the next World Conservation Congress. It is hoped that this more strategic, coordinated approach to SSC's red listing activities will ultimately enhance the authority and effectiveness of the IUCN Red List, enabling informed conservation advocacy and action. From: *Species*, Newsletter of the IUCN Species Survival Commission, (30): 7-8, June 1998.

A NEW GENETIC RESEARCH LABORATORY IN PARÁ, BRAZIL

In July 1998, the Federal University of Pará established a major new research laboratory for molecular genetics at their Bragança Campus, on the coast of Brazil in southern Pará. The laboratory will focus on three major research fields: systematics and molecular evolution of primates; systematics, evolution and biogeography of crabs; and the systematics, evolution and biogeography of bivalve molluscs. The research team is comprised of Dr. Horacio Schneider, Dr. Iracilda Sampaio, Dr. Claudia H. Tagliaro, Dr. Colin R. Beasley, Claudia Nunes Santos MSc, Leônidas O. de Carvalho MSc, and Renata Chaves de Almeida MSc.

Horacio Schneider, Laboratório de Biologia Molecular, Campus Universitário de Bragança, Universidade Federal do Pará, Alameda Leandro Ribeiro s/n, 68600-000 Bragança, Pará, Brazil, e-mail: <hschneider@uol.com.br>.

UM CONVÊNIO ENTRE CONSERVATION INTERNATIONAL E O CENTRO DE PRIMATOLOGIA DO RIO DE JANEIRO (CPRJ/FEEMA)

No dia 28 de setembro de 1998 foi assinado o convênio entre a Conservation International do Brasil e a Fundação Estadual de Engenharia do Meio Ambiente do Estado do Rio de Janeiro-FEEMA, para o desenvolvimento de ações conjuntas no Centro de Primatologia do Rio de Janeiro (CPRJ) e na Estação Ecológica Estadual do Paraíso. O principal objetivo desse projeto é o desenvolvimento de estratégias para a revitalização do Centro de Primatologia do Rio de Janeiro, fortalecendo a estrutura de pessoal qualificado e introduzindo novas atividades (educação ambiental, ecoturismo, centro de informações e estudos sobre biodiversidade) direcionadas para a ampliação do papel da FEEMA e do próprio Centro na conservação e pesquisa sobre a biodiversidade regional e nacional.

Luiz Paulo de Souza Pinto, Coordenador de Projetos, Conservation International do Brasil, Avenida Antônio Abrahão Caram 820/302, 31275-000 Belo Horizonte, Minas Gerais, e **Alcides Pissinatti**, Diretor, Centro de Primatologia do Rio de Janeiro (CPRJ), Fundação Estadual de Engenharia do Meio-Ambiente (FEEMA), Rua Fonseca Teles 121/1624, Caixa Postal 23011, São Cristóvão, 20940-200 Rio de Janeiro, Rio de Janeiro, Brazil.

AN AUDIO FIELD GUIDE TO NEOTROPICAL RAINFOREST MAMMALS

The *Sounds of Neotropical Rainforest Mammals* is an audio guide, comprised of two compact discs (105 min.), to serve as a companion to *Neotropical Rainforest Mammals: A Field Guide*, by Louise H. Emmons and François Feer (The University of Chicago Press, Chicago, 2nd ed., 1997). This collection of calls of 109 species and subspecies includes almost all primates and the commonly en-

countered larger mammals. It was put together by Louise H. Emmons, Bret M. Whitney and David L. Ross, Jr. The CDs are accompanied by a booklet. Price US\$24.95. Available from: The University of Chicago Press, 5801 South Ellis Avenue, Chicago, IL 60637. Web site: www.press.uchicago.edu.

MESTRADO EM PSICOLOGIA - SUBPROGRAMA ETOLOGIA

A Universidade Católica de Goiás, Brasil, estará abrindo seis vagas para o subprograma de "Etologia Animal e Humana", dentro de seu Programa de Mestrado em Psicologia. Os dois orientadores deste subprograma, os professores Dwain Phillip Santee e Francisco Dyonísio Cardoso Mendes (Dida), trabalham com comunicação vocal e comportamento social de primatas. Além do Parque Estadual de Goiás, da Estação São José, e de dois zoológicos, Goiânia e áreas adjacentes contam com vários parques e reservas que oferecem boas possibilidades de pesquisa sobre primatas. As inscrições estarão abertas entre os dias 9 e 14 de fevereiro. Maiores informações podem ser obtidas no telefone (062) 227-1116, ou na página <http://www.ucg.br>.

JWPT SUMMER SCHOOL



The Summer School of the Training Centre of the Jersey Wildlife Preservation Trust "Breeding and Conservation of Endangered Species" will be held from 16th July to 6th August 1999. The course is based at the Trust's headquarters in Jersey and will consist of morning and afternoon lectures, discussion sessions and individually supervised research exercises. It offers: An overview of how the JWPT and other organisations have integrated conservation in captivity and the wild, and what future strategies could be; Lectures which are a mixture of fundamentals and provocative appraisals encouraging the formulation of views on the conservation role of zoos based on an understanding of the issues involved; Study projects which provide an opportunity to gain first-hand experience of carrying out research and analysing data, projects tailored to suit the capabilities, background and types of investigation of interest to each student; Practical instruction/workshop sessions, with demonstrations of systematic data collection, based on appropriate experimental design, and showing how to analyse the information obtained; and Other demonstration sessions in which zoo staff and invited experts explain some of the practicalities of captive and field management.

