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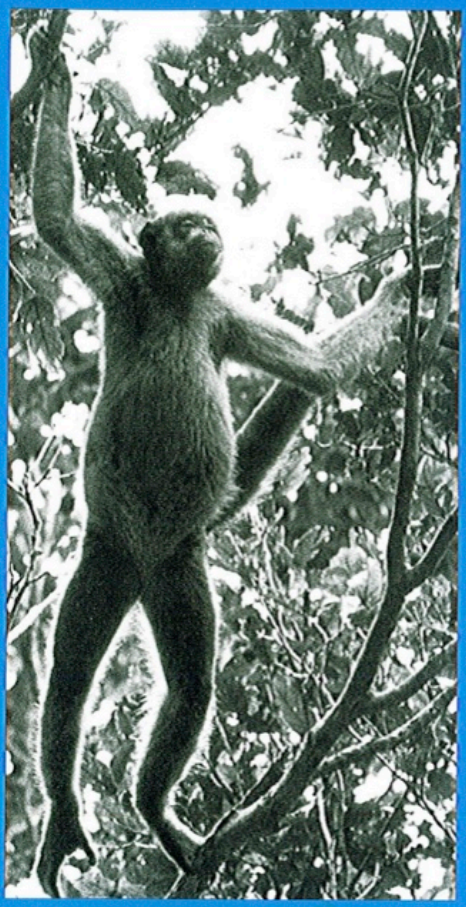
NEOTROPICAL PRIMATES



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Short Articles

Western Extension of the Range of Bearded Sakis: A Possible New Taxon of *Chiropotes* Sympatric with *Cacajao* in the Pico da Neblina National Park, Brazil

Jean Philippe Boubli

Presently, two species of *Chiropotes* are recognized: *Chiropotes albinasus* and *C. satanas*. The latter includes three subspecies, namely *C. s. satanas*, *C. s. chiropotes* and *C. s. utahicki* (see Hershkovitz, 1985; Rylands *et al.*, 2000; Groves, 2001). *C. albinasus* is found to the south of the Rio Amazonas between the Rios Xingu and Madeira, and *C. satanas* is found to the east of the Rio Xingu, south of the Rio Amazonas and to the east of the Rio Aracá, north of the Rio Solimões, including most of the Guianas and Southern Venezuela (Fig. 1).

During a long-term field study of the black-headed uacari monkey, *Cacajao melanocephalus melanocephalus*, I obtained strong evidence of bearded sakis (*Chiropotes* sp.) occurring in the study area in the Pico da Neblina National Park, Amazonas (Boubli, 1997, 1999). I first became aware of the possibility of bearded sakis there in 1991 when I noticed Yanomamis (the people that inhabit the park) from Maturacá (a large Yanomami settlement and Salesian Mission inside Pico da Neblina National Park, Fig. 2) wearing decorative headpieces made from their tails. Inquiring about the origins of the headpieces, I was told that bearded sakis could be found throughout the national park. They were, however, also reported to be rare in most areas of the park, although relatively more abundant to the east of the Rio Marauiá, which marks the eastern limit of Pico da Neblina National Park (Fig. 1). The Yanomamis I interviewed said that although bearded sakis could be seen in monospecific groups, they were more often found in mixed-species aggregations with black-headed uacaris.

The presence of bearded sakis in the Pico da Neblina National Park was confirmed on 23 May 1995, when my two field assistants (locals from São Gabriel da Cachoeira, Fig. 2) observed a single female carrying an infant within my study site (marked as "Camp" in Fig. 2). I have since carried out three surveys to locate bearded sakis in the park. The first two were conducted in the Pico da Neblina mountain range and then along the Rio Cauaburi (September 1995 and July 2001), and the third was restricted to the Rio Marauiá (November 2001). During these surveys, I visited areas where Yanomami informants had reported having seen bearded sakis. They included the region of the mouth of the Rio Iá at a location known as "Tabuleiro", the foothills of the Neblina mountains, along the Rios Preto and Anta, along the head-waters of the Rio Cauaburi, and along the lower Rio Marauiá (Fig. 1).

Figure 1. Geographic distribution of the two species of *Chiropotes* (*Chiropotes satanas* in dark grey and *C. albinasus* in light grey) and proposed western extension of the geographic distribution of the genus (hatched). The black box indicates the area of Figure 2.

