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*A Newsletter of the Neotropical Section of the IUCN/SSC Primate Specialist Group*

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## Articles

### TAXONOMIC NOTES ON *ATELES GEOFFROYI*

In their review on the current status of New World monkey classification at the species and subspecies level, Mittermeier and Coimbra-Filho (1981) discussed the taxonomic problems of each genus and pointed out weaknesses and the need for further research. They indicated that *Ateles geoffroyi* is one of the species in need of a major taxonomic revision, which in our opinion is becoming an important problem in terms of its conservation status. In this note, we comment this and other authors' (e.g., Konstant *et al.*, 1985; Mittermeier *et al.*, 1988) notes on the taxonomic status of *Ateles geoffroyi vellerosus*, *A. g. yucatanensis* and *A. g. pan*, and compare them to the observations we have made and recorded in study sites from three countries; Mexico, Belize, and Guatemala.

Mittermeier and Coimbra-Filho (1988) referred to *Ateles* as a "variable genus" and suggested that "...some rearrangement and perhaps reduction of the species and subspecies recognized by Kellogg and Goldman is probably necessary." Roosmalen and Klein (1988), referring to Hernández-Camacho and Cooper (1976), noted that "Differences between species and subspecies are based almost entirely upon the pelage characteristics. These are, to some extent, variable within populations and may intergrade between populations over large parts of their range...". However, considering the subspecies *vellerosus*, *yucatanensis*, and *pan*, to what extent are the pelage characteristics "variable" within populations, and how much may they "intergrade" between populations over large parts of the species' range? In our experience, the species' pelage characteristics are widely variable and therefore not sufficiently reliable to be considered as one of the major traits supporting subspecies' distinctions in the cases of *vellerosus*, *yucatanensis*, and *pan*. In other words, we believe the pelage characteristics of *Ateles geoffroyi* should not be regarded as the measure of distinctive taxonomic traits among the three subspecies. The following observations are summarized to support our statement.

#### *A. geoffroyi vellerosus*

In their assessment of *Ateles geoffroyi*'s current taxonomic situation, Konstant *et al.* (1985) described *A. g. vellerosus* as a subspecies in which "...dorsal surfaces...range from black to dark brown, except for a light band across the lumbar region, and contrast strongly with its lighter abdomen and inner limbs. Exposed flesh-

colored skin is often present about the eyes." This description is compatible with the field observations of Gilberto Silva-López, Joaquín Jiménez-Huerta, María Rebeca Toledo-Cárdenas, and Jorge Benítez-Rodríguez on *A. g. vellerosus* at Sierra de Santa Marta, Veracruz, Mexico, except for the fact that these researchers also found several adult individuals in which: (a) the dorsal surfaces were not as dark, (b) the allegedly lighter band across the lumbar region was not very marked, and (c) the contrast between the color and tones of the dorsal surfaces and the inner limbs was not at all clear. Konstant *et al.* (1985) also pointed out that the "...subspecies can apparently be distinguished from *A. b. belzebuth* and the darker variety of *A. belzebuth hybridus* by the absence or marked reduction of a white triangular forehead patch and sideburns"; but observations at Santa Marta suggest that the white triangular forehead patch may be very common in *A. g. vellerosus*. Biologists J. Jiménez-Huerta and J. Benítez-Rodríguez (pers. comm.), for example, observed several individuals with this characteristic, and even came to the point of distinguishing one of the female dominated subgroups by the presence of "Blanca", an adult female with a large white triangular forehead patch, a trait which was shared with two of the infant females that were forming part of Blanca's subgroup.

These observations suggest that the *vellerosus* subspecies has a wide variety of pelage colors and tones which, according to *campesinos* of the Sierra, may vary between "muy negro a muy blanco" (very black to very white). Mexican researcher Alvar González Christen (pers. comm.) had the chance to observe the "dirty white" coloration of an adult spider monkey in the crater of the Santa Marta volcano, and Hall and Dalquest (1963, p.262) noted that "One man reported an albino spider monkey in the hills west of Jimbal (Veracruz)." Our team also observed a whitish *vellerosus* spider monkey while at the National Park of Tikal, Guatemala, with a darker distal third of the tail. Both A. González-Christen in Veracruz, and our team in Guatemala, found no evidence to conclude these monkeys were albinos, but merely individuals with a markedly whitish coloration.

#### *A. geoffroyi yucatanensis*

Konstant *et al.* (1985) described *A. g. yucatanensis* as "... brownish-black on its head, neck and shoulders, becoming lighter brown on the lower back and hips and contrasting with its silvery white underside, inner limbs and sideburns..." They also noted that the subspecies "...may be confused with lighter individuals of *A. geoffroyi vellerosus*." None of the papers by Elizabeth Watts and Victor Rico-Gray (e.g., Watts *et al.*, 1986; Watts and Rico-Gray, 1987), who studied spider monkeys in the Yucatan Peninsula, provide evidence

on the subject and only note that "The taxonomic status of (*Ateles geoffroyi yucatanensis*) is controversial and little is known of (its) natural history and ecology". The general description of the subspecies by both Dr. Damián Rumiz and Gilberto Silva-López at the Río Bravo Conservation and Management Area of Belize (Fragoso *et al.*, 1990; Silva-López and Rumiz, 1995) is quite similar to that of William Konstant, Russell Mittermeier and Stephen Nash, but D. Rumiz and G. Silva-López also noted that "The pattern of color observed in the spider monkeys more closely resembled that of the Mexican subspecies (*A. g. vellerosus*) than the Yucatan subspecies (*A. g. yucatanensis*), contrary to what was previously reported for Belize (Kellogg and Goldman, 1944)", and continue "We might say there was certain inter-individual variation in the color, which made it difficult to assign individuals to a particular subspecies. In fact, some individuals showed patterns of color that are intermediate between the subspecies' descriptions and color representations made by Konstant *et al.* (1985)".

#### *A. geoffroyi pan*

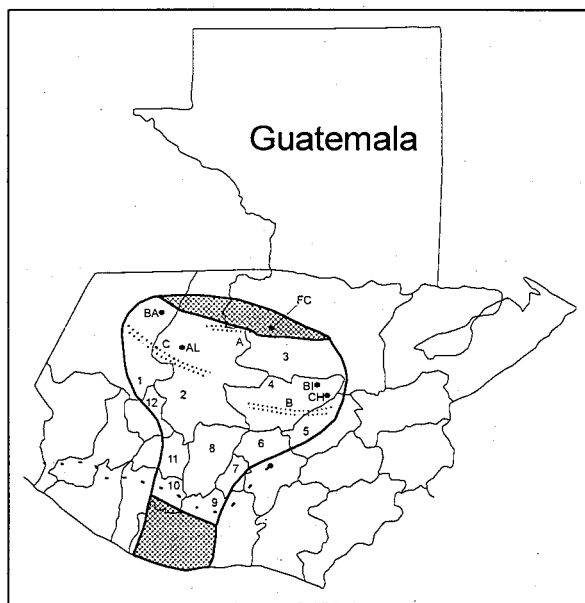
The Guatemalan spider monkey, *Ateles geoffroyi pan*, was reported by Konstant *et al.* (1985) as "...very similar

to the darker colored individuals of *A. geoffroyi vellerosus*", and described it as "...having a thick black coat, and is said to occur at high altitudes. It differs from *A. g. vellerosus* in that its dorsal coloration does not contrast as markedly with that of its ventral surface, and it does not possess a lighter-colored saddle on its lumbar region." However, the description of the subspecies, which is "...supposed to occur in the central mountains of Guatemala..." was based "...on only 3 animals of unknown geographic origin (Kellogg and Goldman, 1944)...", which encouraged Konstant and coworkers to conclude *pan* "...may not be a valid taxon."

Our study of the subspecies' geographical range, as proposed by Kellogg and Goldman (1944, in Konstant *et al.*, 1985), seems to support the remark by Konstant *et al.* regarding the validity of *pan* as a distinct subspecies. The area of reference appears in more detail in Figure 1. As can be seen, the area includes important portions of several Guatemalan departments. The main vegetation type in the area is coniferous forest, with *Pinus*, *Quercus*, and *Liquidambar* among the dominant genera. Some remnants of tropical forest can be found in the lowlands of Alta Verapaz and Quiché (including the locality of Barillas), to the north; near Chilascó and in the Biotopo Mario Dary Rivera, in the east; and in Escuintla and Retalhuleu, in the south. The latter, however, is a very disturbed area surrounding a segment of the Panamerican Highway, with extensive cultivation of maize, rice, banana, and beans.

Portions of three important sierras form part of the area, including: the Sierra de Chamá (in Alta Verapaz and Quiché), with elevations ranging from 300 to 1,500 m; the Sierra de Chuacús (in Baja Verapaz and Quiché), with elevations ranging from 600 to 2100 m; and the Sierra de los Cuchumatanes (in Huehuetenango and Quiché), with elevations between 1,500 and 2,700 m. Barillas is located on the northern slope of the Cuchumatanes, but *Alouatta palliata* is the only monkey species reported for the area. The same species was reported by Villar (1994) in the Biotopo Mario Dary Rivera, which is located in the highlands of the Sierra de Chuacús (a zone also known as the highlands of the interior). In Chilascó, another locality included in our records, the only species reported is *Alouatta pigra*. Chilascó forms part of the Sierra de las Minas. The literature and field reports we have indicate spider monkeys have not been recorded in this area.

Captive monkeys have also been studied. In 1990-1991, Johanna Motta carried out a detailed survey of captive spider monkeys in four Guatemalan zoos (three individuals from La Aurora Zoo, 11 individuals from The Jungle Zoo [IRTRA], nine individuals from the Minerva Zoo, and three individuals from the Petencito



**Figure 1.** Presumed geographical range of *Ateles geoffroyi pan* (see Konstant *et al.*, 1985). The figure has been modified for this report (see text). Legend: BA: Barillas; AL: Aldea Juil; FC: Finca Chelemhá; BI: Biotopo Mario Dary Rivera; CH: Chilascó. The thick line delimits the geographical range proposed for *A. g. vellerosus*; diagonal lines indicate tropical forest, the dotted line is the Panamerican Highway, the dashed lines show the Sierras of Chamá (A), Chuacús (B), and Cuchumatanes (C). The numbers indicate the Departments within the range: 1. Huehuetenango, 2. Quiché, 3. Alta Verapaz, 4. Baja Verapaz, 5. El Progreso, 6. Guatemala, 7. Sacatepéquez, 8. Chimaltenango, 9. Escuintla, 10. Suchitepéquez, 11. Sololá, 12. Totonicapán.

Zoo), one safari park (Autosafari Chapin, 19 individuals), and two private collections (one individual from Finca Nacional Santo Tomás, and four individuals from the Finca Enrique Ponce), taking footprints, pictures, measuring and weighing every single individual, as well as obtaining blood samples of the monkeys and inquiring about their history. Her purpose was to conduct a chromosome study of the monkeys, supported by accurate records from the sampled individuals. Dr. Anne Baker, then of the Brookfield Zoo, Chicago, helped in the analyses of the blood samples in 1991, but unfortunately the results were not conclusive. However, the interviews, observations, and analyses of photographs of the 50 individuals led her to conclude that: (a) no single color pattern was dominant among the individuals studied, (b) the individual range of patterns of color and tone varied remarkably, from very dark-colored to very whitish-colored animals, and (c) the study provided insufficient evidence to conclude that *pan* and *yucatanensis*, if considered valid taxa, are among Guatemala's captive spider monkeys.

The spider monkeys at La Aurora Zoo, Guatemala City, provide an example of the wide spectrum of colors and tones in *Ateles geoffroyi*. We had the chance to observe La Aurora's spiders and are in agreement with the researcher Lorena Calvo (see Konstant *et al.*, 1985) that the subspecies kept at the zoo is *A. g. vellerosus*.

All these observations and records have led us to conclude that:

1. The coloration pattern of *A. g. vellerosus* includes a broader spectrum of color and tones than the previously considered;
2. *A. g. yucatanensis* may be considered a valid taxon, but only after more evidence (photographs, morphological studies, caryological studies, and field observations) can be obtained from several localities in the known geographical range of the subspecies;
3. based on the available evidence (maps, vegetation types, and existing records) and supporting the observations of Konstant *et al.* (1985) on the subject, we conclude that *A. g. pan* should not be considered a valid taxon.

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## SISTEMÁTICA DE LOS PLATIRRINOS: UNA PERSPECTIVA FILOGENÉTICA

La clasificación taxonómica de los monos del Nuevo Mundo ha sufrido constantes reordenamientos desde el pasado siglo. Sin embargo, se arribó a un consenso más o menos generalizado al separarlos en 2 familias: Callitrichidae (*Callithrix*, *Cebuella*, *Leontopithecus*, *Saguinus*), y Cebidae, agrupando a todos los géneros restantes (Simpson, 1945; Cabrera, 1958; Simons, 1972); esto se transformó en la clasificación tradicional que en muchos casos continúa vigente, con el objetivo principal de distinguir a los "Callitrichidae", aquellos platirrinos de pequeño tamaño corporal, poseedores de garras en lugar de uñas planas, que han perdido el tercer molar y que dan a luz dos crías. No obstante, todos estos caracteres fueron observados como adquisiciones derivadas (Ford, 1980) en contraste con la hipótesis de que son caracteres primitivos retenidos desde los platirrinos ancestrales (Hershkovitz, 1977). Pero es obvio que la gran diversidad del Infraorden Platyrrhini va más allá de esta dicotomía familiar.

Rosenberger (1981) consideró que los Cebidae reúnen sólo a *Cebus* y *Saimiri* (Cebinae) con *Callithrix*, *Cebuella*, *Leontopithecus*, *Saguinus* y *Callimico* (Callitrichinae), mientras que los restantes se agrupan en la Familia Atelidae, subdividida en Atelinae (*Ateles*, *Lagothrix*, *Brachyteles* y *Alouatta*) y Pitheciinae (*Pithecia*, *Chiropotes*, *Cacajao*, y *Callicebus* y *Aotus* como taxones hermanos más distantes). El esquema de Ford (1986) difiere en la exclusión de *Callicebus* y *Aotus* fuera de los Pitheciinae, agrupándolos con *Cebus* y *Saimiri* en la Familia Cebidae, aunque sólo a los efectos de preservar el amplio uso de "Cebidae" y la contraposición histórica con Callitrichidae (*Callithrix*, *Cebuella*, *Leontopithecus*, *Saguinus* y *Callimico*, sensu Ford). No obstante, Ford aclara la escasa sustentación de su Familia "Cebidae", en especial la posición de *Cebus* en relación a los restantes platirrinos. Kay (1990) establece que *Aotus* representa el taxón hermano de los Atelinae (*Ateles*, *Brachyteles*, *Lagothrix* y *Alouatta*), en

tanto *Saimiri* se relacionaría con los Callitrichinae; *Cebus* se considera aquí una forma más primitiva que divergió antiguamente de los restantes grupos.

De estos esquemas, podemos ver que existe consenso en algunos clados, pero la problemática se centra en los géneros *Aotus*, *Callicebus*, *Cebus* y *Saimiri*. Thorington y Anderson (1984), en respuesta a las diferentes hipótesis, reunieron a todos los platirrinos en la única Familia Cebidae, subdividida en subfamilias; aquí *Aotus*, *Callicebus*, *Cebus* y *Saimiri* son separados en las subfamilias monotípicas Aotinae, Callicebinae, Cebinae y Saimiriinae, respectivamente. Los restantes clados se conservan como fue señalado más arriba, a excepción de *Alouatta*, también separado en Alouattinae; pese a que comúnmente se lo agrupa con los Atelinae, aún no es clara la posición de *Alouatta*, puesto que conserva ciertos caracteres de la dentición cuya polaridad es dudosa.