The Course Directors are the Trust Department Head of Training, Dr. John E. Fa, and two internationally recognised scientists. The Course Tutor is Dr. Anna T. C. Feistner, Trust Department Head of Research. The Course Co-ordinator is Mr. Chris Clark, Assistant Deputy Head of Training at the Trust. The fee per per-

son is £1,095 (includes 1999 membership of the Trust, hotel accommodation, all meals, and course expenses. Participation is limited to approximately 24 students, with selection based on merit and suitability. Early application is essential. *Closing date for applications: 31 January 1999.*

For applications, write to: Jersey Wildlife Preservation Trust, Trinity, Jersey JE3 5BP, Channel Islands, British Isles, Tel: +44 1534 864666, Fax: +44 1534 865161, e-mail: <itc@jwpt.org>.

IV CURSO INTERNACIONAL: DISEÑO Y ANÁLISIS DE PROYECTOS PARA EL MANEJO Y MONITOREO DE LA DIVERSIDAD BIOLÓGICA

Curso Teórico del 17 al 19 de mayo, Universidad de Antioquia en Medellín, Colombia (Costo: U.S. \$100; Cupo: 40 estudiantes), y Curso Práctico, del 20 mayo al 1 de junio de 1999, Parque Nacional Utria, Departamento del Chocó, Colombia (Costo: U.S. \$400; Cupo: 25 estudiantes). *Organizado por:* Centro para la Biología de la Conservación (CCB) Universidad de Stanford, California. USA; Facultad de Ciencias Exactas y Naturales, Departamento de Biología, Universidad de Antioquia, Medellín, Colombia; Facultad de Ciencias Agropecuarias, Posgrado en Bosques y Conservación Ambiental, Departamento de Ciencias Forestales, Universidad Nacional de Colombia, Sede Medellín. *Objetivo general:* Promover procesos alternativos de capacitación para estudiantes y profesionales de América Latina en el desarrollo de programas de monitoreo y manejo para afrontar la crisis de la diversidad biológica. *Objetivo específico:* Profundizar en conceptos teóricos y metodológicos importantes para el desarrollo de programas de monitoreo y manejo de la diversidad biológica, mediante la combinación de la teoría ecológica, diseño y análisis de resultados. *Instructores:* Carlos E. Galindo Leal, Centro para la Biología de la Conservación, Stanford, California; Marco A. Rodríguez, Departement de Chimie-Biologie, Université du Québec, Canada; Antonio W. Salas, Coordinador CCB-Perú - Museo de Historia Natural, Universidad Ricardo Palma, Lima, Perú; Manuel Weber, Coordinador CCB-México - Colegio de la Frontera Sur, Centro Campeche, México; Mauricio Guerrero, Coordinador CCB-Ecuador, Fundación Ecológica Mazán, Cuenca, Ecuador; Brian C. Bock, Departamento de Ciencias Forestales, Universidad Nacional de Colombia, Sede Medellín; Alicia Uribe Toro, Departamento de Biología, Universidad de Antioquia, Medellín; Oscar Ortega, Departamento de Biología, Universidad Nacional de Colombia; Jaime H. Polanía, Centro de Estudios Caribeños, Universidad Nacional de Colombia, San Andrés; Vivian P. Páez, Departamento de Biología, Universidad de Antioquia, Medellín. *Fechas:* Límite de inscripción: 27 de Febrero de 1999; Notificación de participantes: 27 de Marzo de 1999. *Requisitos:* El curso está dirigido a estudiantes avanzados y profesionales de

Ciencias Biológicas o afines, cuyo perfil principal es: 1. Ser estudiante de último año de pregrado; estudiante de posgrado o profesional de Ciencias Biológicas o afines; 2. Estar involucrado activamente en un proyecto de tesis, investigación o manejo (conservación, ecología), pudiendo estar en la fase de planeación, ejecución, o análisis. 3. Tener conocimiento básico de estadística elemental y ecología. Además deberá presentar la siguiente documentación: 1. Formulario "Solicitud de Inscripción" (ver página web); 2. Formulario "Perfil de Proyecto de Investigación" relacionado con la diversidad biológica, que esté realizando, o que vaya a realizar (usando formato página web = afiche); 3. Curriculum Vitae resumido y actualizado (máximo 5 páginas). Mayores informaciones e inscripciones: Dr. Vivian P. Páez, Bloque 7 #106, Departamento de Biología, Universidad de Antioquia, Medellín, Colombia, Tel: 574 210 5624, Fax: 574 233 0120, e-mail: <vpaez@matematicas.udea.edu.co>, <vpaez@quimbaya.udea.edu.co>. Web: <http://www.stanford.edu/group/CCB/Trop/internationalcourses.html#Spanish>.

ZOO BIOLOGY - CALL FOR MANUSCRIPTS

Zoo Biology, the Journal of Zoo and Aquarium Research, is calling for manuscripts for a special issue focussing on non-human primate nutrition. This issue will be a collection of scientific papers relating to primate nutrition, feeding and dietary husbandry. Articles with information on nutrient requirements, deficiencies, toxicity, nutritional status, biological response criteria, as well as field data as they relate to captive husbandry, are encouraged. Please prepare all manuscripts in the appropriate *Zoo Biology* format. Guidelines are available in the journal. Send manuscripts to Dr. Dan Wharton, Editor, *Zoo Biology*, Central Park Wildlife Center, 830 Fifth Avenue, New York, NY 10021-7095. Submission deadline: 30 April 1999.