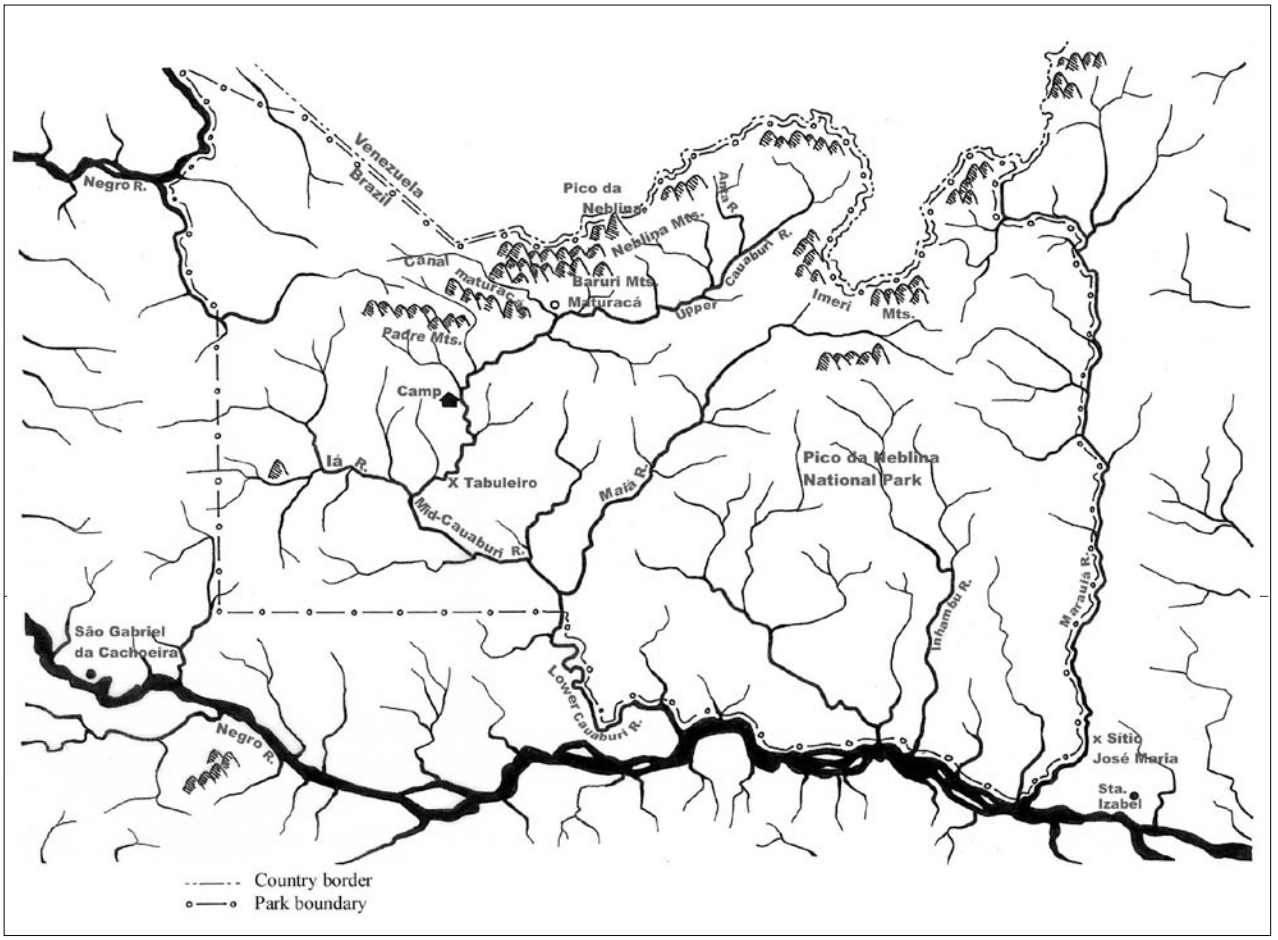

Figure 2. Pico da Neblina National Park, Amazonas, Brazil.

Following a suggestion by Yanomamis from the lower Rio Marauiá, on my most recent survey, I took up my search again for bearded sakis around a small settlement known as "Sítio do José Maria", on the left bank of the lower Rio Marauiá (Fig. 1). There, on 11 November, Dr. Albert Ditchfield (a biologist from São Paulo University), Dorismar and Adamor (locals hired as field assistants from the town of Santa Isabel, Fig. 2), Chico and Miguel (Yanomami guides), and I set up camp and began our search. Later that same day, we found a mixed-species group of three adult bearded sakis (*Chiropotes* cf. *satanas*) and five black-headed uacaris (*Cacajao melanocephalus melanocephalus*), approximately 150 m north of camp (0°20'33"S, 65°09'00"W). One adult female bearded saki was collected for the Zoology Museum of São Paulo University (MUZUSP, #JPB 79, Fig. 3).

The specimen collected was similar to *Chiropotes satanas chiropotes* in that the head, limbs and tail were black, and the back from the neck to the tail gradually changed from a lighter brown in the center back between the shoulders to darker brown on the sides and towards the tail. However, it differed from *C. s. chiropotes* in that the brown coloration of its dorsum was greenish brown (olive) as opposed to light golden brown (Fig. 3). The body measurements were comparable to that of *C. satanas* and *C. albinasus* (head and body = 390 mm; tail = 400 mm; hind foot = 125.8 mm; ear = 28.7 mm; weight = 2400 g) (see Emmons, 1997; Hershkovitz, 1985). I am currently carrying out a detailed morphological and molecular analysis to determine whether this is a new taxon or merely a color variant of *C. s. chiropotes*.

The discovery of bearded sakis in the Pico da Neblina National Park considerably extends the geographical distribution of the genus *Chiropotes* to the west. Similar specimens have been collected further east of Pico da Neblina, around the town of Barcelos, Amazonas (Museu Nacional do Rio de Janeiro, MN59012 and MN59011).

Given the above evidence, I suggest that the geographic distribution of this Pico da Neblina taxon of *Chiropotes* may include the entire region bordered by the Rio Aracá in the east, the Rio Negro in the south and west and the Ríos Cassiquiari and Orinoco in the north, overlapping totally with the geographical distribution of black-headed uacaris (Fig. 1). Considering that I did not see bearded sakis while conducting my surveys along the Rio Cauaburí and that the Yanomami report them to be rare west of the Rio Marauiá, it is possible that bearded sakis are scarce in this region, occurring at insignificant densities between the Rios Cauaburí and Negro. This could result from intense competition with black-headed uacaris in a habitat that could possibly be better suited to the latter. Thus, even if

Figure 3. *Chiropotes* cf. *satanas* collected from the lower Rio Marauiá, Amazonas.

the geographic distribution of *Chiropotes* is bounded to the west by the Rio Negro, I believe that the ecological limit for this taxon does not extend this far west, possibly only reaching as far as the Rio Marauiá. Future surveys of left bank tributaries of the Rio Negro east of the Rio Marauiá, such as the Rios Darahá, Preto and Padauarí, will reveal where the *Chiropotes* densities begin to increase relative to those of *Cacajao*. Such surveys would help to mark the ecological boundary between the two genera.