Al parecer no existen sinapomorfias dentarias exclusivas de todos los platirrinos (Szalay y Delson, 1979; Kay, 1980; Rosenberger, 1981); por el contrario, hallamos la que posiblemente sea la única sinapomorfia craneal, consistente en el contacto entre parietal y yugal, evitando la conexión entre frontal y aliesfenoides, en la región ptérica (Ashley-Montague, 1933; Le Gros Clark, 1959; Rosenberger, 1977; Delson y Rosenberger, 1980; Ford, 1986). También existirían al menos tres caracteres postcraneales únicos para todos los platirrinos, a excepción de su posible presencia en ciertos especímenes del Oligoceno de Egipto (Ford, 1986). Es decir que en principio no poseemos suficiente información confiable para reunir a todos los platirrinos en un clado

**Tabla 1.** Clasificación de los Platyrrhini.

|                           |  |
|---------------------------|--|
| Familia Atelidae          |  |
| Subfamilia Atelinae       | <i>Ateles</i><br><i>Brachyteles</i><br><i>Lagothrix</i>  |
| Subfamilia Alouattinae    | <i>Alouatta</i>  |
| Subfamilia Pitheciinae    | <i>Pithecia</i><br><i>Chiropotes</i><br><i>Cacajao</i>   |
| Subfamilia Callitrichinae | <i>Callithrix</i><br><i>Cebuella</i><br><i>Leontopithecus</i><br><i>Saguinus</i><br><i>Callimico</i> |
| Subfamilia Cebinae        | <i>Cebus</i>   |
| Subfamilia Saimiriinae    | <i>Saimiri</i>   |
| Subfamilia Aotinae        | <i>Aotus</i>   |
| Subfamilia Callicebinae   | <i>Callicebus</i>  |

monofilético (la carencia de sinapomorfias puede trasladarse a todo el Orden Primates, dado que la única que poseen estos es la bula formada por una extensión del petroso, en el complejo temporal), y luego se presentan aún más inconvenientes al buscar caracteres derivados exclusivos de todos los "Cebidae" de la clasificación tradicional.

Es sabido que los fósiles deben contribuir, y de hecho son la parte fundamental, en la compleja construcción taxonómica de las formas vivientes; entonces hallamos que los fósiles más abundantes y mejor preservados consisten en dientes aislados o *in situ* en especímenes fragmentarios. También asumimos que estos dientes nos proveen de una importante información sistemática, por lo cual, pese a deducir que no existirían sinapomorfias dentarias que sean exclusivas de los Platyrrhini, podemos aproximarnos a una historia evolutiva lo suficientemente fundamentada dentro del infraorden, más aún teniendo en cuenta el gran incremento de hallazgos fósiles en las últimas dos décadas. Los análisis de la dentición, entre otros, nos muestran entonces que no existe una "Familia Cebidae" que agrupe a los no-Callitrichinae, y consecuentemente el registro fósil corrobora esta hipótesis.

Como resultado de un análisis cladístico de 67 caracteres dentarios (Tejedor, ms.) se evidenció una estrecha relación entre los Callitrichinae (representados en este estudio por *Callithrix*, *Leontopithecus* y *Callimico*) y *Saimiri* y *Cebus*, este último como el taxón hermano más distante. Rosenberger (1981) obtuvo idénticos resultados basado en caracteres craneodentarios; asimismo, recientes estudios moleculares demuestran similar agrupamiento (Schneider *et al.*, 1995, incluyendo además *Aotus* y *Callicebus*) o excluyen sólo a *Cebus* (Meldrum *et al.*, 1993). Por otra parte, en el mencionado análisis cladístico, *Callicebus* y *Aotus* aparecen como taxones hermanos de los restantes platirrininos, y más distante aún se halla *Homunculus*, un fósil del Mioceno temprano de Patagonia, de cercanas vinculaciones con *Callicebus* y, en menor grado, con *Aotus*. Los otros géneros utilizados en este análisis fueron *Ateles* (como representante de los Atelinae, excluyendo *Alouatta*) y *Pithecia* y *Cacajao* (representando a los Pitheciinae), separados ambos grupos en clados bien distintivos, cuya monofilia es indudable. En estas instancias, y recordando el esquema de Thorington y Anderson (1984), es pertinente sugerir el uso de subfamilias para separar los distintos clados monofiléticos de los Platyrrhini (Tabla 1), donde filogenéticamente puede corroborarse, luego de extensos debates, la estrecha relación entre los Callitrichinae y *Cebus* (Cebinae) y *Saimiri* (Saimiriinae). Provisionalmente, *Alouatta* es considerado como único integrante de la Subfamilia Alouattinae, aunque restan estudios más amplios para comprender su exacta

posición filogenética. No fue incluido *Homunculus* dentro de esta clasificación porque sólo se utilizó en el análisis cladístico para concluir si existía una cercana relación con *Callicebus* y *Aotus*, ya que previas observaciones indicaban una gran afinidad morfológica, y más precisamente *Callicebus* muestra importantes caracteres primitivos compartidos con *Homunculus* (Tejedor, 1995a, 1995b). La prolongada evolución independiente de *Callicebus* y *Aotus* conduce a separarlos en las subfamilias monotípicas Callicebinae y Aotinae, respectivamente; ambos presentan caracteres diferenciales en los incisivos, siendo en *Aotus* más espatulados y de implantación más vertical, en tanto que en *Callicebus* son más estrechos y procumbentes. Los caninos son reducidos y escasamente proyectados sobre el plano oclusal, mientras que los molares tienen cúspides bien desarrolladas, más prominentes en *Callicebus*, quien posee además un gran hipocono y marcado cingulo lingual en los molares superiores. Algunas de las tendencias derivadas en otros platirrininos actuales conducen a extremar la procumbencia de los incisivos (Pitheciinae, *Callithrix*, *Cebuella*), incrementar el tamaño de los caninos, con su máxima expresión en los Pitheciinae, reducir el tercer molar (*Cebus*, *Saimiri*, e incluso se pierde en los Callitrichinae, excepto *Callimico*), acentuar el desarrollo de crestas en los molares (*Brachyteles*, *Alouatta*), reducir el relieve oclusal de premolares y molares (Pitheciinae), o aumentar notablemente el espesor del esmalte dentario (*Cebus*). Parte de la polaridad tentativa de estos caracteres se deduce de la información que provee *Homunculus*, como antiguo representante del infraorden (Tejedor, ms.).

Es oportuno insistir en la utilización del nombre familiar Atelidae (Tabla 1), que agrupa según este estudio a todos los platirrininos, en reemplazo de "Cebidae". Delson (comunicación personal; ver también Rosenberger *et al.*, 1990) advierte que el término supragenérico Atelina Gray 1825, basado en el género *Ateles*, antecede a Cebina Bonaparte 1831, basado en *Cebus*, y dado que a instancias del Código Internacional de Nomenclatura Zoológica todos los nombres del "grupo familiar" (Superfamilia, Familia, Subfamilia, Tribu) deben estar basados en el mismo género con la misma prioridad en todas las jerarquías dentro de ese grupo familiar, no existen razones para continuar utilizando "Cebidae".

Reiterando que estos estudios están basados en el análisis de la dentición exclusivamente, es imprescindible contar con mayores contribuciones a partir de otras alternativas de trabajo, para elucidar la compleja radiación filogenética de los platirrininos.

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## UPDATING THE TWO PLEISTOCENE PRIMATES FROM BAHIA, BRASIL

The discovery of two nearly complete skeletons of large Pleistocene primates from Bahia, Brazil, was announced in these pages three years ago (Cartelle, 1993). Preliminary analysis of these fossils is now complete, and they are identified as two different genera of very large atelines (Fig. 1). One skeleton is an adult individual referred to *Protopithecus brasiliensis* Lund, 1838 (Hartwig and Cartelle, 1996), and the other is a nearly

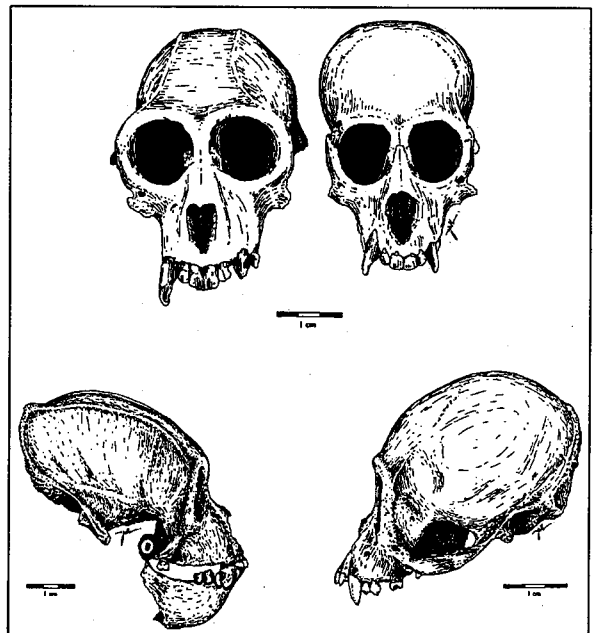


Figure 1. Frontal and lateral views of the skull of *Protopithecus* (left) and *Caipora* (right). Illustration by Humberto do Espirito Santo.

**Table 1.** Cranial measurements for *Protopithecus*, *Caipora*, and the four genera of living ateline New World monkeys. All measurements in millimeters.

|         | <i>Protopithecus</i> | <i>Caipora</i><br>subadult | <i>Ateles</i> | <i>Brachyteles</i> | <i>Lagothrix</i> | <i>Alouatta</i> |
|---------|----------------------|----------------------------|---------------|--------------------|------------------|-----------------|
|         | n = 1                | n = 1                      | n = 92        | n = 11             | n = 73           | n = 25          |
| NCL     | 110.1                | 94.1                       | 77.9          | 86.6               | 73.7             | 61.2            |
|         |                      |                            | 68.5-84.4     | 79.8-91.7          | 67.0-81.2        | 54.9-68.8       |
| NCB     | 72.8                 | 75.4                       | 60.8          | 61.9               | 58.6             | 51.0            |
|         |                      |                            | 54.9-65.7     | 57.7-65.1          | 53.8-63.1        | 47.3-56.2       |
| TSL     | 150.5                | 131.5                      | 114.1         | 114.8              | 104.9            | 107.6           |
|         |                      |                            | 104.0-122.0   | 100.0-122.0        | 97.2-114.6       | 96.3-121.4      |
| BAS-NAS | 83.4                 | 77.2                       | 63.3          | 68.2               | 63.1             | 64.9            |
|         |                      |                            | 55.4-71.9     | 58.2-74.4          | 57.9-70.0        | 57.6-78.2       |
| PL      | 43.8                 | 40.6                       | 34.4          | 38.7               | 31.6             | 39.9            |
|         |                      |                            | 29.9-40.7     | 34.2-44.1          | 26.2-37.4        | 34.7-59.9       |
| BOB     | 70.8                 | 63.3                       | 55.6          | 57.3               | 54.0             | 52.3            |
|         |                      |                            | 49.9-64.2     | 52.0-61.2          | 47.9-59.0        | 47.2-60.7       |

NCL = Neurocranial length, NCB = Neurocranial breadth, TSL = Total skull length, BAS-NAS = Basion-nasion, PL = Palate length, BOB = Biorbital breadth.

**Table 2.** Postcranial measurements for *Protopithecus*, *Caipora*, and the four genera of living ateline New World monkeys. All measurements in millimeters, except where indicated. Asterisk denotes incomplete growth of the fossil.

|       | <i>Protopithecus</i> | <i>Caipora</i><br>Subadult | <i>Ateles</i> | <i>Brachyteles</i> | <i>Lagothrix</i> | <i>Alouatta</i> |
|-------|----------------------|----------------------------|---------------|--------------------|------------------|-----------------|
|       | n = 1                | n = 1                      | n = 31        | n = 3              | n = 17           | n = 25          |
| FHD   | 25.0                 | 22.9                       | 17.9          | 18.2               | 15.0             | 13.4            |
|       |                      |                            | 15.8-20.2     | 16.9-19.8          | 14.0-15.7        | 11.8-15.9       |
| FND   | 16.2                 | 15.2                       | 9.9           | 10.3               | 8.3              | 7.9             |
|       |                      |                            | 8.0-11.8      | 9.5-11.2           | 7.4-9.6          | 6.4-10.8        |
| FL    | 237                  | 216*                       | 205.6         | 202.0              | 166.4            | 154.2           |
|       |                      |                            | 190.5-226.0   | 186.5-212.0        | 157.5-176.5      | 139.0-171.0     |
| BCB   | 45.4                 | 38.5                       | 31.8          | 29.0               | 27.1             | 23.9            |
|       |                      |                            | 29.1-34.9     | 28.0-30.9          | 24.2-29.3        | 21.4-26.7       |
| HHD   | 28.4                 | 25.1                       | 20.5          | 19.8               | 20.1             | 19.8            |
|       |                      |                            | 17.8-24.1     | 18.2-21.6          | 18.6-22.2        | 16.9-23.1       |
| HMST  | 18.5                 | 18.5                       | 11.0          | 10.4               | 10.2             | 9.5             |
|       |                      |                            | 10.0-12.4     | 9.4-11.6           | 9.2-11.4         | 7.3-12.1        |
| BIEPI | 48.0                 | 37.7                       | 30.9          | 30.0               | 28.0             | 26.6            |
|       |                      |                            | 28.5-33.2     | 26.7-33.0          | 25.6-30.0        | 22.5-30.8       |
| I-I   | 1.04                 | 1.06*                      | 1.05          | 1.07               | 0.98             | 0.95            |
|       |                      |                            | 1.01-1.07     | 1.05-1.08          | 0.96-1.0         | 0.92-0.98       |
| FV    | 90 ml                | 70 ml                      | 40 ml (n=1)   | -                  | 20 ml (n=1)      | 20 ml (n=1)     |

FHD = Femoral head diameter, FND = Femoral neck diameter, FL = femoral length, BCB = femoral bicondylar breadth, HHD = humeral head diameter, HMST = humeral midshaft thickness, BIEPI = humeral biepicondylar breadth, I-I = Intermembral index (forelimb length/hindlimb length), FV = femoral volume (measured by water displacement in a graduated cylinder).

mature subadult recently described as a new genus and species, *Caipora bambuorum* Cartelle and Hartwig, 1996 (Fig. 1).

The complete skeleton of *Protopithecus* is remarkable for its large size, calculated to be approximately 25 kg based on extrapolations from postcranial measurements (Tables 1 and 2). It is further remarkable because the cranium distinctly resembles *Alouatta*, the howler monkey, while the postcranium bears the same adaptations to suspension and brachiation as *Ateles* and *Brachyteles*. The type specimen discovered in Minas Gerais by Lund in 1836 was known only from a proximal femur and a distal humerus, and from these it was assumed that *Protopithecus* was a large Pleistocene miquiqui (Hartwig, 1995). The presence of a flat, posterior nuchal plane, and an extended basicranium in the skull

of the new skeleton was entirely unexpected. *Protopithecus* presents as unique mixture of size and morphology, and shows that atelines were more diverse in the recent past.

The *Caipora* skeleton resembles living spider monkeys in both cranial and postcranial details. The skull is sufficiently different from *Protopithecus* in the shape of the neurocranium and basicranium to warrant its own genus. It differs from *Ateles* in having a much wider, and thus larger braincase. The limb bones are not fully grown, but suggest that this *Caipora* individual weighed approximately 20 kg.

Together, *Protopithecus* and *Caipora* represent the largest South American primates, the most complete fossil platyrrhines, and the first substantial record of



Pleistocene primate evolution on the continent.