PRIMATE LITERATURE DATABASE ON THE WEB

The Primate Information Center's Primate Literature Database (PrimateLit) is now available for searching on the World Wide Web as a pilot project through June 1999. PrimateLit indexes over 140,000 research publications from 1940 to the present. There is no charge to access the database during the January-June 1999 pilot period. Instead, the PIC staff are soliciting user feedback to help guide the development of an outstanding bibliographic search tool for the primatological community. The only requirements for database access are an Internet connection, and willingness to answer a short feedback questionnaire. Access to PrimateLit is by password only. Please contact the PIC to obtain your free password: E-mail: <pic@u.washington.edu>. Subject Line: Password Request. Message: Include your full name, affiliation and e-mail address. A password and instructions for accessing the database will be sent by return e-mail.

Jackie Pritchard, Manager, Primate Information Center, Health Sciences Libraries, University of Washington, Seattle, e-mail: <plj@u.washington.edu>.

Recent Publications

A SPECIAL EDITION OF *PRIMATE REPORT* ON *CALLICEBUS* AND *AOTUS*

Number 51 (June 1998) of *Primate Report* (ISSN 0343-3528), Editor Dr. Michael Schwibbe, is dedicated to a single monograph, "Behavioural data on the titi monkey *Callicebus cupreus* and the owl monkey *Aotus azarai boliviensis*. A contribution to the discussion on the correct systematic classification of these species", by C. Welker, B. Jantschke and A. Klaiber-Schuh. It is divided into five sections, each presented as a separate paper. Part I: Introduction and behavioural differences (pp.3-18); Part II: Pair formation and relations between mates (pp.19-27); Part III: Living in family groups (pp.29-42); Part IV: Breeding biology (pp.43-53); and Part V: Miscellaneous notes and final discussion (pp.55-71). *Primate Report* is published three times a year by the Deutsches Primatenzentrum (DPZ), Göttingen. The subscription price is DM18.00 or US\$12.00 per issue, and includes also a copy of the annual scientific report of the DPZ. For more information: Dr. Michael Schwibbe, Editor *Primate Report*, German Primate Center, Kellnerweg 4, D-37077 Göttingen, Germany, e-mail: <mschwib2@gwdg.de>.

A SPECIAL EDITION OF THE *AMERICAN JOURNAL OF PRIMATOLOGY* - NESTING AND RESTING

Volume 46, number 1, 1998, of the *American Journal of Primatology*, the official journal of the American Society of Primatologists, is dedicated to "Nesting and Resting in Primates: Behavioral Ecology of Inactivity". The Guest Editors were William C. McGrew, Miami University, Oxford, Ohio, and Barbara Fruth, Max Planck Institut für Verhaltensphysiologie, Seewiesen, Germany. The papers result from a symposium held during the Joint Congress of the International Primatological Society and the American Society of Primatologists in Madison, Wisconsin, in August 1996. Contents: Introduction to nesting and resting in primates: Behavioral ecology of inactivity - Barbara Fruth & William C. McGrew, pp.3-5; Nests, tree holes and the evolution of primate life histories - Peter M. Kappeler, pp.7-33; Sleeping sites, sleeping places, and presleep behavior of gibbons (*Hylobates lar*) - Ulrich Reichard, pp.35-62; Sleep, sleeping sites, and sleep-related activities: Awakening to their significance - James R. Anderson, pp.63-75; Sex-specific usage patterns of sleeping sites in grey mouse lemurs (*Microcebus murinus*) in northwestern Madagascar - Ute Radespiel, Sabine Cepok, Vera Zietemann and Elke Zimmermann, pp.77-84; Shadows on a changing landscape: Comparing nesting patterns of hominids and chimpanzees

since their last common ancestor - Jeanne Sept, pp.85-101.

AJP subscription inquiries: John Wiley & Sons, Inc. Subscription Department, 9th floor, 605 Third Avenue, New York, NY 10158, Tel: 212 850-6645. Members of the American Society of Primatologists can subscribe at a reduced rate, for details contact: Steven J. Schapiro, Department of Veterinary Sciences, M. D. Anderson Cancer Center, University of Texas, Rt. 2, Box 151-B1, Bastrop, TX 78602-9733, USA.

THE MURIQUI PHVA

Conserving Brazil's Muriqui: Population and Habitat Viability Assessment (PHVA) for Brachyteles arachnoides, edited by A. B. Rylands, K. B. Strier, R. A. Mittermeier, J. Borovansky and U. S. Seal. 1998. Conservation Breeding Specialist Group (CBSG), Apple Valley, MN. Price: US\$35.00 (incl. p+p). The final report of the PHVA Workshop for the muriqui, held in Belo Horizonte, Minas Gerais, Brazil, 23-26 May 1998, organized by the Fundação Biodiversitas, the Brazilian Institute for the Environment (IBAMA) and Conservation International do Brasil, in collaboration with the IUCN/SSC Conservation Breeding Specialist Group (CBSG) and the Primate Specialist Group (PSG), and sponsored by the Margot Marsh Biodiversity Foundation. Contents: Executive summary and recommendations; Distribution and status; Population and habitat management; Social, political, economic and education impacts; Species biology and modeling; Workshop participants; Vortex reference. Available from: IUCN/SSC Conservation Breeding Specialist Group, 12101 Johnny Cake Ridge Road, Apple Valley, MN 55124, USA, Fax: 612 432 2757, e-mail: <office@cborg.org>. US checks payable to "CBSG". Web site: <http://www/cborg.org>.

PUBLICATIONS OF THE REGIONAL OFFICE OF FAO FOR LATIN AMERICA AND THE CARIBBEAN

The Regional Office of FAO for Latin America and the Caribbean (FAO/UNEP/Rede Latinoamericana de Cooperación Técnica en Parques Nacionales, Otras Areas Protegidas, Flora y Fauna Silvestres), based in Santiago, Chile, have published some important reports.