The discovery of a taxon of *Chiropotes* that co-occurs with black-headed uacaris, and in particular that associates with these primates in mixed-species groups, is intriguing in the perspective of classic equilibrium ecology; bearded sakis and uacaris are believed to occupy similar ecological niches. Primates of these genera are phylogenetically very close, have similar body weights, diets, group sizes and day-ranges (Ayres 1986, 1989; Schneider *et al.*, 1995; Boubli, 1999). Morphologically, they possess identical adaptations to consume hard-husked fruits (dentition and chewing apparatus) (Kinzey and Norconk, 1993). The present finding thus challenges the idea that the geographic distribution of *Cacajao* and *Chiropotes* was determined by competitive exclusion (Ayres 1986).

Acknowledgments

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Survey of Three Primate Species in Forest Fragments at La Suerte Biological Field Station, Costa Rica

Jill D. Pruetz
Heather C. Leasor

Introduction

As habitat destruction continues to threaten the existence of tropical species, it becomes increasingly important to document their numbers as a means of assessing their survival potential. Surveys are a method commonly used to document the status of species such as primates and often serve as a preliminary step to long-term studies of primate populations. Reports of non-human primate surveys are common in the literature (for example, Agoramoorthy and Lohmann, 1999; Cant, 1978; Gonzalez-Kirchner, 1996, 1999; Hashimoto, 1995; Johnson and Overdorff, 1999; Plumptre and Reynolds, 1996; Thomas, 1991; Whitesides *et al.*, 1988; Yamagiwa *et al.*, 1992). However, Peres (1999a) points out the lack of consistency in many studies and makes suggestions for standardizing techniques as a way to ensure the reliability of primate surveys between sites. Many of Peres' (1999a) guidelines were adopted in our study (See 'Methods').

Here we report a survey of the three primate species inhabiting tropical lowland rainforest at La Suerte Biological Field Station (LSBFS) in Costa Rica, and address the difficulty in assessing primate densities using brief contacts with surveyed groups. Although the site has been the focus of numerous primate-oriented field courses, systematic data are lacking on the densities of the primate species occurring at LSBFS. This site provides an ideal setting in which to examine the effects of reforestation efforts on several primate species.

Methods

Study site

La Suerte Biological Field Station is approximately 20 km from the Atlantic coast of Costa Rica, and is home to black-handed spider monkeys (*Ateles geoffroyi*), mantled howling monkeys (*Alouatta palliata*), and white-faced capuchins (*Cebus capucinus*). The LSBFS was purchased by the Molina family in 1987 and is characterized by lowland tropical rainforest, cropland (pineapple, coconut), marshland, and pasture for cattle. The site is a government-protected area and has functioned as a research and teaching facility since 1993.

The three forest fragments at La Suerte are all characterized by some degree of disturbance due to logging. The Small Forest is advanced secondary forest that was last logged in the 1970s (Garber and Rehg, 1999). It was 15 ha in size when the study was conducted but has since been reduced by approximately one-seventh in an area not owned by LSBFS (JDP, pers. obs.). The Large/German Forest was approximately 100 ha in size, 30 ha of which is owned by the LSBFS (Fig. 1). These forest patches are surrounded by either pasture or croplands but are connected to one another and to other forest patches by a narrow strip of riparian habitat (<50 m width on average) that runs along the La Suerte River. A forest fragment that was purchased by LSBFS in 1998 is a 40 ha plot within a 180 ha area of secondary growth, pasture and marshland, which had yet to be surveyed properly at the time of our study. While howling monkeys were seen in this forest in August 1999 (JDP, pers. obs.), based on the degree of disturbance and the lack of many large trees it seemed unlikely that spider monkeys occurred there, although it possibly supported capuchins. A goal in progress is to establish corridors between the fragments (Fig. 1).

The third forested area surveyed in this study was not owned by LSBFS (Fig. 1: Logged Forest). It was included in the survey because spider monkeys were observed, besides the other primates, before it began to be logged very heavily in 1998 (N. Mann, pers. comm. and JDP, pers. obs.). It has been logged since 1997, a practice which continued

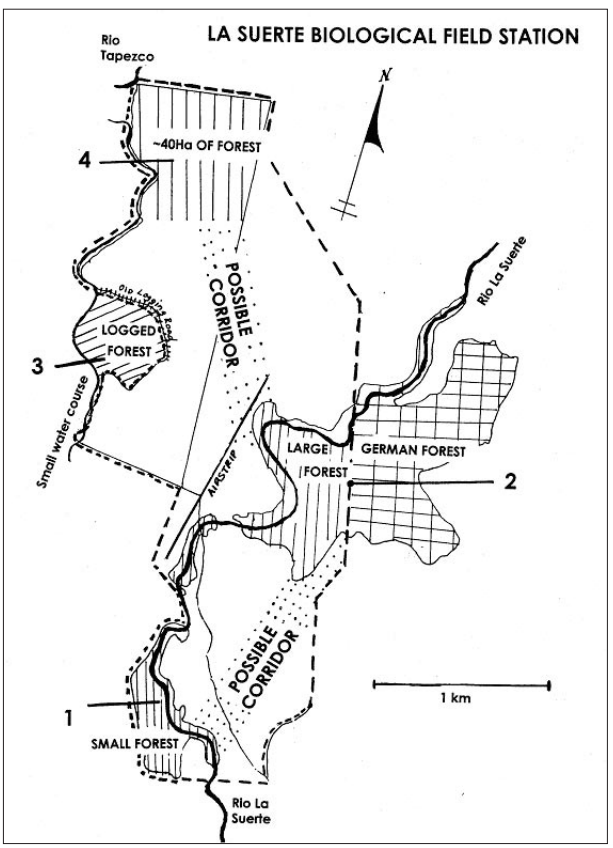

Figure 1. Map of La Suerte Biological Field Station, Limon Province, Costa Rica. 1 – Small Forest, 2 – Large Forest/German Forest, 3 – Logged Forest, 4 – New Forest patch.