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## CHARACTERISTICS OF TWO TYPES OF HABITAT AND THE STATUS OF THE HOWLER MONKEY (*ALOUATTA CARAYA*) IN NORTHERN ARGENTINA

In Argentina the black howler monkey, *Alouatta caraya*, inhabits upland semideciduous forests, and flooded forests on the islands of the large rivers, Paraná and Paraguay (Cabrera, 1939; Brown and Zunino, 1994). Field studies done on this species in these habitats revealed differences in density, social organization, diet, and behavior, related to the floristic structure (Rumiz, 1987, 1990; Rumiz *et al.*, 1986; Zunino, 1986, 1989; Bicca-Marques, 1994; Brown and Zunino, 1994).

Currently, *A. caraya* is not considered as threatened (Emmons, 1990; Rylands *et al.*, 1995). However, in Argentina the continuous extensive deforestation for timber, land use, and dam construction, suggests a progressive degradation and reduction of the habitat available for this species. The aims of the project reported here consisted in the definition of three types of habitat occupied by *A. caraya*, evaluating as such the relation between habitat and population characteristics and the effects of alteration.

### Study Site and Methods

The study was carried out in the northwest of the Corrientes Province, Argentina (27° 30'S, 58° 50'W), comprising riparian forest patches along the Riachuelo river, and flooded forest in the Paraná river.

In the Riachuelo river area, the forest is a mosaic of tall

and low patches of about 10 ha separated by grasslands. The forest patches show different degrees of alteration, some suffering a selective logging while in others most of the trees have been eliminated.

On the islands, the terrain is inundated almost yearly defining as such the floristic structure which is characterized by the presence of fast-growing tree species (Rumiz *et al.*, 1986). Occasionally, floods persist over long periods resulting in the loss of trees, and reducing dramatically the presence of howler monkeys. Due to the low quality of the timber, and the fact that the soils are not suitable for agriculture, logging is not a serious problem.

To compare the habitats, inventories of trees were carried out in three sites inhabited by the howler monkeys. On the Riachuelo river, a tall forest patch was selected which had suffered little alteration (BPA), along with a second which had been heavily exploited (BMA). The criteria used to select these sites were based on qualitative evaluations of the tallness of the canopy, the presence of species of economic importance, abundance of thin-trunked trees, and evidence of exploitation. The study of the flooded forest patch (SI) was carried out on the island of Brasilera, near the confluence of the Paraná and Paraguay rivers.

The species, height, and diameter at breast height (DBH) were recorded for all trees with a DBH greater than 10 cm. They were plotted in quadrats of 10 x 10 m. For comparisons between habitats we employed the following variables: NiH>10 m = Number of trees belonging to each species with a height greater than 10m; DBHm = Mean DBH; Nsp = Number of species; Ni/Nsp = Number of individuals of each species with respect to the total number of species; and NiDBH>20 cm = Number of individuals with a DBH greater than 20 cm. We also calculated the density, and used Shannon's index as a measure of diversity. Differences between habitats were analyzed by applying a discriminant analysis. To evaluate the effect of logging, we compared our results with previous inventories of 174 ha at BPA and BMA in 1987.

The density of howler monkeys was estimated in BPA, BMA, and SI. Daily censuses by transect were carried

**Table 1.** Habitat characteristics. Mean values and SD of tree density expressed as individuals per ha (Di); Total number of species (Nsp); Shannon's Index (H'); Diameter at breast height (DBH); Mean height (Hm); BPA: Unexploited forest; BMA: Disturbed forest; SI: Flooded forest.

| Site | Di         | Nsp | H'   | DBH          | Hm          |
|------|------------|-----|------|--------------|-------------|
| BPA  | 500 (26.8) | 20  | 4.61 | 16.68 (7.5)  | 6.58 (1.6)  |
| BMA  | 745 (75.8) | 14  | 1.92 | 19.95 (2.9)  | 5.99 (1.5)  |
| SI   | 300 (76.5) | 7   | 1.15 | 32.47 (11.4) | 15.15 (3.6) |

**Table 2.** Results of classification among the three habitats.

| Site | N  | BMA  | BPA  | SI   |
|------|----|------|------|------|
| BMA  | 20 | 70.0 | 25.0 | 5.0  |
| BPA  | 19 | 36.8 | 63.2 | 0.0  |
| SI   | 29 | 0.0  | 6.2  | 93.1 |

out during at least three weeks at each site. The area surveyed was estimated by multiplying the distance traveled by 40 m. The estimated density values were obtained applying the Non-Linear Density Plot Method (Struhsaker, 1981).

## Results and Discussion

The floristic analysis (Table 1) showed that the BPA and BMA had more slender trees than the SI. BMA showed the greatest abundance of trees with a DBH between 10 and 30 cm, with a few individuals in the largest categories. At BPA we also observed a predominance of slender trees (DBH=10-30 cm), but some larger trees were also present. SI showed the highest frequency of large trees, with a peak of DBH between 20 and 50 cm.

Small trees were most abundant at BMA; almost 50% of those recorded were between 4-6 m. BPA also showed a high frequency of low trees, with more than 40% grouped between 6-8 m. SI, on the other hand, showed the greatest spread, with individuals ranging in height from eight to 24 m.

The most diverse of the three plots was BPA due to the high number of tree species. The diversity values in BMA were approximately half those of BPA, suggesting the possibility that a wider range of food sources was to be found in the less altered environments. At SI, however, diversity was lower than in the other two habitats, due to fewer species. Finally, the highest density values were obtained at BMA, were found to be intermediate in BPA, and lowest in SI.

The vegetation quadrats were grouped in 3 OTUS, each corresponding to the previously defined habitats. The first discriminant function explained 95% of the variance, and suggested that the first two functions could explain the relationships between the ecological factors. The variables with greatest discriminant value were: Hm, Ni, and Ni/Nsp on the first function, and Hm on the second. The first discriminant function separated most of the SI quadrats with respect to BPA and BMA (Table 2). However, the analysis did not discriminate clearly between BPA and BMA. The partial overlap suggested a degree of similarity between them. This was expected due the common origin of the two areas, differentiated only by the degree of exploitation.

Regarding the howler census, we found that the mean

**Table 3.** Population characteristics of black howler monkeys. Mean values (SD), and comparisons by ANOVA among habitats.

| Variable           | BMA         | BPA         | SI           | P     |
|--------------------|-------------|-------------|--------------|-------|
| Density (inds./ha) | 0.50 (0.17) | 0.88 (0.18) | 2.37 (0.74)  | <0.01 |
| Group size         | 4.60 (1.42) | 7.80 (1.64) | 13.00 (7.10) | <0.01 |
| Sex ratio          | 1.60 (0.62) | 2.00 (0.70) | 1.90 (0.60)  | >0.05 |

group size was significantly lower at BMA, and only slightly smaller at BPA than at SI (Table 3). However, larger groups were more frequent at SI than at BPA.

The density values showed significant differences between habitats, the lowest was at BMA, and the highest at SI. In spite of the differences in density and group size, sex ratio was not significantly different between habitats. The sex ratio appeared as a constant, independent of the environmental differences, but with many multimale groups in SI and a predominance of unimale groups in the other habitats.

A continuous reduction in quality and size of the useful habitat for howlers was observed for the Riachuelo area between 1987 and 1994. Currently 21.14% of the 123 ha of BPA studied in 1987 is being exploited, which is consequently becoming more similar to BMA, and considering the 174 ha of habitat comprising BPA and BMA, 16.1% has been eliminated altogether. Considering the islands occupied by howlers, the recently inaugurated dam of Yacireté has eliminated habitats containing between 4000 and 14000 howlers due to inundation (Neris *et al.*, 1994; Zunino and Ruiz, 1995).

The density of howler monkeys in the flooded forest is higher than has been recorded for other populations of *Alouatta* living in tropical environments (Crockett and Eisenberg, 1987). The flooded forest offers a less diverse diet (Brown and Zunino, 1994), but seasonality is less marked than in the *terra firme* forest patches at the same latitude (Rumiz *et al.*, 1986). The availability of potential food resources in the flooded forest appears to be more uniform in space and time.

In the last decades forest exploitation in the study site has resulted in a loss of habitat for the black howler monkeys, reducing the populations and increasing the isolation of the groups. If this trend continues in the future, the mainland population will be seriously threatened. The status of *A. caraya* in flooded forest, however, remains uncertain. Other projects threaten this environment, such as the Corpus and Paraná Medio dams and the waterway project that intends to permit navigation as far as Bolivia. Protected areas where these howlers occur are limited to the National Parks of Chaco and Pilcomayo, with an estimated population of about 10,000 howlers, and none of them includes flooded forests, the most important habitat for this species

(Brown and Zunino, 1994).

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## TEMPORAL DIVISION OF LABOR IN A PRIMATE: AGE-DEPENDANT FORAGING BEHAVIOR

### Introduction

Division of labor based on age or size may reflect the reproductive condition of individuals in social groups. In 1967, West proposed the general hypothesis that hierarchical relations may be advantageous to both dominants and subordinates and that individuals of low rank may be inferior reproductives who benefit genetically from associations with and contributions to reproductively superior individuals. Since increasing age or size eventually entails decreasing reproductive value ( $V_x$ ), several authors have noted that the display of social behavior, such as foraging behavior that benefits all members of a group, should increase with age as the benefits from individual (selfish) reproduction decline (e.g., West-Eberhard, 1975; Hrdy and Hrdy, 1976). As individual reproductive value decreases, benefits (genetic or other) from assisting the reproduction of conspecifics (social behavior) may increase because costs (genetic or other) of social behavior decrease with decreased benefits from individual reproduction. In order to test this hypothesis, I studied the relationship between adult female age, dominance rank, reproductive value, and social foraging behavior (food search and pursuit) for adult female mantled howler monkeys (*Alouatta palliata* Gray).

### Subjects and Methods

During an extended period of study at Hacienda la Pacifica, Cañas, Guanacaste, Costa Rica, I studied two marked, aged groups of mantled howler monkeys in two tropical dry forest habitats (see Jones, 1980; Table 1). For this species, age and dominance rank are negatively correlated in both sexes (Jones, 1978, 1980).

Foraging was operationally defined as the behavioral series: feed-rest-move (at least 100m) - feed, by a unit of more than three adults. These criteria were adopted in order to standardize measurement and to eliminate periods of food search within unusually large patches

and by consort pairs. I identified which females in the primary study groups initiated foraging sequences and analysed these observations by age.

My null hypothesis held that the frequency of foraging by females of any age class would be proportional to the total number of females who foraged in an age class. Two of the 15 females in one group (both young adults) were never observed to direct foraging sequences and are excluded from analysis. Three females were aged on the basis of physical and behavioral traits other than tooth wear, and assignment to age classes for these females was made independent of the present analysis. Two of these females were observed from sub-adult through adult growth and classified as young adults; a third female, classified as middle-aged, was the mother of a sub-adult and a juvenile offspring, a highly unlikely combination for any other age class (see Glander, 1980). In my analysis of the second group (eight adult females), two young adult immigrant females were never observed to forage socially and were excluded from analysis. The pattern of results reported here would remain unaffected by alternative treatments of the raw data.

A monthly foraging rate for each forager was computed by dividing the frequency of foraging by the female's number of months resident in a group, a period of time varying from 10-14 months since some females emigrated during the study. These rates were compared with a female's age class, on the one hand, and dominance rank, on the other, to assess the relationship

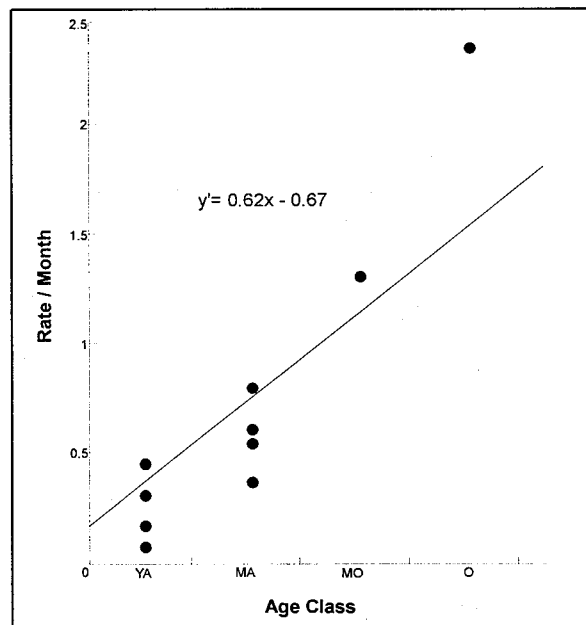


Figure 1. Social foraging rate as a function of age for young adult (YA), middle-aged (MA), middle-aged to old (MO) and old (O) female howlers. Each point represents one adult female except where asterisk indicates two.

Table 1. Age class, estimated age in years, number of females in each age class (N), observed (O) and expected (E) frequencies of social foraging, and cumulative chi square ( $\chi^2$ ) values for a test of the null hypothesis.

| Age class                  | N  | O   | E     | (O-E) <sup>2</sup> /E |
|----------------------------|----|-----|-------|-----------------------|
| Young adult (5-7)          | 5  | 15  | 42.4  | 17.71                 |
| Middle-aged (7-10)         | 5  | 35  | 42.4  | 1.29                  |
| Middle-aged to Old (10-15) | 1  | 18  | 8.1   | 12.11                 |
| Old (15+)                  | 1  | 33  | 8.1   | 76.54                 |
| Total                      | 12 | 101 | 101.0 | 107.65                |

between the display of social foraging behavior and rank, and reproductive value ( $V_x$ , population data in Malmgren, 1979, Table 23; equation after Wilson and Bossert, 1971) where the relative contribution to future generations of an individual of a given age is quantified.

## Results and Discussion

Table 1 presents the results of my analysis for the first group of foraging frequency as a function of female age, including expected frequencies. Computing "goodness of fit" led to an unequivocal rejection of the null hypothesis ( $P \leq 0.001$ ,  $\chi^2 = 107.64$ ,  $df = 3$ ). Thus, old age and foraging frequency are significantly related. Young adult females initiate foraging significantly less than expected on the basis of their numbers ( $P \leq 0.001$ ), suggesting that such individuals are relatively "selfish" or are conserving time and energy, possibly for reproduction or competition. Table 1 also shows that the middle-aged to old female foraged more than expected by chance ( $P \leq 0.01$ ), and this female succeeded the oldest and lowest ranking female as the most frequent forager when the old female emigrated in 1977 (personal observation).

Additional observations support the reliability of the above patterns. The oldest female in the second group foraged more frequently than any other ( $P \leq 0.001$ ,  $\chi^2 = 17.29$ ,  $df = 2$ ). Similarly, the relationship between foraging rate and age class (Fig. 1) yields a significant positive correlation ( $r_s = +0.629$ ,  $p \leq 0.05$ ). Related to this, the correlation between foraging rate and dominance rank (Fig. 2) is significant but negative (i.e., the higher the foraging rate, the lower the dominance rank,  $r_s = -0.63$ ,  $p \leq 0.05$ ). Thus, the initiation of foraging is significantly associated with female age and dominance rank.

It was hypothesized above that the expression of social behavior should increase with increasing age since reproductive value (Fig. 3) decreases with age and with it the benefits from selfish reproduction. Fig. 3 shows the reproductive value curve for the population of howler monkeys at Hacienda da Pacifica. Comparing Fig. 3 with Figs. 1 and 2, consistent with expectation, a strong negative association appears to exist between reproductive value and rate of foraging. Reproductive

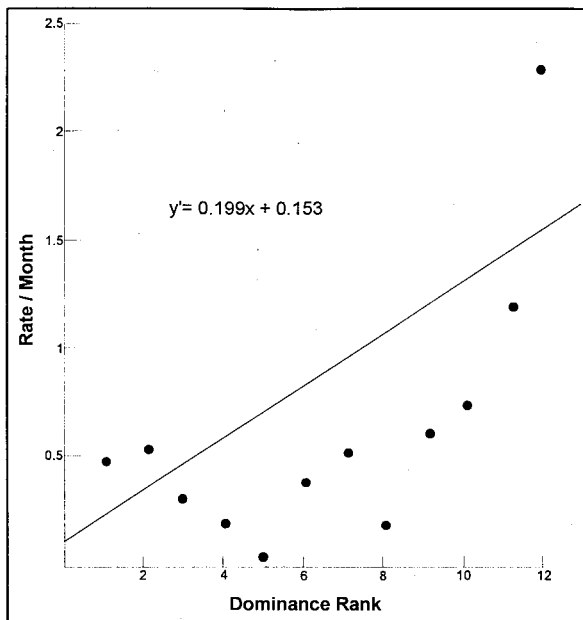


Figure 2. Social foraging rate as a function of individual dominance rank; each point represents one adult female. Note that low numbers mean high rank.

value in the four adult age classes is negatively and significantly correlated with social foraging rate/month ( $r_s = -0.95$ ,  $p \leq 0.02$ ). These results support the view that increasing age or size eventually entails decreasing reproductive value and that the display of social behavior should increase with age as the benefits from individual (selfish) reproduction decline.