Políticas, Estrategias y Acciones para la Conservación de la Diversidad Biológica en los Sistemas Costero-Marinos de Areas Protegidas, by Jose Jairo Escobar R, 1996, 103pp. Documento Técnico No. 22 (Proyecto FAO/PNUMA FP/0312-94-14), in Spanish, includes chapters on; The coastal-marine biodiversity of the region; Diagnosis of the structure of the national coastal-marine protected area systems; Diagnosis of planning and management in the national coastal-marine protected area systems; Synthesis and conclusion regarding the diagnoses of the national coastal-marine protected area systems; Proposals for a policy framework for the structure and management of national coastal-marine protected area systems. The results of a workshop "Políticas, Estrategias y Plan de Acción Regional para la Conservación

de la Diversidad Biológica en los Sistemas Costeros de Areas Protegidas" held in Cancún, Mexico. 9-12 November 1995. Appendices: Organizational aspects of the workshop; Maps of the Pacific and Atlantic coast and Caribbean coastal-marine protected areas; and a listing of the marine coastal protected area by country.

Uso y Conservación de la Fauna Silvestre en Los Países de la Cuenca del Amazonas, by Juhani Ohasti, 1997, 205 pp. Documento Técnico No. 23 (Proyecto GCP/RLA/118/NET "Apoyo a la Secretaría Pro Tempore del Tratado de Cooperación Amazónica"), in Spanish. Includes the following chapters: Parte I - Diagnosis. Introduction; The use of Amazonian wildlife; Trade in Amazonian wildlife and its products; Economic value of wildlife; Sustainable management of wildlife; Wildlife conservation. Part II - Policy. Introduction; Policy guidelines. Part III - Regional Projects. Antecedents; Justification; Profiles of subprojects; Costa and proposals. With 14 appendices. Based on the international workshop "Uso Sostenible y Conservación de la Fauna Silvestre en los Países de la Cuenca del Amazonas", held in the National Natural Park of Amacayacu, Colombia, 30 August - 4 September, 1995.

Políticas para la Conservación de la Diversidad Biológica en los Sistemas de Areas Protegidas de América Latina y El Caribe, by Pedro Araya R., 1997, 56pp. Documento Técnico No. 24 (Proyecto FAO/PNUMA FP/0312-94-14), in Spanish, includes chapters on: Institutional aspects (hierarchy and institutional autonomy, the role of NGOs, human resources and financing); The structure and coverage of protected area systems; Protection of biological diversity; Public use; Research; Sustainable use of biological diversity; Buffer zones and local communities.

Available from: Kyran D. Thelen, Oficial Regional Forestal, Oficina Regional de la FAO para América Latina y el Caribe, Av. Dag Hammarskjöld 3241, Casilla 10095, Santiago, Chile, Fax: (562) 337 2101/2/3, e-mail: <kyran.thelen@field.fao.org>

JOURNAL OF THE ASOCIACIÓN PERUANA DE ECOLOGÍA

The Asociación Peruana de Ecología has launched a journal - *Ecología, Revista de la Asociación Peruana de Ecología*. The first issue, Volume 1(1), was published in October 1998. The editor is Eduardo Gómez-Cornejo Belgrano, Universidad Nacional Agraria La Molina, Lima. It publishes a broad range of original articles on basic ecological themes. It will include the following sections: Scientific articles (peer-reviewed, up to 10 printed pages, including tables and figures); Technical notes (peer-reviewed, short articles of up to three printed pages); Reviews (invited); Opinion and comments (up to two printed pages); and Book reviews. Subscriptions: S/.100.00. For more information: Eduardo Gómez-Cornejo Belgrano, Editor - *Ecología*, Departamento Académico de Biología, Universidad Nacional Agraria La Molina, Apartado Postal 456, Lima 100, Peru,

Fax: +51 1 3496015, e-mail: <ape@lamolina.edu.pe>. Information kindly supplied by Eckhard W. Heymann, Deutsches Primatenzentrum, Göttingen, Germany.

ECOLOGY LETTERS

The publishers Blackwell Science, in association with the Centre National de la Recherche Scientifique, launched a new journal in July 1998 - *Ecology Letters*, ISSN 1461-023X. It is a new forum for the very rapid publication of the most important and interesting research in ecology. The Editor-in-Chief is Michael Hochberg, Institut d'Ecologie, Université Pierre et Marie Curie, Ecole Normale Supérieure, 7 quai St. Bernard, Bât. A., 7ème étage, CC237m 75252 Paris 05, France, e-mail: <ecolets@snv.jussieu.fr>. It will be published three times in 1998 and bimonthly thereafter. For more information and subscriptions: Anna Rivers, Blackwell Science Ltd., Osney Mead, Oxford OX2 0EL, UK, Tel: +44 1865 206206, Fax: +44 1865 206096. Web site: <http://www.blackwell-science.com/online>.

BOOKS

Guía de Campo de Los Mamíferos de Honduras, por Leonel Marineros y Francisco Martínez-Gallegos, 1998, 374pp. Instituto Nacional de Ambiente y Desarrollo (miembro de la UICN), Tegucigalpa. Precio US\$28.00 (incluye gastos de envío por correo ordinario). Esta guía de campo provee información detallada de los mamíferos terrestres y marinos registrados en Honduras. Su principal contenido da información sobre las áreas protegidas, listados de mamíferos, descripción de las especies, ilustraciones a color, ilustraciones en blanco y negro (murciélagos, ratones y cetáceos), huellas, craneos, mapas de ubicación de registros en Honduras y bibliografía. Los primates abarcan las páginas 120 a la 128. Los interesados pueden solicitarlo a: Instituto Nacional de Ambiente y Desarrollo INADES, Apartado No. 4160, Tegucigalpa, M. D. C., Honduras, correo electrónico: <inades@sdnhon.org.hn>.