during our study and through July 2001 (K. Dingess, pers. comm.). The Logged Forest was approximately 35 ha in size, was adjacent to other forested areas that have not been surveyed, and could be accessed by primates through one or more riparian corridors. The extent and condition of forested areas to the west of LSBFS (and of the Logged Forest) is unknown.

The survey at LSBFS (83°46'15"W, 10°26'30"N) was conducted from 21 June to 18 August 1999. Both line transects and total count methods were used to assess the densities of primates during 318 hours in the field. Primate groups were encountered 152 times. During 98 hours on 19 days we conducted concentrated searches along trails and transects, including fruiting tree vigils at a *Ficus* tree (12 hours over 2 days). Twelve days were spent conducting systematic line transect surveys. Compositions of groups noted during 51 hours of contact by JDP at LSBFS in January 1997 and May-August 1997, as well as published data (Garber and Rehg, 1999), provide some indication of group demographics over a short time-period.

Surveys

From 21 June to 4 July, two observers (JDP and one inexperienced observer), prepared the survey areas by cutting transects through areas previously not marked, marked all transects at 25 m intervals (see Peres, 1999a) and began sampling the vegetation [in prep.]. Existing trails that ran in parallel were used as transects when possible to minimize time spent clearing areas and disturbance of the forest areas, given the narrow width of the fragments. Transects were cut in parallel through most of the length of the German Forest section of the Large/German Forest. Two of the three established trails overlapped and crossed one another at their beginning points, and the presence of natural barriers such as swamps forced observers to place even new transects in overlap in one case. The initial two-week time period for site preparation gave the inexperienced observer the opportunity to become familiar with the primate species at LSBFS. A third observer (HCL), who was familiar with primate behavior in the wild and had worked at this site before, arrived at the field site on 5 July. We began line transect surveys of the forests at LSBFS on 7 July 1999, with three observers. Each of the three forest fragments was surveyed four times. At least one day passed where transects that had been recently cut were avoided by observers before they were systematically surveyed (after Peres, 1999a).

All line transect surveys began between 0500 and 0600 hours. Observers started at the same time, using synchronized watches, and walked slowly along marked transects at a speed of approximately 1.5 km per hour (see Peres, 1999a). Observers stopped every 100 m to search the surrounding area for a duration of two minutes before proceeding. Surveys were not conducted on rainy days (see Peres, 1999a). In the Large/German Forest, transect length ranged from 2.7 to 3.7 km. Here, observers completed a survey in one direction (NW-SE or SE-NW) during a single morning. In the two smaller forest fragments, short transect length (range: 663 m - 1500 m) enabled observers to complete two surveys of the same transect in one morning. Upon reaching the end of a transect observers backtracked to the starting point. In all forest patches observers alternated the starting point of a survey each time a survey was conducted. Observers surveyed a different transect each time in order to minimize observer bias (Peres, 1999a). A contact time with primate groups of 30 minutes was targeted during line transect censuses because we reasoned that a lengthier amount of time spent in contact with primate groups would provide for more reliable counts. The small areas surveyed enabled us to use such a contact time without sacrificing survey time during periods when primates were most active. Data recorded when primates were encountered included: (1) location (transect and meter marker), (2) species, (3) distance (m) from observer to monkey, (4) perpendicular distance (m) from monkey to transect, (5) height of monkey in the trees, (6) activity, (7) habitat type, (8) mode of detection (sound or sight), (9) number of individuals in group, (10) ages of individuals seen (adult, infant, other immature) and (11) sex and (12) time of day. Infants were defined as those dependent on adults for travel (i.e., carried). Observers were tested for the reliability with which they recorded distances (see Peres 1999a) by having each record their estimation of the distance to the nearest half-meter between pairs of flags set into the ground at varying distances apart (usually 20 pairs per test, N=6 tests).

The Large/German Forest was the focus of concentrated searches by JDP for spider monkeys. Once a primate group was encountered, a total count (Srivastava *et al.*, 2001) was obtained. Intense searches were made in areas where spider monkeys had been seen before. All primate species were recorded during these searches.

Analyses

We first analyzed the accuracy of observers' estimates of group sizes recorded during line transect surveys by comparing these figures to known group sizes of primates in the Small Forest. In the Small Forest, primate group sizes were known from approximately 37 hours of contact time during the study, and from conferring with teaching assistants and instructors at LSBFS after our study. Since group sizes were greatly underestimated during line transect surveys (see Fernandez-Duque *et al.*, 2001; Table 1), we decided to use line transects mainly to establish group density and not individual primate density (see Peres, 1999b). We also examined the effect that the duration of contact time had on group size counts using data from concentrated searches in an analysis of variance test. Individual primate densities were calculated using a combination of line transect surveys and surveys concentrated in areas where groups had been seen. Averages of group counts recorded during line transect surveys were used when a complete group count could not be recorded.

The size and composition of approximately one-third of the howling and capuchin monkey groups estimated to inhabit LSBFS was known (n = 6 of 17–18 groups). The number

Table 1. Primate group sizes in Small Forest.