What features of the howlers' environment might favor temporal division of labor? On 52 occasions, I was able to record the specific resource upon which foraging sequences terminated. Forty-four (85%) of these sequences terminated on ephemeral food, while eight (15%) sequences terminated with feeding on mature leaves ( $P \leq 0.001$ ,  $\chi^2 = 49$ ,  $df = 1$ ). Thus, the initiation of foraging sequences appears to be associated with food, the local distribution of which is temporally uncertain; new leaves, flowers, and fruit. The old female initiated 21 of the 52 (40%) bouts, 20 of these for ephemeral food.

An old female's presumed experience with the mosaic of her home range might enhance her efficiency as a forager so that her foraging activity may yield an energetic and nutritional gain to other group members. Temporal uncertainty of preferred food resources may favor individuals that are the beneficiaries of the foraging activity of others when reproductive value is low. Division of labor through differential social roles may be a function of relative reproductive value, and behavioral roles may be understood within the context of life history patterns.

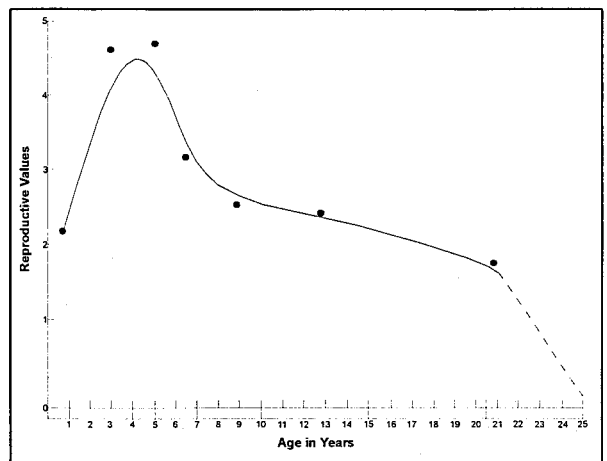


Figure 3. The reproductive value ( $V_r$ ) curve for the howler population at Hacienda La Pacifica, Cañas, Guanacaste, Costa Rica. Reproductive value was computed for the mid-point of each age class since discrete ages could not be determined year-by-year.

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## PRELIMINARY RECORDS OF COMMON MARMOSETS (*CALLITHRIX JACCHUS*) FROM THE SETE CIDADES NATIONAL PARK, PIAUÍ, BRAZIL

Common marmosets (*Callithrix jacchus*) are endemic to northeastern Brazil and live in a variety of habitat types (Rylands *et al.*, 1993). Previous research on the behavior and ecology of this species has been restricted to the semi-deciduous coastal forests of Permambuco, Paraíba, and Rio Grande do Norte (e.g., Alonso and Langguth, 1989; Digby and Barreto, 1993; Hubrecht, 1984; Scanlon *et al.*, 1989). However, the majority of the common marmoset geographic range encompasses the very different vegetation found in the interior of Brazil. Here we report on preliminary surveys of a marmoset population in the northeastern Brazilian state of Piauí.

### Vegetation of the Brazilian Northeast

The northeastern interior is dominated mainly by two types of vegetation: the *cerrado* (savanna forest) and the *caatinga* (dry thorn scrub). The *cerrado* covers over 2.01 million km<sup>2</sup> within Brazil and is second only to the Amazon forest in the area it covers (Rizzini *et al.*, 1988). The term *cerrado* (*sensu lato*) encompasses a wide range of subtypes of xeromorphic vegetation from the *campo limpo* (open grasslands) to the *cerradão* (dense savanna forests). Trees are semi-deciduous with broad and rigid leaves and thick bark that allows them to survive frequent savanna fires (Eiten, 1972). The *caatinga* covers an additional 0.91-1 million km<sup>2</sup> and is characterized by a semi-arid climate. Herbs and grasses grow in the *caatinga* only during the rainy season, and vegetation is xerophytic or deciduous (Rizzini, 1977; Rizzini *et al.*, 1988). The flora of the Brazilian *cerrado* is estimated to include 7,000 species compared to the 60,000 species of the Amazon flora and 2,000 species of the flora found in the northeastern *caatinga* (Castro, 1994).

### The Study Site

Surveys were conducted at the Sete Cidades National Park in the municipalities of Piri-piri and Piracuruca, Piauí (04° 05-09'S, 41° 30-45'W; alt. 100-300 m). The park encompasses 6,221 ha and includes a small hostel,

restaurant, and administrative offices. The primary tourist attractions in the park are a series of dramatic rock formations and rock paintings (Brazil, IBDF/FBCN, 1979).

The park exists in a *cerrado-caatinga* transition zone resulting in a mosaic of habitats. In relatively level areas with good drainage, plant species characteristic of the *cerrado* predominate [e.g., "lixreira" (*Curatella americana*), "barbatimão" (*Stryphnodendron coriaceum*), "cascudo" (*Terminalla fagifolia*), "faveira-de-bolota" (*Parkia platycephala*), and "piquei" (*Caryocar coriaceum*)]. In areas with poor drainage (and subject to flooding) open grassland is found, and along stream beds, riparian forests of the *cerradão*. Mixed into many of these habitats are species characteristic of the riparian forests [e.g., "jatobá-de-mata" (*Hymenaea courbaril* var. *stilbocarpa*), "pau-marfim" (*Agonandra brasiliensis*), and "pau-pombo" (*Sclerolobium paniculatum* or *Tapirira guianensis*)] and species characteristic of *caatinga* [e.g., "sabiá" (*Mimosa caesalpinifolia*), "pau-d'arco-de-sete-folhas" (*Tabebuia aurea*), "aroeira" (*Miracrodruon urundeuva*), "macambira" (*Bromelia lacinoso*), and "xique-xique" (*Pilosocereus gounellei*) (Barroso and Guimarães, 1980).

### Marmoset Surveys

Informal surveys were carried out during two periods: July 1994 (three days; eight surveys of 2-5 hours duration) and July 1995 (17 days, total of 66 hours of surveys). Surveys involved one to four observers in five different areas within the park. Particular attention was paid to locating and identifying gum-producing plants bearing characteristic marmoset gouge-holes.

Direct sightings or indirect evidence of common marmosets were found in three areas. In Area 1, a patch of *cerradão* with no standing water, a group of at least three individuals was sighted during the 1994 survey. Vocalizations were heard in this same general area in 1995. Though the area contained trees known to be gum sources for this species [e.g., "cajuí" or cashew (*Anacardium occidentale* var. *microcarpum*)], no trees with gouge-holes were found. In Area 2, pristine riparian forest in a section of the park closed to tourists, three gum trees were found with gouge marks typical of those created by the marmosets (see below). Area 3 consisted of a semi-disturbed gallery forest adjacent to the park office and hostel. Here, a marmoset group containing at least seven individuals was followed for 9.5 hours over 10 days. The group consisted of three adults (at least one male and one female), two juveniles (estimated at 6-7 months of age based on size and pelage), and two infants (estimated at about one month of age). During the brief observation period animals used approximately

one to 1.5 ha of an estimated 15 hectare patch of forest.

A total of eight individual trees of four species were found with gouge holes typical of those produced by marmosets. Three cashew trees (*Anacardium occidentale* var. *microcarpum*) were found marked. One (in Area 3) was seen being used by the marmosets and was heavily marked with fresh gouges. The other two trees contained only older, dry gouges. Three "pau terra" trees (*Qualea grandiflora* and *Q. parviflora*) were identified. Again, marmosets in Area 3 were observed feeding on one of the three trees. This is the first record of this genus being used by common marmosets, though both species have been reported as a food source for the black-tufted marmoset (*Callithrix penicillata*) (Fonseca and Lacher, 1984). One "jatobá-de-chapada" (*Hymenaea stigonocarpa*) was found with only three gouges, and it is unlikely that this tree was used as a food source. The fourth species was unidentified, but was heavily marked with old, dry gouges. Overall, while several gum trees were found, their apparent densities were much lower than those found in the Atlantic coastal forests (e.g., Alonso and Langguth, 1989; Scanlon *et al.*, 1989).

## Discussion

Marmosets have become increasingly well known for their unusual social organization and variable reproductive strategies. While we have been able to broaden our understanding and documentation of their behavior, it is currently unclear what ecological factors may be responsible for this flexibility. Seasonality in food availability is likely to affect marmoset population densities and home range sizes which, in turn, are likely to have profound effects on the social organization and reproductive strategies of this species. As the seasonal *caatinga* and *cerrado* habitats make up the majority of the common marmoset geographic range, a long-term study of the groups at the Parque Nacional de Sete Cidades should add considerably to our understanding of this species.

Preliminary results from Sete Cidades already indicate some key differences between this marmoset population and those found in the coastal forests. Of particular note is the apparent low density of trees being used as gum sources by the marmosets (less than two gouged trees/hectare in Area 3). In comparison, Scanlon *et al.* (1989) found a minimum of 54 gum-producing trees per hectare (most with gouge marks), and Alonso and Langguth (1989) identified 25 gum-producing trees in their group's home range (5 trees/hectare; all with gouged holes). The relatively low density of gouged trees at Sete Cidades suggests that the marmoset themselves are at low densities, or that they rely on other food sources. The

low frequency of visual or auditory contacts with animals during surveys supports the former, that groups are indeed at low densities compared to coastal populations (e.g., Digby and Barreto, 1993; Scanlon *et al.*, 1989). The density of gouged trees and marmoset groups at Sete Cidades are also low in comparison to those for the black-tufted-ear marmoset (*C. penicillata*) (Fonseca and Lacher, 1984; Faria, 1984). Additional behavioral observations will be necessary before it can be determined which alternative food sources are available to the Sete Cidades marmosets.

These results, while preliminary, already suggest important differences in the ecology of common marmosets living in the *cerrado-caatinga* transition zone compared to groups living in the coastal forests. The confirmation of the presence of common marmosets at the Sete Cidades National Park is a further important step in the understanding of this species' ecology, in particular because of the lack of protected areas in the semi-arid *caatinga* and *cerrado* habitats within its geographical range. Of the seventeen conservation units (excluding two that contain "possibly introduced and mixed populations") cited for the species by Rylands *et al.* (1993), only three protect semi-arid habitats. Despite its ecological flexibility, natural populations of common marmosets are increasingly vulnerable to habitat destruction. The protection of a relatively large area of native habitat such as that at Sete Cidades will be important for the conservation of common marmosets (and that of other *cerrado/caatinga* fauna) over the long term, as will the collection of more detailed data on the behavior and ecology of this species.

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## AN UNUSUAL PRIMATE COMMUNITY AT THE ESTAÇÃO ECOLÓGICA SERRA DOS TRÊS IRMÃOS, RONDÔNIA, BRAZIL

Located in northwestern Rondônia (Figure 1), the 99,813 ha Estação Ecológica Serra dos Três Irmãos was decreed in 1990 as part of statewide network of conservation units. Três Irmãos is the only component of this network located on the left or west bank of the Rio Madeira, which plays an important role in the zoogeography of the region's primates (Rylands and Bernardes, 1989; Ferrari and Lopes, 1992), in addition to a number of other mammals (Emmons, 1990). Most of these taxa are not found elsewhere in Rondônia, which emphasizes the importance of this Ecological Station's role in the conservation of the biodiversity of this state, one of the most intensely-colonized areas of Brazilian Amazonia.

Two different areas of the Station were surveyed in October and December 1995 in order to identify its diurnal mammal species and evaluate their population densities. Nine primate species were observed during these surveys (Table 1). In addition to nocturnal sightings, a group of four owl monkeys was seen in activity on one occasion at mid-morning. A tenth species not observed during surveys, *Alouatta seniculus*, was encountered on the left bank of the Madeira, 5 Km from the southern limit of the Ecological Station.

Local residents interviewed all reported that howlers are found only in areas close to the Rio Madeira. This, together with the lack of any indirect evidence (vocalizations or feces) of the occurrence of *Alouatta* within the Ecological Station, which at its closest point is 3 km from the Madeira, indicates that the distribution of *A. seniculus* in this area may be restricted to a relatively narrow corridor, perhaps less than a kilometer in width, on the left bank of this river. Howlers are nevertheless more widespread further downstream (Ferrari and Lopes, 1992).

A similar distribution was indicated by local residents for two other species not observed during the present study - *Ateles belzebuth* and *Cebuella pygmaea*. The presence of *Ateles* would be expected from its known

**Table 1.** Primates observed in the Três Irmãos Ecological Station, Rondônia.

|                                       |
|---------------------------------------|
| <i>Aotus nigriceps</i>                |
| <i>Callicebus caligatus</i>           |
| <i>Cebus albifrons</i>                |
| <i>Cebus apella</i>                   |
| <i>Lagothrix lagotricha cana</i>      |
| <i>Pithecia irrorata</i>              |
| <i>Saguinus fuscicollis weddelli</i>  |
| <i>Saguinus labiatus labiatus</i>     |
| <i>Saimiri (sciureus) boliviensis</i> |



distribution (Kellogg and Goldman, 1944), but that of *Cebuella*, while not improbable (Rylands *et al.*, 1993), would constitute an important extension of its geographical range. It is hoped further fieldwork, planned for 1996, will not only confirm the occurrence of these two species in the area, but will also provide insights into the factors determining their local distribution, and that of others such as *Alouatta seniculus*.

Two-hundred kilometers of line transect censusing were carried out during the present study, during which all but two species - *A. nigriceps* and *C. albifrons* - were recorded. A third species, *S. boliviensis*, was sighted on only one occasion. The most abundant species were *L. lagotricha*, *P. irrorata*, *S. fuscicollis* and *S. labiatus*, which together contributed 86.4% of sightings. *Lagothrix* appeared to be particularly abundant at the site, a good indication of a lack of hunting within the reserve.

The relative scarcity of the *Cebus* species, normally among the most abundant primates in western Amazonian communities, whether hunted or not (Peres, 1990), raises some interesting questions, especially in the light of the local distribution of *Alouatta*, for example. *Pithecia*, on the other hand, was recorded twice as frequently as *Cebus* at Três Irmãos, the opposite of the situation recorded at most other western Amazonian sites.

Fortunately, the Serra dos Três Irmãos Ecological Station is relatively isolated from Rondônia's principal areas of human colonization, which lie to the east/south of the Rio Madeira. The Station is accessible only by boat, and appears to suffer little encroachment, except by local fisherman. The results of the present study nevertheless indicate the need for the extension of the Station's limits to the left bank of the Madeira in order to protect fully the area's mammalian communities. This has been recommended to the state environment secretariat, and is currently under study.