Primate Adaptation and Evolution, by John G. Fleagle, 1999, 596pp. Academic Press, San Diego. Second edition. ISBN 0 122 60341 9. Price US\$55.00. This is an extremely useful, clearly written, and excellently and lavishly illustrated textbook and reference. Wonderful line drawings by Stephen Nash, Hugh Nachamie, Luci Betti and Leslie Jungers. Considerably expanded from the first edition of 486pp. Very highly recommended for researchers and students alike. Available from: Academic Press, Ordering Department, 6277 Sea Harbor Drive, Orlando, FL 32887, USA, Tel: 1 800 545 2522, Fax: 800 874 6418.

Molecular Biology and Evolution of Blood Group and MHC Antigens in Primates, edited by A. Blancher, J. Kellin and W. W. Socha, 1997, 570pp. Springer Verlag, New York. ISBN 3 540 61636 5. Price: US\$149.00. Available from: Springer Verlag New York, Inc., 44 Hartz Way, Secaucus, NJ 07094, USA, Tel: +1 800-SPRINGER., Fax: 212 533 3503.

Introduction to the Primates, by Daris R. Swindler, illustrated by Linda E. Curtis. University of Washington Press, Seattle. 1998. Price: Paperback US\$22.00. A comprehensive but compact guide to the long evolutionary history of the world's prosimians, monkeys and apes, and to the much shorter history of humankind's interactions with them. Available from: University of Washington Press, P. O. Box 50096, Seattle, WA 98145-5096, USA, Tel: +1 800 441 4115, Web site: <http://www.washington.edu/uwpress/>.

Primate Locomotion: Recent Advances, edited by Elizabeth Strasser, John Fleagle, Alfred Rosenberger, and Henry McHenry, 1998. Plenum Press, New York and London. ISBN: 0 306 46022 X. Price: US\$110 (USA and Canada), other countries add 20%. Contents: Part I: Naturalistic Behavior - Alfred L. Rosenberger; 1. Methodological issues in studying positional behavior: Meeting Ripley's challenge - Marian Dagosto & Daniel L. Gebo; 2. Fine-grained differences within positional categories: A case study of *Pithecia* and *Chiropotes* - Suzanne E. Walker; 3. Patterns of suspensory feeding in *Alouatta palliata*, *Ateles geoffroyi* and *Cebus capucinus* - David J. Bergeson; 4. Within- and between-site variability in moustached tamarin (*Saguinus mystax*) positional behavior during food procurement - Paul A. Garber; 5. Locomotion, support use, maintenance activities, and habitat structure: The case of the Tai Forest cercopithecids - W. Scott McGraw; 6. The gorilla paradox: The effects of body size and habitat on the positional behavior of lowland and mountain gorillas - Melissa J. Remis. Part II: Morphology and behavior; Introduction - John G. Fleagle; 7. Reconstruction of hip joint function in extant and fossil primates - Laura MacLatchy; 8. Grasping performance in *Saguinus midas* and the evolution of hand prehensility in primates - Pierre Lemelin & Brian W. Grafton; 9. Tail-assisted hind limb suspension as a transitional behavior in the evolution of the platyrrhine prehensile tail - D. Jeffrey Meldrum; 10. Unique aspects of quadrupedal locomotion in nonhuman primates - Susan G. Larson; 11. Forelimb mechanics during arboreal and terrestrial quadrupedalism in Old World monkeys - Daniel Schmitt. Part III: Data acquisition and analytic techniques; Introduction - Elizabeth Strasser; 12. Advances in three-dimensional data acquisition and analysis - John Kappelman; 13. Laser scanning and paleoanthropology: An example from Olduvai Gorge, Tanzania - Leslie Aiello, Bernard Wood, Cathy Key & Chris Wood; 14. Use of strain gauges in the study of primate locomotor biomechanics - Brigitte Demes; 15. The information content of morphometric data in primates: Function development and evolution - Charles E. Oxnard; 16. Heterochronic approaches to the study of locomotion - Laurie R. Godfrey, Stephen J. King & Michael R. Sutherland; 17. Body size and scaling of long bone geometry, bone strength, and positional behavior in cercopithecoid primates - William L. Jungers, David B. Burr & Maria S. Cole. Part IV: Fossils and reconstructing the origins and evolution of taxa; Introduction - Henry M. McHenry; 18. *Afropithecus*, *Proconsul*, and the primitive hominoid skeleton - Carol V. Ward; 19. Fossil evidence for the origins of terrestriality among Old

World higher primates - Monte L. McCrossin, Brenda R. Benefit, Stephen N. Gitau, Angela K. Palmer & Kathleen T. Blue; 20. Ecological morphology of *Australopithecus afarensis*: Traveling terrestrially, eating arboreally - Kevin D. Hunt; 21. Time and energy: The ecological context for the evolution of bipedalism - Robert A. Foley & Sarah Elton; 22. Heel, squat, stand, stride function and evolution of hominoid feet - Russell H. Tuttle, Benedikt Hallgrímsson & Tamara Stein; 23. Evolution of the hominid hip - Christopher Ruff. To order: Plenum Publishing Corporation, 233 Spring Street, New York, NY 10013-1578, Tel: 1-800-221-9369, Fax: 1-212-620-8000, <<http://www.plenum.com>>.