Species	Average group size: line transect census	Known group sizes	Difference
Alouatta palliata	6.5 (N=6) range 4-10	12 individuals (Group 2)	46%
Cebus capucinus	6.5 (N=2) range 4-9	9 individuals	28%

of capuchins living in the Logged Forest was based on the maximum number of individuals recorded during any one observation, since we could only reliably say that one capuchin group lived there (Table 1). For two of the three howling monkey groups observed in the Logged Forest, the discontinuity of the canopy allowed JDP to make reliable group counts as individuals moved along a single pathway. The size of the third group was based on the average size of howler groups observed in this forest (i.e., 4.4 individuals, Table 1). Data on the howling monkey and capuchin groups inhabiting the Small Forest that were collected in this study, in 1997 by JDP and in 1995 by Garber and Rehg (1999) were compared over a four-year period.

JDP was able to obtain a full count of the "big" howling monkey group (n = 21 individuals) in the Large/German Forest as the group entered and then left a large fruiting *Ficus* tree during a tree vigil. For howling monkey groups other than the "big" group in the Large/German Forest (n = 7), averages from line transect surveys were used to estimate group sizes. This method was also used to estimate the sizes of capuchin groups observed in the Large/German Forest (n = 3). For spider monkeys, minimum community size was based on data from simultaneous observations of *A. geoffroyi* during sweep transect censuses.

Results

Primate density and group sizes at LSBFS

Data on the number of primate groups inhabiting the different forest patches at LSBFS are presented in Table 2.

Contact time and individual primate densities

During concentrated searches, spider monkeys (n = 22 encounters) and capuchin monkeys (n = 19) were encountered relatively more often per survey hour than howling monkeys (n = 38), compared to line transect surveys (n = 10, 10 and 53 times, respectively). Time spent with primate groups averaged 31 minutes (range 1–210 minutes). On average, during group encounters in concentrated searches, capuchins were observed for 30 minutes, and howling monkeys were observed for 38 minutes. For the 79 primate group contacts made during searches, the duration of time with a group significantly affected the number of individuals counted (ANOVA: $F = 12.9$, $df = 46$, $p<0.001$). The number of individuals increased along with duration of time spent with a group up to 120 minutes.

Discussion

In this study, systematic survey measures (i.e., line transects) were supplemented with data on primate group size from total counts to calculate densities of the primate population at LSBFS. Line transect surveys with multiple observers were most useful in estimating the number of primate groups inhabiting a forest patch. The location of groups observed more or less simultaneously could be plotted onto maps so that they could be found later for a more thorough count. Concentrated searches using total counts were instrumental in providing information on group size, since observers were not restricted to a set contact time with groups. The number of individuals counted increased significantly with the time that an observer stayed in contact with the group. Group size was significantly underestimated using line transect surveys, compared to the known number of howling monkeys in the Small Forest. Using data from total counts, where observers spent varying amounts of time with groups, at least two hours were necessary in order to obtain a steady count (i.e., one that no longer increased with time). However, increasing contact time with groups during line transect surveys to such a duration would only be feasible in areas of less than 40 ha in order to survey when primates are most active. Nonetheless, we question the reliability of density estimates for arboreal primates using a 10-minute targeted contact time.

Capuchins and howling monkeys in the Small Forest occurred at higher densities than at most other sites where these primates have been studied (Freese and Oppenheimer, 1981; Freese, 1976). Capuchin numbers in the Large and Logged forests at LSBFS were more similar to capuchin densities elsewhere. Individual howling monkey density was also extremely high per unit area in the Small Forest. Using multiple surveys averaged over time, Chapman and Balcomb (1998) showed that mantled howlers averaged

Table 2. Primate groups inhabiting forested areas at LSBFS.

Species	Small Forest (15 ha)		Logged Forest (35 ha)		Large Forest (100 ha)	
	Indiv. per km²	Groups per forest	Indiv. per km²	Groups per forest	Indiv. per km²	Groups per forest
Alouatta palliata	150	2	41	3	30	7–8
Cebus capucinus	60	1	11	1	15	3
Ateles geoffroyi	0	0	6	1	8–10 (min.)	1

Table 3. Primate group compositions in Small Forest, 1995-1999.

Group	Year	No. of individuals	No. of males	Reference
Tippy's howlers	1997 1999	11 10	1 2	JDP unpublished data; this study
2nd howler group	1997 1999	10 12	2 3	JDP unpublished data; this study
Small forest capuchins	1995 1997 1999	13 12 9	 2–3 1–2	Garber & Rehg 1999; JDP unpubl. data; this study

48.5 individuals per km² (calculated from Table III: Chapman and Balcomb, 1998). Based on these data, howlers in the Logged and Large/German forest patches at LSBFS approach, but fall below, average population density of mantled howling monkeys, but Small Forest howlers occur at a density approximately three times that of the average (Chapman and Balcomb, 1998). Fashing and Cords (2000) noted the possibility that recent deforestation or other disturbance can result in primate populations that are high in density due to crowding, but that may become significantly lower as the effects of such disturbance become evident. Given the high density of howlers in this forest patch compared to other patches at LSBFS and at other sites where howlers have been studied, this may indeed be the case at LSBFS. Over short periods, howling monkey and capuchin group size in the Small Forest was somewhat stable, with the number of capuchins only slightly decreasing during this time. Additionally, the size of howling monkey groups here was similar to averages taken from a review by Chapman and Balcomb (1998: 12.2 group size based on averages of multiple censuses in different years). If the high densities exhibited by howling and capuchin monkeys in the Small Forest at LSBFS are due to crowding, detrimental effects on group sizes have not become evident in five years. Given the fact that these primate groups are often the focus of study for several primate field courses per year, such information could be gathered for comparison with our data, as well as those from other sites (e.g., Santa Rosa and La Pacifica, Costa Rica).