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## PREDATOR (*MUSTELA NIVALIS*) RESPONSES IN CAPTIVE-BRED *CALLITHRIX JACCHUS*

In 1985, a family of common marmosets was moved from a laboratory setting to a "wild" environment (Chamove and Rohrhuber, 1989). The group was composed of a pair of 2-year-old laboratory-born common marmosets (*Callithrix jacchus*) and their first set of laboratory-born twin sons (9 months old). The four lived together in a wire-mesh cage 3 x 2.1 x 1.4 m prior to release and were fed on a normal laboratory diet. Soon after moving to the garden, twins were born and were 1.2 months old at the time of this observation. The outside area included what was once a walled garden - long neglected - containing trees, shrubs, and vines. There was continuous woodland for several kilometers and the animals could move throughout a wide area without needing to go to the ground. Ivy covered most of the wall and extended out from it over 1.4 m in a tangle of old and new stems. Toads (*Bufo vulgaris*) and semi-wild domestic cats were also seen, but were never observed being approached by the monkeys. This is in contrast to Kleiman *et al.* (1986) who reported that lion tamarins showed great interest in toads. (Presumably other indigenous Scottish wildlife were present although not seen). Upon release, the marmoset family appeared to adapt quickly (Wendt, 1962). The most striking change in the behavior of the animals was the branch type they chose to use. When in the cages they spent most of the time on flat mesh surfaces and horizontal branches with infrequent, brief (0.8/min) visits to the floor. Unrestricted outside, they spent most of the time (89%) in the dense network of thin flexible ivy vines, where they could not be seen at a distance. They rarely visited more open shrubs (10%) or trees (1%). The monkeys were never observed on the ground. Although having no prior experience with gums, the monkeys were regularly observed feeding from gouges they had made

in elm trees (*Elnus*) preferring those of smaller girth.

In the laboratory, the monkeys reacted to soaring birds as well as to aeroplanes, giving alarm calls and then approaching the skylights to search for the bird once it had disappeared. On the outside the monkeys responded to soaring birds of all kinds, gulls were common, by leaping into dense bushes and remaining still. The marmosets appeared to ignore a large rubber snake located on the ground or in the branches, even when the head was made to move [see Heymann, 1987]. I found a dead weasel (*Mustela nivalis*) that had been flattened laterally by a car, and wedged its dry form into some branches in a life-like position. Three of the four marmosets mobbed the animal, giving alarm calls and directing threats at the predator. The father, carrying the 1-month-old babies, approached most hesitantly, remaining about 1.5 m away; the adult female approached closest, to within 10 cm, and appeared to be the most active in the mobbing. Surprisingly, the juvenile males were not the most vigorous mobbers (Millar, Evans, and Chamove, 1988). After about five minutes, and when the weasel did not move off, the marmosets' interest decreased. They moved away, still giving sporadic alarm calls, and looking back at the immobile weasel.

When the study was published, there were few reports of responses to predators of South American primates, and we reported the response of the marmosets as being presumably abnormal, maladaptive, and unlike what would be expected from wild animals. The report by Philips (1995) seems to suggest that this might not be the case, with monkeys approaching predators more closely than humans would judge as safe. Philips' white-faced capuchins were mobbing a tayra, approaching to within 2 m. Only one animal approached, but it was one of the two adult males. The monkey (female) carrying an infant did not approach closely. The remaining group members were intermediate in distance. Just like the tayra, our weasel made no aggressive response towards the monkeys in response to their mobbing. Could it be that there is a single animal that is the prime defender in a group; that is has the "role" of defender (Chamove, 1983)?

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## WILD PRIMATES - NATURAL RESERVOIRS OF THERMOTOLERANT CAMPYLOBACTERS IN EASTERN PERU

Thermotolerant campylobacters have been shown to be one of the most important etiological agents of acute enteritis in humans, but in other mammalian species the bacteria are present in an apparently healthy carrier-state in the majority of cases (Rosef *et al.*, 1983). In order to determine the importance of wild primates as reservoirs of these zoonotic microorganisms, rectal swabs were obtained from a total of 43 individuals representing nine species (Table 1) from different areas in the vicinity of the town of Iquitos.

All samples were immediately placed into the transport and enrichment medium (Fernández, 1992) and cultivated within eight hours on modified Skirrow's medium (Fernández, 1983), at 42°C for 48h, in microaerophilic conditions. Suspected colonies were identified (Luechtefeld *et al.*, 1981b) using catalase and oxidase tests (both positive) and the morphological features observed in Gram-stain (curved S-shaped rods). Later, the thermotolerant *Campylobacter* species were identified using the criteria proposed by Lior (1984) and Goossens and Butzler (1992).

Campylobacters were isolated from 9 (20.9%) of the animals studied (Table 1). However, none of the animals showed signs of enteritis or other illness. This isolation rate was higher than that reported by Luechtefeld *et al.*

**Table 1.** Prevalence of fecal cultures positive for thermotolerant campylobacters in wild primates.

| Species                     | No. of individuals | Culture positive |                |                | Culture negative | Total no. positive |
|-----------------------------|--------------------|------------------|----------------|----------------|------------------|--------------------|
|                             |                    | <i>C. jejuni</i> | <i>C. coli</i> | <i>C. lari</i> |                  |                    |
| <i>Saguinus labiatus</i>    | 12                 | 1                | 2              | 0              | 9                | 3 (25.0)           |
| <i>Saguinus mystax</i>      | 7                  | 0                | 2              | 0              | 5                | 2 (28.6)           |
| <i>Pithecia monachus</i>    | 6                  | 0                | 2              | 0              | 4                | 2 (33.3)           |
| <i>Saimiri sciureus</i>     | 4                  | 0                | 0              | 0              | 4                | 0                  |
| <i>Lagothrix lagotricha</i> | 4                  | 0                | 0              | 0              | 4                | 0                  |
| <i>Cebus apella</i>         | 4                  | 1                | 1              | 0              | 2                | 2 (50.0)           |
| <i>Cebus albifrons</i>      | 2                  | 0                | 0              | 0              | 2                | 0                  |
| <i>Ateles paniscus</i>      | 2                  | 0                | 0              | 0              | 2                | 0                  |
| <i>Aotus sp.</i>            | 2                  | 0                | 0              | 0              | 2                | 0                  |
| Total                       | 43                 | 2 (22.2)*        | 7 (77.8)*      | 0*             | 34               | 9 (20.9)           |

Numbers in parentheses = %. Numbers in parentheses with an asterisk = % of isolates.

(1981a) (9.3%) and similar to the results obtained by Fernández *et al.* (1987) in Brazil (19.0%). As reported previously (Russell *et al.*, 1988; Gozalo *et al.*, 1991), and supported by the present study, *C. coli* was the predominant bacteria isolated from the primates.

It is highly likely that mammalian species differ in their susceptibility to intestinal colonization by *C. jejuni* and *C. coli*, regardless of the degree of exposure to these bacteria. This circumstance may help to explain the different carriage rates detected in this and similar studies (Rosef *et al.*, 1983). Our data provide evidence that wild primates from Iquitos appear to be important reservoirs and infection sources of these bacteria for man. Further studies are required to clarify and understand the epidemiology of campylobacteriosis that is evidently a complex phenomenon in developing countries.

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## NEWS

### DISCOVERY OF A NEW SPECIES OF MARMOSET IN THE BRAZILIAN AMAZON

The existence of a new and undescribed marmoset near the Rio Madeira was first brought to our attention in June 1994 by Dr. José Márcio Ayres of the Wildlife Conservation Society, New York. Information available at the time indicated that it occurred in the region of the Rio Abacaxis in the east of the state of Amazonas. As a result, we organized an expedition to the area, made possible through collaboration with Drs. Horacio Schneider and Júlio Pieczarka of the Department of Genetics of the Federal University of Pará, and Dr. José Augusto Muniz of the National Primate Center, National Health Foundation, Belém. The expedition was financed by the John D. and Catherine T. MacArthur Foundation

and a Manaus-based tourist company, Amazon Ecopark Hotéis e Turismo Ltda.

Further information was first obtained in the town of Olinda do Norte. Describing what we knew of the species, a local inhabitant indicated the Rio Canumã, as the region where it occurred. Arriving at the mouth of Rio Canumã, we obtained immediate confirmation of the existence of the monkey, with a local trader, Sr. Pedro Coelho, having two pet marmosets in his backyard, one being *Callithrix chrysoleuca* from the west bank of the Rio Canumã and the other the new species, which he reported occurred on the east bank, where he lived. We stayed in the area for four days, time enough to collect two specimens of the new species. We also observed *C. chrysoleuca* at Santa Bárbara on the left bank of the Canumã.

From there, we traveled to the Paraná Urariá in the direction of the Rios Abacaxis and Marimari, where we were able to observe and collect specimens of the new species as well as *Callithrix mauesi*, first described by Mittermeier, Schwarz and Ayres in 1992, at the localities of Santa Maria, Abacaxis and São João.

The description of this new species will be published in the near future in the periodical *Goeldiana Zoologia*, a publication of the Museu Paraense Emílio Goeldi, Belém, with financial support from, Washington, D. C. Conservation International. Stephen D. Nash of the State University of New York kindly provided the illustrative material.

The new taxon has been named *Callithrix saterei* Silva Jr. and Noronha 1996 after the Saterê-Maués Indians of the region. The type series (holotype and six paratypes) has been placed in the mammal collection of the Museu Paraense Emílio Goeldi (MPEG), represented by the series MPEG23955-23961. The type locality is "the mouth of the Rio Canumã, right bank of the Rio Canumã, municipality of Borba, Amazonas, Brazil (03° 59' S, 59° 05' W)", and the type series comes from three localities.

*Callithrix saterei* was assigned to the bare-eared "argentata" marmoset group of Hershkovitz (1977), and is evidently allopatric with regard to its nearest relations, *C. argentata*, *C. leucippe*, *C. melanura*, *C. emiliae* and *C. nigriceps*. It is, however, larger (average weight 430 g) and presents some autapomorphic traits, especially with regard to an unusual morphology of the genitalia of both sexes, and a combination of pigmented black ears but loss of pigmentation on the face. It also has a number of synapomorphies with the species *C. nigriceps*, *C. emiliae* and *C. intermedia* to the south.

The conservation status of *C. saterei* remains unknown.

However, a large part of its geographic range is covered by the Coatá-Laranjal Indigenous Area of the National Indian Foundation (FUNAI), shared by the Saterê-Maués and Mundurucus Indian tribes. This implies indirect protection for the region's fauna and flora. In the area we surveyed, outside the Indigenous area, it appears to be a common species in secondary terra-firme forest in varying stages of succession, as well as seasonally inundated black-water forest (*igapó*), and even near slash-and-burn cultivation.

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## CONSIDERACIONES SOBRE LA ORGANIZACIÓN SOCIAL Y EL SISTEMA DE PAREAMIENTO DE UN GRUPO DE MONOS AULLADORES (*ALOUATTA PALLIATA*)

El presente estudio es parte del monitoreo de un grupo de monos aulladores que fue liberado en la isla Agaltepec, Veracruz, México, dentro de un programa de translocación con fines conservacionistas (Rodríguez-Luna *et al.*, 1993). La liberación del grupo progenitor terminó en 1989 y la tropa quedó constituida por 9 animales adultos (8 hembras y 1 macho) y un infante; a partir de entonces, se ha presentado un crecimiento considerable a lo largo de estos años (Cortés-Ortiz *et al.*, 1994).

Un aspecto importante a estudiar en un grupo de monos recién formado y en crecimiento, es la forma en que se

organizan socialmente para reproducirse. Para la especie se han reportado diferentes tamaños de grupo, variando desde 8 hasta 20 individuos (Milton, 1982; Estrada, 1982; Crockett y Eisenberg, 1986). La organización social ha sido descrita como grupos o subunidades poligínicos que pueden ser unimacho, multimachos y de edad graduada (Jones, 1985; Crockett y Eisenberg, 1986) y algunos investigadores han reportado la forma en que hembras y machos se asocian para copular (Carpenter, 1965; Glander, 1980; Jones, 1985; Clarke, 1983). Sin embargo, mientras algunos afirman que el macho dominante en turno tiene acceso exclusivo a las hembras adultas (Clarke, 1984) y que aun cuando haya más de un macho adulto en las tropas, el sistema de organización social es muy similar al sistema de harem unimacho (Crockett y Eisenberg, 1986); otros aseguran que las hembras en estro pueden establecer relaciones de consorte y copular con varios machos durante este período (Carpenter, 1965), y han observado que los machos dominantes copulan en la parte media del estro, que ha sido relacionado con el "pico" de la fertilidad, y los de menor rango durante otros momentos antes o después de este pico (Glander, 1980; Jones, 1985).

Debido a estas diferencias, se planteó la necesidad de estudiar el tipo de organización social que opera en el grupo de monos aulladores de Agaltepec. Las observaciones para este estudio se realizaron durante 3 períodos (marzo-abril 1994, noviembre 1994, mayo-julio 1995), cumpliéndose con un total de 1225 horas de observaciones y pudiéndose observar 25 estros de 12 hembras diferentes. Al momento de iniciar las observaciones la tropa estaba constituida por 30 individuos: 6 machos adultos, 12 hembras adultas (3 de las cuales todavía no habían tenido crías, ni se habían observado en interacciones sexuales), 9 juveniles y 2 infantes (3 infantes más nacieron durante este período); conforme transcurrieron los períodos de observaciones, varios machos y hembras entraron en la madurez sexual e intervinieron en algunos episodios reproductivos de la tropa; asimismo, una hembra adulta murió. Al finalizar las observaciones el grupo estaba constituido por 36 individuos: 9 machos adultos, 14 hembras adultas (9 que habían tenido por lo menos una cría, 2 gestantes y tres nulíparas), 11 juveniles y 2 infantes.

Con base en la información obtenida a partir de la revisión bibliográfica, se formularon 4 hipótesis alternativas sobre el tipo de asociación que se llevaría a cabo entre machos y hembras en Agaltepec. Estas hipótesis son las siguientes:

1. Las hembras de la especie *Alouatta palliata* copulan con varios machos cualesquiera que estos sean, durante sus períodos de estro (Carpenter, 1965).
2. Las hembras de la especie *Alouatta palliata* copulan

con varios machos durante su período de estro; sin embargo, durante un período restringido, donde se supone hay mayor fertilidad, copulan preferentemente con un solo macho (Jones, 1985; Glander, 1980).

3. Las hembras de la especie *Alouatta palliata* copulan con un solo macho durante sus períodos de estro, pero siempre con el mismo (Clarke, 1983).
4. Las hembras de la especie *Alouatta palliata* copulan con un solo macho durante un período de estro, pero pueden cambiar de pareja durante los estros siguientes.

Estas hipótesis fueron enviadas, en noviembre de 1994, a cuatro de los investigadores que han estudiado poblaciones de monos aulladores en libertad y que han hecho algunos comentarios sobre el sistema de apareamiento en sus artículos (Dr. Margaret Clarke, Dr. Clara Jones, Dr. Kenneth Glander y Dr. John Eisenberg), para que las analizaran y asignaran, según su experiencia, la probabilidad de cada una de las hipótesis en tropas silvestre de *Alouatta palliata*.

Los investigadores consultados difirieron en su apreciación sobre la probable ocurrencia de las hipótesis planteadas; lo cual sugiere que esta organización no es estática, sino que varía de acuerdo a condiciones particulares. Todos los investigadores coincidieron en que esta organización depende de la estructura del grupo y de su estabilidad social.

Los datos obtenidos durante el trabajo de campo realizado para este estudio, actualmente están siendo analizados para identificar cuál o cuáles de estas hipótesis se cumplen para la tropa de Agaltepec, y si existen preferencias individuales sobre alguno de los patrones de apareamiento referidos o sobre la pareja. Sin embargo, los datos para este grupo multimacho, sugieren que la mayoría de las hembras copulan con más de un macho durante un período de estro.

En México, la mayoría de las selvas donde se pueden encontrar poblaciones de monos aulladores, se encuentran severamente fragmentadas, y los grupos quedan aislados en estos remanentes de vegetación, provocando la imposibilidad de emigración de machos y hembras hacia otros grupos o la inmigración de nuevos adultos a las tropas, como sucede de manera natural en hábitat extenso. Esta situación conlleva a la formación de un grupo cerrado, como lo es el grupo de Agaltepec, con presencia de un mayor número de machos de los que regularmente se presentan en condiciones naturales para la especie; por lo cual es muy probable que un tipo de organización social muy similar al de Agaltepec esté operando en muchas tropas de monos aulladores en hábitat fragmentado.