Cognitive Ecology: The Evolutionary Ecology of Information Processing and Decision Making, edited by Reuven Dukas. The University of Chicago Press, Chicago. 1998, 420pp. Price: Paperback US\$30.00. This book maps out a new field in the intersection between cognitive psychology and behavioral ecology, The chapters provide up-to-date reviews of current research, including topics as diverse as neural networks, recognition of bird song, spatial memory and foraging decisions. Available from: The University of Chicago Press, 5801 South Ellis Avenue, Chicago, IL 60637. Web site: www.press.uchicago.edu.

Educação Ambiental: Caminhos Trilhados no Brasil, edited by Suzana M. Padua and Marlene F. Tabanez, 1997, 283pp. IPÊ - Instituto de Pesquisas Ecológicas, Brasília. In Portuguese. Twenty-two chapters outlining, reviewing and detailing the state-of-the-art of environmental education in Brazil. Contents: Projeto Reciclar - Isabel Zaneti, pp.19-26; Uma proposta de educação agroecológica para o meio rural do semi-árido brasileiro - Edvalda P. T. L. Aroucha & M. L. Aroucha, pp.27-42; Educação ambiental e universidade: Um estudo de caso - M. Sorrentino, pp.43-54; Escola de educação ambiental: A universidade e a incorporação da educação ambiental no ensino do 1º grau - Elizabeth da C. Santos, pp.55-72; A formação de professores em educação ambiental à luz da Agenda 21 - Nahyda von der Wied, pp.73-88; Avaliação de trilhas interpretativas para educação ambiental - Marlene F. Tabanez *et al.*, pp.89-102; Levantamento do perfil dos diferentes grupos relacionados ao Parque Estadual do Turvo, RS - Cibele B. Indrusiak & Suzana M. Padua, pp.103-117; Um programa integrado para a conservação do mico-leão-preto (*Leontopithecus chrysopygus*) - Pesquisa, educação e envolvimento - Suzana M. Padua & Claudio Valladares-Padua, pp.119-131; Programa de conservação do mico-leão-dourado: Atividades de educação comunitária para a conservação da Mata Atlântica no estado do Rio de Janeiro - Lou Ann H. Dietz & Elizabeth Y. Nagagata, pp.133-146; Resgate cultural e conservação de tartarugas marinhas - Jaqueline C. de Castilhos, Dayse A. R. Alves & Augusto César C. D. da Silva, pp.147-156; Instrumentos educativos: Estratégia de educação ambiental para o manejo sustentável da fauna silvestre por populações tradicionais em reserva extrativista - Magaly da F. e S. T. Medeiros, pp.157-169; A ciência dos Mëbengôkré na educação ambiental de jovens Kayapó - Sandra M. Machado, pp.171-181; Extensão e

educação florestal na Amazônia Oriental: O caso do Projeto-Piloto de Manejo Florestal - Paulo Amaral & Tatiana Corrêa, pp.183-192; Zoológico: Uma sala de aula viva - Maria C. Mergulhão, pp. 193-200; Importância de auto-estima no Projeto Cerrado, Casa Nossa, do Jardim Botânico de Brasília (JBB) - Carmen X. de Almeida, pp. 201-210; Educação ambiental com animais peçonhentos: "Na natureza não existem vilões!" - Pedro A. Federson Jr., Nayte Vitiello & Silvana C. da R. Calixto, pp.211-220; A educação ambiental e a formação de jovens - Gabriela P. de Oliveira, pp.221-229; Repórter Eco: A beleza transforma - Lia de Souza & Vera L. Diegoli, pp.231-235; Unidades de conservação e organizações não-governamentais em parceria: Programa de educação ambiental - Ligia M. de Rocha, pp.237-245; Educação ambiental nas empresas: Uma nova proposta de trabalho - Carola A. Thamm, pp.247-256; Breve histórico da educação ambiental - Naná M. Medina, pp.257-269; As transformações na cultura e debate ecológico: Desafios políticos para a educação ambiental, pp. 271-280. Available from: IPÊ - Instituto de Pesquisas Ecológicas, Caixa Postal 47, 12960-000 Nazaré Paulista, São Paulo, Brazil, e-mail: <ipe@ax.ibase.org.br>.

Mammalogy: Adaptation, Diversity and Ecology, by George Feldhammer, Lee Drickamer, Stephen Vessey and Joseph Merritt, 1999, 552pp. WCB/McGraw-Hill, New York. ISBN 0 697 16733-X. A student text book, provides complete coverage of the behaviour, ecology, and biogeography of mammals, intended for one-semester, upper-level undergraduate and graduate courses. Available from: WCB/McGraw-Hill, Tel: 800 338 3987, e-mail: <webcomp@mcgraw-hill.com>. International orders (outside Canada and USA) - e-mail: <nick_agnew@mcgraw-hill.com> or call 609-426 5793.

Proceedings: International Symposium on Assessment and Monitoring of Forests in Tropical Dry Regions with Special Reference to Gallery Forests, edited by José Imaña-Encinas (University of Brasília) and Christoph Kleinn (University of Freiburg), 1997, 378pp. University of Brasília, Brasília. Proceedings of a symposium held in Brasília from 4-7 November 1996. Thirty-three contributions. For more information: Editora Universidade de Brasília, SCS Q.02, Bloco C, No. 78, Edifício Ok, 2º. andar, 70300-500, Brasília, D. F., Brazil.