According to recorded sightings of spider monkeys in the Large/German Forest, the spider monkey community is typical of those found elsewhere (Chapman, 1988; Estrada and Coates-Estrada, 1996; Freese, 1976; Cant, 1978; Gonzalez-Kirchner, 1999). The minimum number of individuals in this community is 10, based on simultaneous sightings by observers during line transect surveys. A single sighting of 15 individuals was reported in 1997 (L. Winkler, pers. comm.), so that the size of the community at LSBFS is similar to the mean number of individuals per km² observed at other sites (calculated from Gonzalez-Kirchner, 1999; Chapman, 1988; Estrada and Coates-Estrada, 1996; Freese, 1976; Cant, 1978: mean number of individuals = 14.4).

Table 4. Groups and sizes recorded during line transect censuses.

Species	Forest patch	Average group size	Average no. groups
Alouatta palliata	Small	6.3	1.75
	Logged	4.0	3.75
	Large	4.0	4.75
Cebus capucinus	Small	6.5	0.25
	Logged	3.0	0.5
	Large	6.3	1.75
Ateles geoffroyi	Small	-	0
	Logged	2	0.25
	Large	3.3	0.75

At present, approximately 70 ha of the 100 ha forest fragment surveyed in this study is owned by outside interests (i.e., German Forest). The property was being logged in June 2001 (K. Dingess, pers. comm.). The spider monkey population currently inhabiting it is predicted to suffer a loss in numbers. If clear-cutting occurred, the spider monkey community would not survive, based on estimates of minimum home range size of communities elsewhere. For example, Fedigan *et al.* (1988) found the range size of individual spider monkeys at Santa Rosa, Costa Rica, averaged 62.4 ha, with a range of 37.4–97.9 ha. Four groups of howling monkeys were recorded in this 70 ha area of the Large Forest, as well as two groups of capuchins. The 30 ha forest tract owned by LSBFS would be insufficient to support such numbers of capuchin and howling monkey. The establishment of a corridor between the forest fragments at La Suerte should be beneficial in facilitating dispersal between the spider monkey communities encountered in this study.

Conclusions

Densities of mantled howlers and white-faced capuchins in the Small Forest at La Suerte Biological Field Station are high compared to populations elsewhere. Densities of these species in other forest patches at LSBFS were similar to other sites. The black-handed spider monkey population at LSBFS is similar in its average density when compared to populations elsewhere. Using different survey methods revealed that time spent in contact with primate groups by observers significantly affected the number of individuals counted. Counts of group members increased and then leveled off after observers had been in contact with groups for approximately 120 minutes. This suggests that standard, short time-periods used to determine group size and com-

position during line transect surveys could result in unreliable density estimates for the primate species surveyed in this study.

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Primates, Lots and Forest Fragments: Ecological Planning and Conservation in the Sierra de Santa Marta, Mexico

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Introduction

Rain forest fragmentation is of particular concern where entire regions are threatened by agriculture and other human activities, constituting as they do some of the most rapidly disappearing habitat on earth. An understanding of processes allowing specific taxa to persist in fragmented habitat is of great importance to conservation programs (Silva-López, 1996; Silva-López *et al.*, 1993a). Resources from forest fragments may play a key role in the domestic economies of local communities (Silva-López *et al.*, 1993b), and community work is as important as research when considering specific conservation measures (Portilla-Ochoa, in press). The management of forest fragments within systems where public land is divided into lots needs to be carefully incorporated into regional and local development plans, and requires a knowledge of the political decisions and socio-economic factors that determine their permanence or state of conservation.

In 1983, recognizing the need to create a balance between primate conservation and the development of rural areas, the Charles A. and Anne Morrow Lindbergh Fund, Inc., decided to support GSL's project "Rainforest exploitation and efforts to protect the endangered spider and howler monkeys at Sierra de Santa Marta, Mexico." The study´s results not only helped to promote new research and initiatives on behalf of primate conservation in the area but, most importantly, it stimulated the participation of biological and social scientists alike to design new approaches to support the conservation of the Sierra. This paper comments on one such approach and represents a new stage in our research program's vision of the problem. It deals with the fact that *campesinos* have long recognized the agricultural relevance of forest fragments, and examines some of the ways they use these fragments in their daily lives.

The Sierra

Each portion of the Sierra has unique geographic, cultural and biological characteristics. The eastern and southern slopes exemplify this situation, which is closely linked to the presence of the local, Zoque-popoluca people inhabiting the area. This indigenous group is the fourth largest in Veracruz, with about 29,000 people, of which about 60% (some 23,000) inhabit the Sierra and neighboring areas. Most of the Sierra and its area of influence is located in the municipality of Soteapan, where the population density, estimated at 52 inhabitants/km², is nearly half of the 95.4 inhabitants/km² average for the entire state (INEGI, 2000). However, the annual population growth rate in Soteapan has been estimated at 4.47%, almost twice that of the state. Soteapan has more than 40 *ejidos* (public lands) and agricultural communities, which combined represent about 98% of the municipality. Clearly, the Sierra´s portion of Soteapan, with its hilly relief marked by streams and small valleys, its Zoque-popoluca population inhabiting *ejidos* and its flora and fauna largely restricted to small forest fragments, is an example of a unique environment.