## Agradecimientos

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## URBAN MONKEYS - *ALOUATTA FUSCA* IN THE MUNICIPALITY OF PORTO ALEGRE

The occurrence and distribution of the brown howler monkey (*Alouatta fusca clamitans*) is being studied in the municipal district of Porto Alegre (30°S 51°W), the capital of Rio Grande do Sul, the southernmost state of Brazil. The presence of the brown howler monkey was mentioned in the "List of the Vertebrates of the Great Porto Alegre" (Fundação Zoobotânica do Estado do Rio Grande do Sul, 1976). However, very little is known about where in Porto Alegre it occurs and how well (or poorly) preserved its populations are. Only by gathering more information on the status of the species will it be possible to define strategies for its conservation in the region.

Porto Alegre is near the southern boundary of the distribution of *Alouatta fusca clamitans* (Prates et al., 1990). The municipality covers 47,152,28 ha and has a population of about one million 200 thousand people, mostly concentrated in the northern part. As the city develops, and formerly forested areas are occupied, the distribution of *A. fusca* is becoming more and more restricted. The study aims to provide data on the status of the populations of the brown howler monkey in the face of the current urban growth and to establish a basis, through the analysis of habitat quality, for the management and preservation of the remaining populations.

The area was divided into a 25 ha grid and the squares with remaining forests are being visited and thoroughly searched for the presence of the howlers. Occurrences are being registered on the basis of actual sightings and also by the presence of feces. Vocalizations and reports by local inhabitants are considered as additional information. Subsequently, vegetation analyses will be carried out in some of the 25 ha squares visited to assess any relationship between habitat structure and the presence or otherwise of the brown howler monkey. The study is divided into three phases, each covering a third of the area of Porto Alegre, and will last twelve months. The work is being developed by a group of researchers from the Department of Zoology of the Federal University of Rio Grande do Sul (Luis Fernando Guimarães Brutto, Sidnei Dornelles, Rodrigo Camará Printes, Gerson Buss and Márcia M. de Assis Jardim, under the coordination of Helena Piccoli Romanowski

and Luis Flamarion B. de Oliveira; and is receiving support from the Fundação de Amparo à Pesquisa do Estado do Rio Grande do Sul (FAPERGS), the Pró-Reitoria de Pesquisa e Pós-Graduação da Universidade Federal do Rio Grande do Sul" (PROPEP-UFGRS) and the Secretaria Municipal do Meio Ambiente. Porto Alegre (SMAM-PMPA).

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differences (Gomes, 1994). Data was also collected on their feeding postures and hand preferences when manipulating the food. The study is jointly supervised by Dr. Karen B. Strier, Department of Anthropology, University of Wisconsin - Madison, and Dr. César Ades, Institute of Psychology, University of São Paulo, São Paulo. Financial support has been kindly provided by the U. S. National Science Foundation (Grant BNS9582998), the Liz Clayborne and Art Ortenberg Foundation, and the Chicago Zoological Society (all to Dr. Karen Strier) and the Brazilian Science Council (CNPq) and FINEP, Rio de Janeiro (to Dr. César Ades and M. Talebi Gomes). The study forms parts of the requirements for a Master's thesis for the Institute of Psychology, University of São Paulo.

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## A FIELD STUDY OF MURIQUIS IN THE CARLOS BOTELHO STATE PARK, BRAZIL

The Carlos Botelho State Park of 37,432 ha (24° 44' - 24° 15'S, 47° 46'48" 10'W) in the south of the state of São Paulo takes in part of the municipalities of São Miguel Arcanjo, Capão Bonito and Sete Barras. It protects an important part of the Atlantic forest of the Serra do Mar, more precisely the Serra de Paranapiacaba. The primates occurring in the park include *Cebus apella nigrilus*, *Alouatta fusca clamitans*, and the murrelet, *Brachyteles arachnoides*. The first study of the murrelet population there was carried out in 1985-1986 by Paccagnella (1991; see also Mittermeier *et al.*, 1987), who estimated a population of 500-800 animals, concentrated in the forest above 600 m altitude. The importance of this site for murrelets resulted in the establishment of a research program there in August 1988 (Strier, 1992), initially involving the location and habituation of study groups, a difficult task in the steep, mountainous terrain, but resulting eventually in successful studies of the diet and distribution of food resources, ranging behavior, and activity patterns (Moraes, 1992a, 1992b, 1994; Carvalho Jr., 1994). A more recent study was begun in January 1994, and since then 26 months of data have been obtained on the diet and feeding behavior, ranging and daily activity patterns of one of the groups. Samples of food sources were collected during this period in order to carry out nutritional analyses, comparing especially seasonal

Paccagnella, S. G. 1991. Censo da população de monos (*Brachyteles arachnoides*) do Parque Estadual Carlos Botelho, estado de São Paulo. In: *A Primatologia no Brasil - 3*, A. B. Rylands and A. T. Bernardes (eds.), pp.225-233. Fundação Biodiversitas and Sociedade Brasileira de Primatologia, Belo Horizonte.

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

## MEETING OF THE INTERNATIONAL COMMITTEES FOR THE LION TAMARINS

The four International Management Committees for the Brazilian lion tamarins held their annual meeting on 28-29 May 1996, in Brasília, hosted by Maria Iolita Bampi, Head of the Faunal Division of the Wildlife Department of the Brazilian Institute for the Environment (Ibama). Over the two days the committees discussed the status of the captive and wild populations. The captive breeding program for the golden lion tamarin, *Leontopithecus rosalia*, supervised by Jon Ballou and Devra Kleiman of the National Zoological Park, Washington, D. C., has now reduced the captive population to a little under 500 animals, while still maintaining a good part of the genetic diversity of founders. Golden-headed lion tamarins, *L. chrysomelas*, now number over 600 in captivity, and although the populations in Europe and the USA are now stable, those in Brazil and Asia continue to grow. There was considerable discussion regarding the future of the black lion tamarin, *L. chrysopygus*, in captivity (and in the wild). The captive population now numbers over 80 animals, but the very few founders available would require the maintenance of an unacceptably large population in captivity to preserve genetic diversity. Having decided on the merits of maintaining a captive population, a metapopulation management plan drawn up by Claudio Valladares-Padua (University of Brasília) and Jon Ballou, which involves the regular introduction of new founders from the five wild populations, was presented, discussed and approved. The various teams working on research and conservation measures in the wild presented reports on their progress. Notable is the highly successful translocation program being carried out by Cecilia Kierulff (University of Cambridge) and Paula Procopio (Golden Lion Tamarin Association) for the isolated and threatened groups of *L. rosalia*. James Dietz (University of Maryland) reported on his ongoing ecological studies of *L. chrysomelas* at the Una Biological Reserve. Claudio Valladares-Padua informed on the continued monitoring of the wild groups of *L. chrysopygus*, and also the progress concerning an ecological behavioral study which his team has begun on a group of *L. caissara* on the island of Superagüi, Paraná. Guadalupe Vivekananda, Director of the

Superagüi National Park, and Sérgio Brant (Ibama) reported on the progress made over the last year regarding efforts to improve the status and infrastructure for the Park, as well as to increase its size to include further important populations of *L. caissara*. Faíçal Simon (São Paulo Zoo) resigned as co-chairman of the committee for the black lion tamarin. He was warmly thanked for his work on behalf of the committee, especially for his role in establishing the current captive population of the black lion tamarin. Alcides Pissinatti (Rio de Janeiro Primate Center - CPRJ/FEEMA) was appointed as co-chair in his place.

The 1997 meeting will be held in Belo Horizonte, Minas Gerais. It will be organized by the Fundação Biodiversitas and Conservation International do Brasil, and will involve besides, a two-day symposium for state-of-the-art reviews on research and conservation, as well as two days devoted to Population and Habitat Viability Analyses for the four lion tamarin species.

## PHVA FOR THE COSTA RICAN SQUIRREL MONKEY, *SAIMIRI OERSTEDI*

One of the recommendations made at the *Saimiri* Workshop held in 1994 was to have a second meeting in the area where they live. From 5-7 June 1995, 48 people met at the Manuel Antonio National Park, on the Central Pacific coast of Costa Rica, to discuss the status and recommendations for the conservation of the species. Five working groups were formed: *Biology* - discussed the biological data available and ran the VORTEX population simulation for the species; *Distribution* - analyzed the past and current distribution of the species and mapped the areas of remaining *Saimiri* populations; *Translocation and Captive Breeding* - developed protocols in case these measures were necessary for the survival of the species, helped by Dr. Cheryl Asa, St. Louis Zoo, and Dr. Larry Williams, University of South Alabama; *Public Education* - discussed the need for an education program; and *Community* - analyzed current and future community actions, with the collaboration of local authorities and five campesinos.

The final report is still being prepared. It includes recommendations for more specific research to support an adequate management of the species. The most urgent topics were given as: 1) Determination of the distribution and demographics of the populations of the two subspecies, *S. o. oerstedii* and *S. o. citrinellus*; 2) the establishment of a public education program directed to the local communities and tourists; and 3) the establishment of a community action plan to protect the species. Dr. Ulysses Seal, Chairman of the IUCN/SSC



Conservation Breeding Specialist Group (CBSG), met with government authorities, who indicated their willingness to implement the recommendations of the workshop. From a report to *CBSG News* 1995, 6(1): 23, by Yolanda Matamoros, ALPZA-AMAZOO.

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## BRISTOL ZOO AND ITS COMMITMENT TO CEBIDS

Bristol Zoo has been exhibiting primates since it opened in 1836. At the present time, the cebid collection comprises 2.2 black howlers (*Alouatta caraya*), 2.2 long-haired spider monkeys (*Ateles belzebuth belzebuth*), 3.9 squirrel monkeys (*Saimiri sciureus*) and 3.1 white-faced sakis (*Pithecia pithecia*). Other primate groups are represented in the Zoo and include two species of lemur, three species of callitrichids and five species of Old World monkeys.

As well as exhibiting the above cebids, the zoo demonstrates its commitment to their captive management in other ways. The UK Taxonomic Advisory Group (TAG) subgroup for cebids is chaired by Siân Waters. This group is subordinate to the European subgroup which is chaired by Bert de Boer of Apenheul Zoo in the Netherlands. Siân Waters took over the leadership of the cebid group in 1994, but prior to that Neil Bemment of Paignton Zoo, UK, ran it and much work was accomplished by him. For example, Neil Bemment began a programme to karyotype the British population of spider monkeys, which is now well underway. This work will now be extended to the rest of Europe. Plans for the future include investigating the possibility of initiating breeding programmes for more endangered cebid species, bearing in mind the recommendations of the forthcoming Global Captive Action Plan for primates.

The zoo other contributions involve two breeding programmes for cebid species. One is a European Breeding Programme (EEP) for the white-faced saki, with Siân Waters as the Species Co-ordinator and the other is a European studbook for black howlers compiled by Darren Webster, Bristol Zoo.

Two editions of the European black howler studbook have been published (Webster, 1995, 1996). Black howlers have a small founder base of 16 (7.9) in Europe, and only Twycross Zoo, UK, has had success with sustained breeding. We plan to carry out a husbandry survey for black howlers in Europe and an exchange of potential founder males has already taken place between Bristol and Apenheul. Between them both zoos hold 6 (2.4) potential founders.

The first European studbook for white-faced sakis will

be published in 1996. Many zoos are interested in exhibiting the species and there is even an EEP participant in South Africa. Although the white-faced saki is not an endangered species an EEP was deemed necessary because the species is the only representative of its genus in any numbers in captivity in Europe. A species committee has been elected and comprises representatives from all over Europe. Husbandry guidelines will be formulated in the future, although some information on management is available in Waters (1995).

Although the long-haired spider monkeys are the only species exhibited at Bristol Zoo which are classed as vulnerable in the wild, we feel it important to exhibit cebids which are not endangered to improve techniques and as a way to inform the public about primate biology and the threats faced by more endangered species in South America.

**Siân S. Waters and Darren A. Webster**, Bristol Zoo Gardens, Clifton, Bristol BS8 3HA, England, UK.

## References

- Waters, S. S. 1995. A review of social parameters which influence breeding in white-faced saki *Pithecia pithecia* in captivity. *Int. Zoo. Yb.* 34:147-153.
- Webster, D. A. 1995. *European Studbook for Black Howlers (Alouatta caraya)*. No. 1. Bristol Zoo Gardens, UK.
- Webster, D. A. 1996. *European Studbook for Black Howlers (Alouatta caraya)*. No. 2. Bristol Zoo Gardens, UK.

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## THE MAMIRAUÁ SUSTAINABLE DEVELOPMENT RESERVE: A NEW CATEGORY OF PROTECTED AREA IN THE BRAZILIAN AMAZON

On the 12th July 1996, the Governor of the Brazilian state of Amazonas, Amazonino Mendes, signed the law approved by the State Assembly to transform the 1,124,000 ha Mamirauá Ecological Station, located 600 km upriver from Manaus on the Rio Solimões, into Brazil's first Sustainable Development Reserve. This action, following four years of work by the Sociedade Civil Mamirauá and the local communities in and around the reserve, legitimizes a unique participatory approach to biodiversity conservation, research and management, and provides the legal framework for the creation of similar reserves throughout the Amazon.

The transformation of Mamirauá into a sustainable development reserve removes the conflicts caused by

the previous legislation, which implied the removal of local residents. Quite to the contrary, the new law will promote their active participation in the management of the reserve, protect their access to the natural resources, and make them principal partners in this conservation endeavor.

While fishing and timber production within the reserve is of crucial importance to local residents and regional markets, the maze of lakes, channels and forests in this inland delta in the upper Amazon is also home to a wide range of endangered or endemic species of wildlife. These include a large number of aquatic birds, the Brazilian manatee (*Trichechus inunguis*), the giant Amazon river otter (*Pteroneura brasiliensis*), the black caiman (*Melanosuchus niger*), tapirs (*Tapirus brasiliensis*), and jaguars (*Panthera onca*), and the Reserve covers the entire known geographic ranges of the blackish squirrel monkey (*Saimiri vanzolinii*), and the white-faced uakari (*Cacajao calvus calvus*). The conservation value of Mamirauá's biodiversity and its importance for studying the intricate aspects of várzea ecology have resulted in the area being included in the Ramsar list of Internationally Important Wetlands, and also its proposal as a future Biosphere Reserve under UNESCO's Man and the Biosphere Program.

The Mamirauá Project has concentrated its efforts so far in the eastern fifth of the reserve, and has supported local initiatives to protect fishery resources, vital to the lifestyle of the local people (*caboclos*) in the flooded várzea forests. In addition to helping residents organize the enforcement of regulations regarding the judicious use of natural resources, the project has developed a wide range of socioeconomic and ecological studies aimed at understanding the workings of this unique ecosystem and developing guidelines for biodiversity conservation and sustainable resource use aimed at improving the living standards and reducing the impact of subsistence and small scale commercial activities in agriculture, forestry and fishing.

Results of the first four years of the project include a wide variety of research projects carried out by more than 80 Brazilian and foreign researchers in anthropology, epidemiology, fisheries management and ecology, terrestrial ecology, agroforestry, soils, and limnology, among other fields. Extension efforts have supported the development of environmental education in local schools, participation of local communities in policy formulation and resource protection, and increasing interest in agroforestry and traditional agricultural techniques.

The Project has been coordinated since its inception by Dr. José Márcio Ayres of the Sociedade Civil Mamirauá

and the Wildlife Conservation Society (WCS). Institutional agreements have been signed with both state and national authorities, including the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA), the Brazil Science Council (CNPq), and the Institute for Protection of the Amazon Environment (IPAAM). Financial support has come from a wide range of organizations, including the British Overseas Development Administration (ODA), the World Wide Fund for Nature (WWF), the Wildlife Conservation Society (WCS), the European Union (EU), and the Brazil Science Council (CNPq).