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Meetings

Association for the Study of Animal Behaviour, Easter Meeting, 29-31 March, 1999. University of Newcastle, UK. Organized by Sue Healy and Marion Petrie. A general meeting with no specific theme. Invited speakers include: Naomi Pierce (Harvard University), Margo Wilson (McMaster University) and John Krebs (Oxford University). A workshop "Advice to Postgraduate Students" will be held in conjunction with the meeting, on 29 March 1999. For more information: Dr Sue Healy, Department of Psychology, University of Newcastle, Newcastle-upon-Tyne NE1 7RU, UK, Fax: +44 (0)191 2225622, e-mail: <s.d.healy@ncl.ac.uk>.

Primate Society of Great Britain Spring Meeting 1999, 12-13 April 1999, Liverpool University, Liverpool, UK. Monday 12 April will be a half-day programme (starting at 1400 h) devoted to the topic of "Social Complexity", and will consist mainly of invited speakers. It will be followed by an informal social evening at a local venue. Tuesday 13 April (an all-day meeting ending at 1600 h) will be an open meeting for presentations by members of the Society; following conventional practice, a special emphasis will be given to presentations by postgraduate students and primate keepers. The organisers would welcome of-

fers of papers for the Tuesday sessions. We would be especially grateful if supervisors would encourage (or nominate) their postgraduate students to give papers reporting on their research. Offers of papers should be sent to Russell Hill, School of Biological Sciences, Nicholson Building, University of Liverpool, Liverpool L69 3BX (email: <rahill1@liv.ac.uk>), from whom further details about the meeting may be obtained. Final details, including programme and places to stay, will be given in the February issue of *Primate Eye*. A small number of rooms at university halls of residence (cost £20.90p B & B per night) will be available, but firm bookings and a cheque for the full amount are required by 6 March at the latest. The halls are a 15 min bus/taxi ride from the university; you may prefer alternative accommodation in hotels (£25 per night B & B) which are just 5 minutes walk from the lecture theatre. Phone numbers of hotels will be listed on the web site (see below) and in the final announcement in the spring issue of *Primate Eye*. Full details of the meeting, as well as places to stay, are available on the PSGB web page: <http://www.liv.ac.uk/~lycett/main.htm>.

I Congreso Colombiano de Botánica, 26-30 de abril de 1999, Instituto de Ciencias Naturales de la Universidad Nacional de Colombia, Santafé de Bogotá. Los Temas que se tratarán girarán alrededor de: Biodiversidad y Conservación, Taxonomía, Sistemática y Evolución; Ecosistemas terrestres y marinos; Biología celular y molecular; Etnobiología y Botánica Económica; Fisiología; Palinología y paleoecología; Anatomía y morfología. Información adicional por favor contactar a: Jaime Aguirre C., Coordinador general, Subdirector de Investigaciones, Instituto de Ciencias Naturales, Tel: 3165000 ext. 11520, e-mail: <jaguirre@ciencias.ciencias.unal.edu.co>.

3rd European Congress of Mammalogy, 29 May - 3 June, 1999, Jyväskylä, Finland. Hosted by the Department of Biological and Environmental Sciences of the University of Jyväskylä, the Societas Europaea Mammalogica and Confennia Ltd. For more information: Congress Secretariat, Confennia Ltd., e-mail: <lappalai@cone.jyu.fi>.

II International Wildlife Management Congress "Wildlife, Land and People: Priorities for the 21st Century", 28 June- 2 July 1999, Gödöllő, Hungary. Organized by The Wildlife Society with the Hungarian co-sponsor and host, the University for Agricultural Sciences in Gödöllő, Hungary. Deadline for proposals of one-half-day workshops, symposium, and special poster session proposals: 30 June 1998. Workshops, symposia, and special poster sessions should focus on topics of wildlife science, management, sustainable development, education and outreach, or laws and policy within the broad theme of the Congress. Each day will begin with a morning plenary session followed by related concurrent sessions, symposia and workshops in the afternoon. Themes for the five-day congress are (1) Sustainable Development and Wildlife Conservation; (2) Landscape Linkages: Ecosystem Science and Management; (3) Issues in Wildlife-Human Con-

flicts; (4) Education, Outreach, and Human Dimensions in Wildlife Conservation; and (5) Techniques for Monitoring Wildlife Populations. Symposia, and, where appropriate, workshop presentations will be considered for publication in a Congress proceedings; organizers will be required to provide an initial edit and evaluation of submitted papers. The proceedings will be published in English; oral presentations will be in English or possibly Hungarian depending on the availability of translators. More information on preparing proposals for workshops, symposia, and special poster sessions can be found in the March-April 1998 issue of *The Wildlifer*, and on The Wildlife Society website <<http://www.wildlife.org/index.html>>, or guidelines may be requested from Co-Chair of the Program Committee, W. Daniel Edge at his e-mail address. Deadline for submission of papers and posters: 15 October 1998. Electronic (e-mail or internet form) submissions are preferred. Electronic submissions of contributed papers and posters should be sent to the Program Co-Chair at the e-mail address below. Please, no telephone inquiries related to abstract submission or acceptance. Direct all other inquiries to The Wildlife Society office at Tel: (301) 897-9770, Fax: (301) 530-2471, e-mail: <tws@wildlife.org>. Decisions concerning acceptance of papers and posters will be made by 30 November 1998. The abstract submission form can be found on the TWS webpage <<http://www.wildlife.org/abstract.html>>. Dr. W. Daniel Edge, Co-Chair, Program Committee, Department of Fisheries and Wildlife, Oregon State University, 104 Nash Hall, Corvallis, Oregon 97331-3803, USA, e-mail - <daniel.edge@orst.edu>, <edged@netten.net>, also <<http://www.wildlife.org>>.