Forest Fragmentation

The problems associated with, and derived from, forest fragmentation have been studied by a number of authors (Silva-López, 1995; Kattan, 1993; Robinson, 1993; Kellman, 1993; Murcia, 1993; Harris and Silva-López, 1992) and are not discussed here. However, although we sometimes suggest that the clearing and fragmentation of a rain forest is an irrational act, from the point of view of the stakeholders involved, it is in fact only rarely so (Schelhas, 1993). Only with an understanding of the basis on which an *ejidatario* (a family head of the *ejido*) makes decisions on land use is it possible to change and influence the conditions promoting destructive uses and create incentives to promote sustainable uses.

An *ejidatario* who leaves one or more intact forest fragments in his lot is not being irrational. Our joint study of 67 *ejidal* lots and approximately 50 fragments suggests that these forest remnants are a refuge for the impoverished flora and fauna, including numerous tree species, palms, and spider and howler monkeys, while also providing a number of products for the local economy. A detailed study of the trees in a 10-ha forest revealed that locals use some 12 species for food, 15 as a source of medicinal products, 10 as a source of construction materials and at least 20 for firewood. Combined, they represent about 30% of the species, 40% of the families and approximately 60% of the trees with a diameter of 20 cm or larger in the fragment (Jiménez-Huerta *et al.*, 1993; Silva-López *et al.*, 1993). Fragments also provide ecological services such as windbreaks, the reduction of erosion levels in areas adjacent to cultivations and protection of streams. More than 90% of these fragments are next to rivers and streams on the Sierra´s eastern slope.

There are severe land use restrictions in a hilly terrain such as that prevailing in the Sierra. One of these is related to climate. The strong winds from the south, locally known as *suradas* (Portilla-Ochoa, 1995), are characteristic of the dry season and can be extremely damaging. They may cause fires started by cattle-ranchers to run out of control, resulting in severe and extensive forest fires. These runaway fires are one of the main causes of forest destruction. The loss of

trees in forest remnants eliminates a natural barrier to these fires and eventually promotes new fires which affect cultivations, firewood and timber reserves alike, as well as the settlements themselves in the Sierra´s upper portions. The *suradas* have also caused the disappearance of the *tapachol* practice (maize cultivation in the winter) and the cultivation of chili, one of the area's few marketable products.

The Management of Lots

In order to ameliorate these kinds of problems, a relatively large number of *ejidatarios* from the *ejido* of Magallanes have requested a management strategy for their lots (Portilla-Ochoa, 1995), based on the consideration of physiographic conditions limiting land-use. The *ejidatarios* use the "lomos de las colinas" (hilltops) for pasture, precisely in the places where the effects of *suradas* can be most harmful. They use the "bajadas-contra" (leeward slopes, or slopes oriented against the direction of the *suradas*) to cultivate maize and other mixed cultivations, which include beans, yucca, sweet potato, string beans and squash. Finally, they use the "planos" (small valleys between the hills) to cultivate maize and some of the 10 banana varieties and/or to maintain forest remnants. The exact system may vary somewhat, but the general pattern is consistent.

Considerations for Ecological Planning at the Level of Lots

We propose that a management strategy based on lots can be used as a preliminary approach for the Sierra's ecological planning. Land use patterns are not static, however. They change in degree or characteristics from time to time due to social, economic and political factors at local, state and national levels. These changes require immediate actions on behalf of the long-term conservation of landscape elements as dynamic as forest fragments.

Forest fragments cannot be perceived as isolated elements of the landscape. Ultimately, they have been, and are, social spaces in the Sierra's rural environment. That is why, in the application of any conservation measure, it is necessary to distinguish the effects of fragmentation *per se* from the effects of man upon fragments, which in most cases are more deleterious and permanent in character. The products and ecological services provided by fragments cannot be guaranteed in the long-term unless the fragments themselves are the object of intensive management.

The immediate protection of fragments can be very cheap but, in spite of the potential management costs, they must form part of an integrated conservation strategy for the Sierra. The key is to identify the most convenient type of projects for management, which of necessity must involve the participation of the locals, with the multiple use of forest remnants as an end-product.

The establishment of general goals in these projects must be carefully planned. Initially, projects may come from a number of different organizations and approaches but, in order to make them viable, they must contribute to a balance which combines the role fragments play for the conservation of forest diversity with an improvement in the Zoque-popolucas' subsistence level in accordance with local environmental conditions. From our point of view, the achievement of this balance, to diversify the economic base in the shortest period of time, is of critical importance.

To summarize, the preservation of forest fragments is only one part of the conservation actions necessary in the Sierra. The area's management must be oriented toward ecological planning at the level of the lots, including traditional or alternative cultivations, the grasslands, and the maintenance and management of forest fragments offering products and ecological services to the *ejidatario* and habitat for the native flora and fauna. In the scheme of a biosphere reserve, this type of ecological planning will be critical to prescribe actions for the buffer zone.

At present, a regional zonation has been made to define the "Los Tuxtlas" Biosphere Reserve, including a nuclear and a buffer zone, of which Santa Marta forms an integral part. Four sub-zones have been distinguished inside the buffer zone: (1) traditional use, (2) recovery, (3) sustainable use of agroecosystems and (4) sustainable use of natural resources (Portilla-Ochoa, 1999). By using this management strategy, the approach to the management of lots is better defined because, for each sub-zone, it has now become possible to establish specific management guidelines combining conservation and the rational use of natural resources.