**Donald Masterson**, Projeto Mamirauá, Sociedade Civil Mamirauá, Caixa Postal 38, 69470-000 Tefé, Amazonas, Brazil.

### References

- Ayres, J. M. 1993. *As Matas de Várzea do Mamirauá*. Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), Brasília. 123pp.
- Queiroz, H. L. de. 1995. *Preguiças e Guaribas: Os Mamíferos Folívoros Arborícolas do Mamirauá*. Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), Brasília. 161pp.

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### NEW FOUNDATION DEDICATED TO SUPPORT FOR PRIMATE CONSERVATION

We are very pleased to announce the creation of the Margot Marsh Biodiversity Foundation, a new charitable foundation dedicated exclusively to primate conservation. This foundation was created by the late Margot Marsh of La Jolla, California, a long-time supporter of a wide variety of primate research and conservation efforts, who died in May 1995.

I had the great privilege of knowing Margot Marsh for 13 years, and was able to enjoy her company on various trips, including one to Madagascar to see lemurs and another to Kenya and Rwanda to see mountain gorillas and some of savanna-dwelling species of Kenya's Masai Mara Reserve. Margot was extremely knowledgeable about primates and human evolution, not to mention many other aspects of biodiversity, and was a great friend and supporter of many of our organizations. We should all be honored that she saw fit not only to remember us in her will, but also to ensure that the kinds of projects that she supported during her life would continue receiving support in the future.

The Primate Specialist Group was specifically mentioned in Margot's will, as were some of our newsletters, journals and action plans, so she clearly recognized the

value of our group and the critical role that it plays in global primate conservation activities. In recognition of this, some of the first projects supported by the Foundation have been aimed at ensuring the continuity of publications such as *Neotropical Primates*. We are extremely grateful to this wonderful friend, and will miss her all very much.

The mission of the Margot Marsh Biodiversity Foundation is straightforward: "To contribute to global biodiversity conservation by providing strategically targeted, catalytic support for the conservation of endangered nonhuman primates and their natural habitats".

Project guidelines are as follows, with preference being given to projects that have one or more of the following characteristics: 1) Projects focusing on endangered nonhuman primates living in their natural habitats; 2) primate projects being conducted in areas of high overall biodiversity and under great threat (e.g., "threatened hotspots", "megadiversity countries") to ensure maximum multiplier effect for each project; 3) projects being carried out by nationals from the tropical countries to increase local capacity for implementing biodiversity conservation; 4) projects that strengthen international networks of field-based primate specialists and enhance their capacity to be successful conservationists; and 5) projects that result in publication of information on endangered primate species in a format that is useful both to experts and the general public.

Projects should contribute to at least one, and preferably more, of the following themes: 1) Enhancement of scientific understanding/knowledge of the target species/ecosystem; 2) improved protection of a key species, habitat, or reserved area; 3) demonstration of *economic* benefit achieved through conservation of a species and its habitat, as compared to loss thereof; 4) increased public awareness or educational impact resulting from the project in question; and 5) improved local capacity to carry out future conservation efforts through training or practical experience obtained through project participation.

The Board of Directors of the Margot Marsh Foundation consists of three members, and an Advisory Group has also been created with an additional three members, all of them selected on the basis of their past relationship with, and knowledge of the interests of, Margot Marsh. I currently serve as President of the Board of Directors, and inquiries about how to apply for support from the foundation can be sent to me at the address below.

**Russell A. Mittermeier**, Margot Marsh Biodiversity

Foundation, 432 Walker Road, Great Falls, Virginia 22066, USA. Fax: + 1 703 759 6879.

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## INTERNATIONAL STUDBOOKS AND REGISTERS

An international studbook for the pied tamarin, *Saguinus bicolor bicolor*, has been endorsed by the World Zoo Organization (IUDZG) and the Species Survival Commission (SSC) of the World Conservation Union (IUCN). The studbook keeper is Dr. Andrew J. Baker, Curator of Primates and Small Animals, Philadelphia Zoological Garden, 3400 West Girard Avenue, Philadelphia, PA 19104-1196, USA. Dr. William Langbauer Jr., also of the Philadelphia Zoological Garden, has taken over as studbook keeper of the cotton-top tamarin, *Saguinus oedipus*. Reported in *CBSG News*, December 1995, 6(1):15.

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## PADRÕES DE DISTRIBUIÇÃO DA BIODIVERSIDADE DA MATA ATLÂNTICA DO SUL E SUDESTE BRASILEIRO

A Conservation International do Brasil, Fundação Biodiversitas, Fundação SOS Mata Atlântica e Fundação André Tosello/Base de Dados Tropicais, promoveram nos dias 23 e 24 de maio, o *Workshop* "Padrões de Distribuição da Biodiversidade da Mata Atlântica do Sul e Sudeste Brasileiro", em Campinas, São Paulo. O encontro é parte de uma série de *Workshops* para a definição de áreas prioritárias para a conservação dos biomas brasileiros.

A reunião de Campinas teve dois objetivos principais: apresentar e discutir com os especialistas em Mata Atlântica das regiões sul e sudeste a metodologia e as ferramentas utilizadas para realizar diagnósticos de áreas prioritárias para conservação sob a ótica regional; e identificar as principais subunidades biogeográficas e seus problemas de conservação. Para tal, reuniram-se cerca de 40 especialistas provenientes de instituições acadêmicas, organizações não-governamentais ambientalistas, órgãos estaduais e federais de meio ambiente, e pesquisadores com larga experiência sobre a Mata Atlântica do sul e sudeste brasileiro.

Os especialistas trabalharam em grupos temáticos - répteis e anfíbios, mamíferos, aves, peixes e invertebrados, flora e estratégias de conservação - para fazer um pré-diagnóstico das informações existentes e discriminar os dados mais importantes a serem obtidos para definir as áreas prioritárias para conservação, segundo o grupo biológico em discussão.

Os resultados da reunião serão divulgados em breve via Internet, que apresentará um mapa das principais regiões-alvo para diagnósticos de biodiversidade da Mata Atlântica do sul e sudeste, uma avaliação das lacunas de conhecimento para as diversas partes da Mata Atlântica, e definir um programa de trabalho para agregar as informações visando uma base dados que fornecerá suporte para uma Política Nacional de conservação para o bioma.

**Luiz Paulo de Souza Pinto**, Conservation International do Brasil, Avenida Antônio, Abrahão Caram 820/302, 31275-000 Belo Horizonte, Minas Gerais, Brasil.

### **ANIMAL BEHAVIOUR - EDITORIAL OFFICE**

The European editorial office of *Animal Behaviour*, the journal of the Association for the Study of Animal Behaviour (ASAB), has moved. With the Executive Editorship of the journal passing from Tim Roper to Chris Barnard as from 1 May 1996, the office is now at the University of Nottingham, UK. All communications relating to manuscripts and editorial matters should be directed to the Managing Editor: Dr. Angela Turner, Department of Life Science, University of Nottingham, Nottingham NG7 2RD, UK, Tel/Fax: +44 (0)115 9513249, e-mail: a.k.turner@pln1.life.nott.ac.uk.

The latest table of contents and other information about *Animal Behaviour* can be found at Academic Press' IDEAL site, an online scientific journal library containing content lists and abstracts of articles from the 178 journals they publish. IDEAL has mirror sites in North America and Europe. <http://www.idealibrary.com> (San José, CA, North America), and <http://www.europe.idealibrary.com> (Bath, UK).

### **BIOLOGICAL BASES OF ANIMAL SOCIAL BEHAVIOR**

SOCIOBIO is a moderated discussion list dealing with the biological bases of the social behavior of animals, including aggression, territoriality, social systems, and mate selection. It welcomes contributions from scholars currently engaged in any kind of research project linked with the issues of socialization, altruism, and animal cooperation. To subscribe to SOCIOBIO send an e-mail message to [Listserv@sjvum.stjohns.edu](mailto:Listserv@sjvum.stjohns.edu) containing the following command in the body of the message < subscribe sociobio yourfirstname yourlastname >. The list is run by Juan C. Garelli, e-mail: [garelli@attach.edu.ar](mailto:garelli@attach.edu.ar).

## **Primate Societies**

### **SOCIEDADE BRASILEIRA DE PRIMATOLOGIA: A PRIMATOLOGIA NO BRASIL - 5**



Estamos preparando o Volume 5, no qual serão incluídos os resumos dos trabalhos apresentados no VI. Congresso Brasileiro de Primatologia que não foram submetidos para publicação. Para a atualização e padronização destes resumos, pedimos aos autores destes resumos o fornecimento das seguintes informações: (a) os nomes completos de todos os autores; e (b) o endereço e/ou vínculo atual do autor para correspondência (inclusive de e-mail, se tiver).

**Stephen F. Ferrari**, Departamanto de Genética, Universidade Federal do Pará (UFPA), Caixa Postal 8607, 66.075-150 Belém, Pará, Brasil. Fax: 091-211-1568, e-mail: [ferrari@cuxiu.cbio.ufpa.br](mailto:ferrari@cuxiu.cbio.ufpa.br)

### **INTERNATIONAL PRIMATOLOGICAL SOCIETY - WORKSHOP ON METHODS OF PRIMATE CONSERVATION**

The International Primatological Society (IPS) is holding a workshop on Methods of Primate Conservation from 11-17 August 1996, immediately preceding the XVIth International Primatological Congress being organized jointly by IPS and the American Society of Primatologists (ASP), in Madison, Wisconsin. The workshop is for primatologists from developing countries. Dr. Jeanne Altmann, Chairman of the Conservation Committee of IPS and Research Curator at the Brookfield Zoo, Chicago, will head the Workshop. Arrival will be the evening of 9 August. Workshop sessions will commence on 10 August. and will include lectures, laboratory and observational work and discussions. Special topics will include genetics, nutrition, and behavior. The course will be given mainly by Brookfield Zoo staff. but will also count on Dr. Anna Feistner, Jersey Wildlife Preservation Trust, Jersey, UK, and a number of other invited scientists. The Workshop will end on 11 August, with bus transport to the IPS Congress at Madison, Wisconsin. The Workshop will aim to take on 24 participants from developing countries, preferably eight from each southern continent.

Contact: Dr. Jeanne Altmann, Vice President for Conservation, International Primatological Society, Chicago Zoological Society, Brookfield Zoo, Chicago, Illinois 60513, USA, Fax: 708 485 3532, e-mail: [bzconbio@ix.netcom.com](mailto:bzconbio@ix.netcom.com), or Dr. Alison Jolly,

President, International Primatological Society, Department of Ecology and Evolutionary Biology, Princeton University, Princeton, NJ 08544, USA, Fax: 609-258-5381, e-mail: [ajolly@arachne.princeton.edu](mailto:ajolly@arachne.princeton.edu).

## AMERICAN SOCIETY OF PRIMATOLOGISTS - BOOK SERIES

The Publications Committee of the American Society of Primatologists (ASP) are accepting book proposal applications for their newly established book series. Each volume will be based on an organized symposium from an ASP meeting and/or special topic in primatology. Income from books published by ASP will be used for fundamental purposes of the Society (e.g., Conservation Fund, educational development, etc.). The inaugural volume, entitled "Primate Conservation: The Role of Zoological Parks", is based on a symposium presented at the Congress in 1995, and will hopefully be ready for sale at the ASP/IPS meeting in Madison in August 1996. For details on submitting a book proposal, contact: Janette Willis, Dept. OB/GYN, OUHSC, Box 26901, Oklahoma City, OK 73190, USA, Tel: (405) 271 4229, Fax: (405) 271-8547, e-mail: [janette-wallis@uokhsc.edu](mailto:janette-wallis@uokhsc.edu). From *ASP Bulletin* 20(2):5, June 1996.

## Recent Publications

### BOLETIN PRIMATOLÓGICO LATINOAMERICANO

The most recent issue of the *Boletín Primatológico Latinoamericano*, Volume 5, Number 1, 1995, 33pp., has been published by the Grupo Argentino de Primatología (GADEP). The editors are Gabriel E. Zunino, Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires, and Julio C. Ruiz, Centro Argentino de Primatología (CAPRIM), Corrientes. This issue includes four articles and a note. Alternative reproductive behaviors in the mantled howler monkey (*Alouatta palliata* Gray): Testing Carpenter's hypothesis - Clara B. Jones; Labilidad cromosómica: una posible explicación en el origen de los reordenamientos cromosómicos en cebídeos - Marta D. Mudry *et al.*; Deforestation, selective cutting, and habitat fragmentation: the impact on a black howler monkey (*Alouatta caraya*) population in northern Argentina - Anneke DeLuycker; Dispersión y germinación de semillas de *Ficus monckii* por el mono aullador negro (*Alouatta caraya*) - Susan P. Bravo, Martin M. Kowalewski and Gabriel E. Zunino; and (note) Monos Cai (*Cebus apella*) en cautiverio: composición de grupos - Aldo M Giudice and Marta D. Mudry.

Contributions to and correspondence regarding the *Boletín Primatológico Latinoamericano* should be sent to Dr. Gabriel E. Zunino, Div. Mastozoología, Museo Argentino de Ciencias Naturales, Avenida Angel Gallardo 470, 1405 Buenos Aires, Argentina, e-mail: [gezunino@overnet.com.ar](mailto:gezunino@overnet.com.ar).

## BOOKS

*Lista Anotada dos Mamíferos do Brasil/Annotated List of Brazilian Mammals*, by Gustavo A. B. da Fonseca, Gisela Hermann, Yuri L. R. Leite, Russell A. Mittermeier, Anthony B. Rylands and James L. Patton, 1996, 38pp. *Occasional Papers in Conservation Biology No. 4*, Conservation International, Washington, D. C., and Fundação Biodiversitas, Belo Horizonte. ISBN 1 881173 17 8. In Portuguese and English. This booklet presents an updated list of the Brazilian mammal fauna, including terrestrial, aquatic and marine species. According to existing data, the country harbors 483 continental and 41 marine mammals, totaling 524 species, distributed among 11 orders, 46 families and 213 genera. These estimates indicate that Brazil has the most diverse mammalian fauna in the world, with Indonesia a close second. This annotated list of Brazilian mammals includes information on each species' occurrence in Brazil's major biomes, along with body weights, diet and locomotor adaptations, as well as common names in Portuguese. Available from Conservation International, Department of Conservation Biology, 1015 Eighteenth Street, N. W., Suite 1000, Washington, D. C. 20036, USA. Fax: 202 887 0193.

*A Belizean Rain Forest: The Community Baboon Sanctuary*, by Robert H. Horwich and Jonathan Lyon, 1990, 420pp. illustrated. Orang-utan Press. ISBN 0-9637982-0-0. Price US\$14.95 + \$2 postage and handling in the U.S., \$4 outside the U.S. This is a composite of information about the Baboon Sanctuary, its flora and fauna, and Belizean natural history. Begun as an eight-page booklet distributed to subsistence farmers, it has developed into a 420 page description of a rain forest and an alternative method of saving it. It has become a rain forest primer for college and high school classes as well as for tourists travelling to Belize or adjacent Central American forests. To order: Community Conservation Consultants, RD 1, Box 96, Gays Mills, WI 54631, USA, Tel: (608) 735 4717, e-mail: [ccc@mwt.net](mailto:ccc@mwt.net). Profits from book sales go toward community conservation programs.

*Primate Ontogeny: International Symposium, 10-15 September 1995, Trest, Czech Republic. Meeting Abstracts*, by the Primatological Group of Czech Republic of the Czech Anthropological Society, 1995, 22pp. Contact: Dr Marina Vancatova, Primate Research

Group, VUFB Konarovice, 28125 Konarovice, Czech Republic.