IX Congresso Brasileira de Primatologia, 25-29 July 1999, Museu de Biologia Mello Leitão, Santa Teresa, Espírito Santo, Brazil. The theme of the congress is "Primate Conservation - Perspectives for the 21st Century". For further information, please contact: Sérgio Lucena Mendes, Museu de Biologia Mello Leitão, Avenida José Ruschi 4, 29650-000 Santa Teresa, Espírito Santo, Brazil, Tel: (027) 259-1182, Fax: (027) 259-1182, e-mail: <mendes@sigma.tropical.com.br>.

22nd Annual Meeting of the American Society of Primatologists, 12-16 August, 1999, Fairmont Hotel, New Orleans, Louisiana, USA. Hosted by the College of Liberal Arts and Sciences and the Regional Primate Research Center of Tulane University. Abstracts must be sent to the Chair of the Program Committee by 1 February 1999. Contact information: Program Chair, Dr. Mollie Bloomsmith, TECHLab, Zoo Atlanta, 800 Cherokee Ave., S.E., Atlanta, Georgia 30315, USA, Tel: (404) 624 5990, Fax: (404) 627-7514, e-mail: <mbloomsmith@mindspring.com>. Local Arrangements Chair: Dr. Margaret Clarke, Department of Anthropology, Tulane University, 1021 Audubon Street, New Orleans, LA 70118, Tel: (504) 865-5336, Fax: (504) 865-5338, e-mail: <mclarke@mailhost.tcs.tulane.edu>. ASP website: <<http://www.asp.org>>.

IV Congreso de Manejo de Fauna Amazonica, 4 al 8 de octubre de 1999, Asunción, Paraguay. Este importante evento, iniciado en 1992, resume en breves días los resultados de todos los esfuerzos aplicados en pos de la conservación de la fauna de toda la región amazónica. En esta oportunidad se fortaleciera la pluriparticipación, la discusión de estrategias y la elaboración de planes de acción apuntando a una conservación protagonizada por los pobladores rurales, beneficiarios directos de un uso sostenible del recurso faunístico. La organización de este evento es el resultado de un esfuerzo conjunto entre la Oficina CITES-Py, La Gobernación del Departamento Central y la organización ambientalista Fundación Moises Bertoni para la Conservación de la Naturaleza. Misión: Trabajar en forma pluriparticipativa y en acción coordinada para la optimización de las políticas de uso, técnicas y estrategias de manejo de la vida silvestre amazónica para fomentar el desarrollo socio-económico sostenible y la conservación de la naturaleza. Los trabajos serán recibidos hasta el 1 de marzo de 1999. Se podrán enviar por correo electrónico, o en impresión en papel blanco tamaño carta con una copia archivada en diskette. Únicamente se recibirán los siguientes formatos: WP5.1, Microsoft Word 6.0 o textos en ASCII (DOS IBM). Invitación a eventos: La comisión organizadora desearía recibir propuestas para la organización de simposios, talleres, cursos, mesas redondas y otras reuniones relacionadas a la temática propuesta para el Congreso. Los interesados en organizar o en participar de algunos de estos eventos pueden comunicarse con el Comité Organizador. Inscripciones: Hasta el 31 de marzo de 1999, estudiantes: US\$30, profesionales: US\$60; Hasta el 30 de setiembre de 1999, estudiantes: US\$50, profesionales: US\$100; Inscripciones tardías (durante el Congreso), estudiantes: US\$60, profesionales: US\$120. Los idiomas oficiales del Congreso serán Español y Portugués, no se harán servicios de traducción simultánea. Comisión Organizadora, IV Congreso de Manejo de Fauna Amazonica, Fundación Moises Bertoni, C.C. 714, Asunción, Paraguay, Tel: (595-21) 608 740, 600 855, Fax: (595-21) 608 741m, e-mail: <congreso@fmbert.una.py>. Visitenos en internet (a partir de julio): <www.mbertoni.org.py>.

Primate Society of Great Britain Winter Meeting 1999, 1 December 1999, Institute of Zoology, London. The theme will be "Mating and Social Systems of Old World Monkeys". Suggestions for speakers and offers of posters are very welcome. Please contact: Dr. Caroline Ross or Mairi Macleod, School of Life Sciences, Roehampton Institute London, West Hill, London SW15 3SN, UK, Tel.: +44 181 392 3561, Fax: +44 181 392 3527, e-mail: <c.ross@roehampton.ac.uk> or <m.macleod@roehampton.ac.uk>.

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XVIIIth Congress of the International Primatological Society, 7-12 January 2001, Adelaide, Australia. Hosted by the Australasian Primate Society, President Mr. John

Lemon, Western Plains Zoo, Dubbo, NSW. Mr. Graeme Crook is Chairman of the Organizing Committee. Deadlines: Symposium titles - July 1999; Abstracts - January 2000. For more information, and to be put onto the Congress Organizer's mailing list, write to: Conventions Worldwide, PO Box 44, Rundle Mall, SA 5000, Australia, Tel: +61 8 8363 0068, Fax: +61 8 8363 0354, e-mail: <satconv@camtech.net.au>, sending your postal address, telephone, fax and e-mail address.

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.

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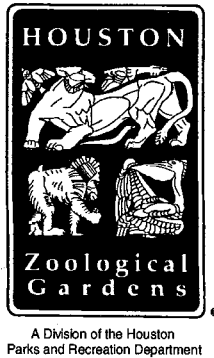
Correspondence, messages, and texts can be sent to:

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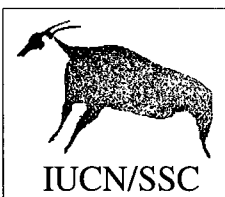
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