*Lemurs of the Lost World: Exploring the Forests and Crocodile Caves of Madagascar*, by Jane Wilson, 1995, 2nd edition, 216pp. Impact books, London. Paperback. ISBN 1 874687 43 9. Price £5.00 or US\$11.00. This is a fascinating account of expeditions to the Crocodile Caves at the Ankàrana Massif, northern Madagascar, in the late 1980's, the difficulties confronted by the expedition members, the remarkable paleontological discoveries, and of the observations of the fauna and especially the living lemurs in the sunken forests there. Besides the crocodiles living in the complex of more than 60 miles of caves, six subfossil lemurs have been found there, including the remarkable sloth lemur, *Babakotia radofilai*, the giant *Megaladapis*, *Pachylemur*, *Mesopropithecus*, *Palaeopropithecus*, and *Archaeolemur*. Ten living lemur species occur there today, and a further two occurred there in the recent past. This book is illustrated with beautiful color photographs and provides an insight to the social, economic, and conservation problems of Madagascar. An excellent read, and highly recommended. In the UK, write to Impact Books, 22 Glen Dale, Rowlands Castle, Hants. PO9 6EP, or Impact Books, 70 Newcomen Street, London SE1 1YT, and in the USA it is available from Impact Books, P. O. Box 287, Great Falls, VA 22066, USA. All profits from the sale of this book will be donated to the Jersey Wildlife Preservation Trust for their work in Madagascar.

*Animais Ameaçados de Extinção*, by Milton Thiago de Mello, 1996, 67pp. Comitê Brasileiro da Associação Mundial de Veterinária, Rio de Janeiro. In Portuguese. Chapters include: Extinct species; Demographic explosion and extinction; Development and biodiversity; Causes of threat; Conservation of threatened species; Protected Areas; Lists of threatened species; Legislation; Universities and research; Eco-92; Conclusions; and Summary. For more information contact the author: Prof. Milton Thiago de Mello, SHIN Q14, Conjunto 2, Casa 19, Lago Norte, 71510-225 Brasília, D. F., Brazil.

*BIODOC, Centro de Documentación e Información. Catalogo de Publicaciones Periodicas Existentes en el BIODOC hasta 1994*, edited by Nidia Durán Villalobos and Enrique Quesada Dobles, 1995, 105pp. 2nd edition. Programa Regional en Manejo de Vida Silvestre (PRMVS), Universidad Nacional, Costa Rica. A catalogue of periodicals maintained by BIODOC, sponsored by the U. S. Fish and Wildlife Service and the Universidad Nacional, Heredia, Costa Rica. Available from: BIODOC, Centro de Documentación en Vida Silvestre, Universidad Nacional, Apartado 54-3000, Heredia, Costa Rica,

América Central. Tel: 2773-472, Fax: 237-7036.

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Journal Editors Robert Costanza (*Ecological Economics*), Sven E. Jorgensen (*Ecological Modelling*), William J. Mitsch (*Ecological Engineering*) and David Rapport (*Ecosystem Health*). In collaboration with the International Society of Ecological Modelling, International Ecological Engineering Society, International Society of Ecosystem Health, International Society of Ecological Economics, SAS Institute Denmark, and International Lake Environmental Committee. For information contact: Ecological Summit 96, Conference Secretariat, Elsevier Science Ltd., The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, UK. Tel: +44 (0)1865 843643, Fax: +44 (0)1856 843958, e-mail: g.spear@elsevier.co.uk.

**1996 Annual Meeting of the Conservation Breeding Specialist Group CBSG/SSC/IUCN**, 22-25 August 1996, Denver, Colorado, USA. Hosted by the Denver Zoological Garden. Immediately preceding the Annual Meeting of the World Zoo Organization - IUDZG. Registration contact: Angela Baier, Marketing Director, Denver Zoological Foundation, City Park, 2300 Steele Street, Denver, Colorado 80205-4899, USA. Tel: 1-303-331-5805, Fax: 1-303-331-4125.

**Conservation in a Changing World: Integrating Processes into Priorities**, 24-25 September, 1996, Zoological Society of London, Regent's Park, London. There is a widespread recognition of the urgent need to identify priorities for conservation action. The last five years have seen enormous progress in the development of quantitative methods for identifying priority areas based on what we know about species' distributions and the relationships between areas and species. The challenge now is to expand on this approach by building an understanding of biological processes into conservation planning. In particular, how can a knowledge of past extinctions help to predict current vulnerability, and how ecological and evolutionary processes can be incorporated into priorities for action? Confirmed speakers include: Nick Nichols, Brian Huntley, Jeremy Jackson, Andrew Balmford, Chris Thomas, William Bond, Dan Janzen, Russ Lande, Stuart Pimm, Jon Fjeldsa and David Pearce. The two-day meeting costs £50 (£25 for students). For further information: Assistant Editor, Zoological Society of London, Regent's Park, London NW1 4RY, UK. Tel: +44 (0)171 448 6272, Fax: +44 (0)171 586 5321.

**6th International Behavioural Ecology Congress**, 29 September - 4 October 1996, Canberra, Australia. Details from: Andrew Cockburn, Division of Botany and Zoology, Australian National University, Canberra ACT 02000, Australia. Fax: 61 6249 5773, e-mail: andrew.cockburn@anu.edu.au.

## Meetings

**International Primatological Society, Workshop on Methods of Primate Conservation**, 9-11 August 1996, Chicago Zoological Society (Brookfield Zoo). For primatologists from developing countries attending the XVth IPS/ASP International Congress of Primatology, Madison, Wisconsin. Contact: Dr. Jeanne Altmann, Vice President for Conservation, International Primatological Society, Chicago Zoological Society, Brookfield Zoo, Chicago, Illinois 60513, USA, Fax: 708 485 3532, e-mail: bzconbio@ix.netcom.com, or Dr. Alison Jolly, President, International Primatological Society, Department of Ecology and Evolutionary Biology, Princeton University, Princeton, NJ 08544, USA, Fax: 609-258-5381, e-mail: ajolly@arachne.princeton.edu.

**XVth Congress of the International Primatological Society & 19th Conference of the American Society of Primatologists**, 11-16 August 1996, University of Wisconsin, Madison, hosted by the Wisconsin Regional Primate Research Center. Contact: Edith Chan, Coordinator/Information, Wisconsin Regional Primate Research Center, 1220 Capitol Court, Madison, Wisconsin 53715-1299, USA. Tel: (608) 263-3500, Fax: (608) 263 4031, e-mail: ipsasp-info@primate.wisc.edu.

**Meeting of the Association of Primate Veterinarians**, 16-17 August 1996, University of Wisconsin, Madison. Contact: Edith Chan, Coordinator/Information, Wisconsin Regional Primate Research Center, 1220 Capitol Court, Madison, Wisconsin 53715-1299, USA. Tel: (608) 263-3500, Fax: (608) 263 4031, e-mail: ipsasp-info@primate.wisc.edu.

**Ecological Summit 96**, 19-23 August 1996, Copenhagen, Denmark. Organized by Elsevier Science,

**III Congresso de Ecologia do Brasil**, 6-11 October 1995, Centro de Convenções Ulisses Guimarães, Brasília. Deadline for submitting preliminary abstracts: 30 March 1996. Deadline for submitting final version of abstracts: 30 June 1996. Contact: Comissão Organizadora, III Congresso de Ecologia do Brasil, Departamento de Ecologia, Universidade de Brasília (UNB), Caixa Postal 04355, 70919-970 Brasília, D. F., Brasil. Tel: +55 (0)61 348-2326, 348-2592, & 348-2282, Fax: +55 (0)61 272-1497 & 273-4571. E.mail: congecol@guarany.cpd.unb.br.

**68th IUCN Species Survival Commission - Full Meeting**, 11-12 October 1996, Montreal, Canada. Theme: Communicating the value of the SSC - its worldwide presence, scientific knowledge, expert advice, and ongoing work, and its relevance to the conservation of biodiversity. Plenary sessions: SSC advice to intergovernmental bodies; Biodiversity conservation information system; SSC Specialist Group Reports. Round table discussion: SSC at the regional and country levels. Workshops: IUCN categories of threat; SSC communications strategy; Fund-raising strategies. Registration fee \$25. For more information: World Conservation Congress Coordinator, IUCN, Rue Mauverney 28, 1196 Gland, Switzerland, Fax: + 41 22 999 0020.

**IUCN World Conservation Congress**, 13-23 October 1996, Montreal Conference Centre, Montreal, Canada. Four distinct parts: Special Members' Session (13-14 October) to consider revised statutes - accredited delegates of IUCN voting members; Members' Business Session (15-16, 22-23 October) to discuss and approve IUCN's future strategy, programme and budget, elect the officers and Council of the Union, and debate and adopt resolutions and recommendations - invited observers may also attend; Open Session of Workshops (17-18, 20-21 October) under the overall theme of "Caring for the Earth" - open to the public; A major environmental exhibition - open to the public. 19 October set aside for excursions. Registration fee \$50 if paid before 31 July 1996, \$100 after that date. Contact: John Burke, Director of Communications, IUCN The World Conservation Union, 28 rue Mauverney, 1196 Gland Switzerland. Tel: +41 22 999 0123.

**XIV Encontro Anual de Etologia**, 16-19 October 1996, Uberlândia, Minas Gerais, Brazil. Organized by the Sociedade Brasileira de Etologia (SBET) and the Departamento de Biociências, Universidade Federal de Uberlândia. Includes symposia on: Human ethology; insect behavior; behavior, animal production and conservation; defensive behavior; reproductive behavior; and aquatic mammals. Deadline for abstracts: 30 July 1996. For more information: XIV Encontro Anual de

Etologia, Coordenador Prof. Dr. Kleber Del-Claro, Departamento de Biociências, Universidade Federal de Uberlândia, Caixa Postal 593, 38400-902 Uberlândia, Minas Gerais, Brazil. Fax: (034) 232 8620, e-mail: debio05@brufu.bitnet.

**Measuring Behavior '96 - International Workshop on Methods and Techniques in Behavioral Research**, 16-18 October 1996, Rudolf Magnus Institute for Neurosciences, Utrecht University, The Netherlands. Registration fee: before 1 August 1996 is NLG 200 (students: NLG 50), after 1 August 1996 is NLG 300 (students: NLG 75). Submission of abstracts: Those who wish to present an oral paper, poster or demonstration should submit the title and abstract of their contribution. All submissions should be received before 1 May 1996. Notification of acceptance of abstracts - 1 July 1996. For program booklet and registration/abstract forms: Measuring Behavior '96, Workshop Secretariat, Attn: Rosan Nikkelen, P.O. Box 268, 6700 AG Wageningen, The Netherlands. Tel: +31 (0)317-497677, Fax: +31 (0)317-424496, e-mail: mb96@noldus.nl. (Information on the workshop is also available on the World Wide Web: <http://www.diva.nl/noldus/mb96.html>).

**I Congreso APE and European Workshop on Primate Research**, 16-19 October 1996, Hotel Escuela, Madrid, Spain. Organized by the Asociación Prmatológica Española (APE). The European Workshop on Primate Research, consisting of a panel of invited speakers and free poster contributions, will take up the last two days of the meeting. The objective of the Congress is to provide a forum to assess the current situation and perspectives on primate research in Spain and the rest of Europe to facilitate the exchange of information among European primatologists and to promote the establishment of co-operative links between European institutions and research groups working in primatology. Confirmed speakers include: B. Deputte (Paimpont, France), B. Thierry (Strasbourg, France), R. Vercauteren Drubbel (Bruxelles, Belgium), R. D. Martin (Zürich, Switzerland), E. Visalberghi (Rome, Italy), P. Timmermans (Nijmegen, Holland), L. Sterck (Utrecht, Holland), W. Kaumanns (Göttingen, Germany), M. Vancatova (Konarovice, Czech Republic), H. Preuschoft (Bochum, Germany), R. Crompton (Liverpool, UK), H. O. Box (Reading, UK), G. Norton and D. Hawkins (Cambridge, UK). Prof. Hans Kummer will also be elected an Honorary Member of APE and will give a talk entitled "Through the fieldglasses: a primatologist's retrospective". For further information: Dr. Fernando Colmenares, Departamento de Psicobiología, Universidad Complutense de Madrid, Campus de Somosaguas, 28223 Madrid, Spain. Tel: +34 1 3943073, Fax: +34 1 3943189, e-mail: ppspc06@sis.ucm.es.

**XV Congresso Panamericano de Ciências Veterinárias**, 21-25 October 1996, Palácio Popular de Cultura, Campo Grande, Mato Grosso do Sul, Brazil. Associação Panamericana de Ciências Veterinárias, Sociedade Brasileira de Medicina Veterinária. Contact: XV PANVET, Comissão Organizadora, Avenida Afonso Pena 2386, Sala 84, 79002-074 Campo Grande, Mato Grosso do Sul, Brazil. Tel: +55 (0)67 724-7071, Fax: +55 (0)67 383-4371.

**PSGB Winter Meeting 1996 - Social Learning Among Mammals**, 29-30 November 1996, Meeting Rooms. London Zoological Society, London. Organized by the Primate Society of Great Britain (PSGB), in association with the Mammal Society and the Zoological Society of London.

**Biodiversity, Conservation and Management at the Beni Biosphere Reserve, Bolivia**, 3-6 December 1996, La Paz, Bolivia. Organized by the Beni Biological Station, Bolivian Academy of Sciences, and the Smithsonian/MAB Biodiversity Program. The objective is to provide a complete overview of the last ten years of research on biodiversity, conservation and management at the reserve. Papers and posters are requested. Proceedings will be published. For additional information, contact: Carmen Miranda, Academia Nacional de Ciencias de Bolivia, Av. 16 de Julio 1732, Casilla 5829, La Paz, Bolivia. Tel./Fax: (591-2) 350612, e-mail [cmiranda@ebb.bo](mailto:cmiranda@ebb.bo), or Francisco Dallmeier, Smithsonian/MAB Biodiversity Program, 1100 Jefferson Drive SW, Suite 3123, Washington, D. C. 20560, USA. Tel: (202) 357 4793, Fax: (202) 786 2557, e-mail: [icfgd@ic.si.edu](mailto:icfgd@ic.si.edu).

**ASAB Winter Meeting, Behaviour and Speciation**, 5-6 December 1996, Zoological Society of London Meeting Rooms, London Zoo. Organizer: Roger Butlin. For further information contact: Dr Roger Butlin, Ecology and Evolution Programme, Department of Genetics, University of Leeds, Leeds LS2 9JT, UK.

**Australian Primate Society XVth Annual Conference**, 6-8 December 1996, Wellington Zoo, Wellington, New Zealand. Conference Organizer: Graeme Strachan, Wellington Zoo. Contact: Graeme Crook, CSIRO Division of Human Nutrition, Animal Services, Majors Road, O'Halloran Hill, South Australia 5158. Tel: +61 82980336, Fax: +61 83770004, e-mail: [graemec@dhn.csiro.au](mailto:graemec@dhn.csiro.au).

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## 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, figures, 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, Universidad Veracruzana, Apartado Postal 566, Xalapa, Veracruz 91000, México, Fax: 52 (28) 12-5748.

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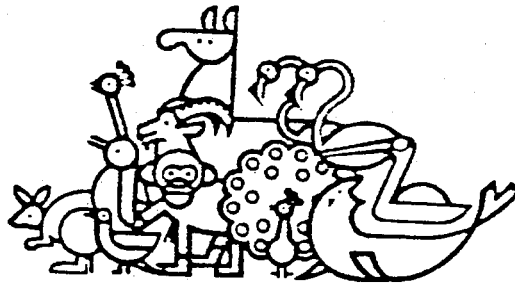
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## 1997

**1997 Meeting of the American Society of Primatologists**, 27 June - 1 July, 1997, Bahia Hotel, San Diego, California. For more information, contact:



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