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Estudio del Patrón de Actividad General de Monos Aulladores (*Alouatta palliata*) en el Parque Yumká, Tabasco, México

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Introducción

Los monos aulladores (*Alouatta* spp.) se han caracterizado por presentar patrones de baja actividad, descansando más de la mitad de su tiempo diurno, lo cual se atribuye a la necesidad de procesar grandes cantidades de fibra vegetal como resultado de una dieta rica en hojas (Milton, 1980). Las variaciones en los patrones de actividad de este primate parecen estar relacionados con el grado de dispersión del alimento en el tiempo y espacio (Crockett y Eisenberg, 1987), con su densidad, y con variables abióticas como el clima (Chivers, 1969; Glander, 1979; Ortíz-Martínez *et al.*, 1999), así como también con la edad y sexo de los aulladores (Bicca-Marques y Calegaro-Marques, 1994). La perturbación antropogénica de los hábitats naturales de este primate también tiene una influencia importante sobre la estrategia de asignación de tiempo y energía a las diferentes actividades vitales (crecimiento, mantenimiento y reproducción), pero hasta el momento existe poca información al respecto (Juan *et al.*, 1999; Estrada *et al.*, 1999).

El estado de Tabasco en el sur de México resguarda poblaciones representantes de las tres especies de primates que existen en México: *Alouatta palliata, A. pigra y Ateles geoffroyi* (Smith, 1970; Horwich y Johnson, 1986; Rylands *et al.,* 1995). Tabasco es el único estado de México, y la única zona de la región Mesoamericana, en donde podemos encontrar representantes de las tres especies de primates y resguarda la zona de transición entre *A. palliata y A. pigra* en algunas localidades (Smith, 1970). Cerca del 60% de la superficie del estado estaba originalmente cubierta por selvas, pero como resultado de la actividad humana en Tabasco, cerca del 80% de esta vegetación ha desaparecido a una tasa de 600 km² ó más al año, siendo las tierras bajas en donde ha ocurrido la mayor transformación de la selva a pastizales y otros agrosistemas (Masera, 1996; SEMARNAP, 1999; INEGI, 1996).

Por otro lado, datos sobre los patrones de actividad de monos aulladores constituyen información fundamental acerca de la historia natural, ecología y comportamiento de la especie involucrada. En el caso de los primates mexicanos, poco es lo que se ha documentado acerca de estos aspectos y la información publicada hasta el momento, proviene de estudios realizados en Los Tuxtlas, Veracruz (Estrada, 1984; Ortíz-Martínez *et* al., 1999; Estrada *et al*., 1999). Para el caso del estado de Tabasco la información es inexistente. La ausencia de datos básicos acerca de los patrones de actividad en *A. palliata* en Tabasco y como varían estos en el tiempo y espacio en respuesta a oscilaciones en la disponibilidad del alimento, dificulta la tarea de diseño y implementación de proyectos de conservación y manejo de las poblaciones de primates silvestres remanentes en el estado.

En este trabajo reportamos los resultados de un estudio parcial sobre los patrones de actividad en una tropa de monos aulladores (*Alouatta palliata*) en el Parque Yumká localizado en la parte central de Tabasco. Un trabajo anterior reporta datos sobre el tamaño y aspectos demográficos de la población de monos aulladores en este sitio (Estrada *et al*., 2001) y otro trabajo reporta datos sobre la utilización de plantas como alimento (García del Valle, 2001).

Métodos

Sitio de estudio

El Parque Yumká se localiza a 15 km al sur de la ciudad de Villahermosa (17°45' y 18°00'N, 92°45' y 93°00'O), la capital del estado. Yumká es un parque público que comprende una superficie de 101 ha, de las cuales, 33 ha presentan selva alta perennifolia, 47 ha son sabanas y el resto lo conforma un lago (Fig.1); altura sobre el nivel del mar es 15 m. El clima es cálido-húmedo con una precipitación media anual de 2159 mm y una temperatura media anual de 29.4°C.

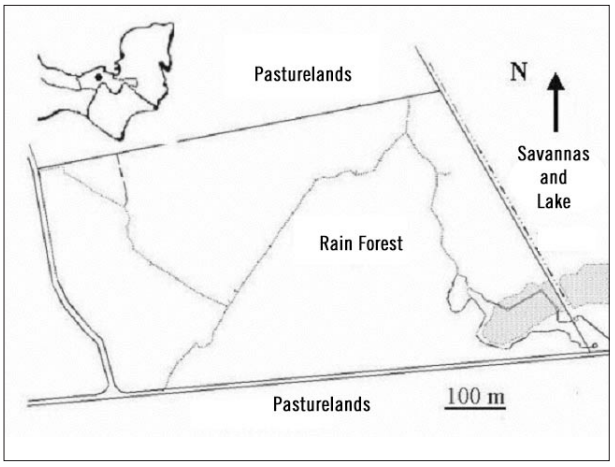

Figura 1. Localización del Parque Yumká en la parte central del estado de Tabasco (punto negro en el mapa del sur de México). Las líneas paralelas son una carretera pavimentada y otra de terracería. Las líneas delgadas son veredas en el área de selva del Parque.

Tropa focal

Nuestro estudio se basó en observaciones del comportamiento de una de las cuatro tropas de monos aulladores que existen en el Parque (Estrada *et al*., 2001). Esta tropa estaba formada por 28 individuos: 5 machos adultos, 11 hembras adultas, 5 juveniles, 4 infantes y 3 individuos cuyo sexo no pudo ser determinado.

Observaciones de los monos aulladores

Las observaciones del comportamiento de los aulladores se llevaron a cabo de Octubre 2000 a Abril 2001. Los aulladores fueron observados, en promedio, durante 7 días en cada mes de 07:00 a 17:00 horas. La ubicación de la tropa al inicio de las observaciones se simplificó siguiendo la dirección de las vocalizaciones emitidas por los machos adultos al amanecer. El método de muestreo empleado en las observaciones fue el de animal focal (Altmann, 1974). La duración de la muestra focal para individuos representantes de cada clase de edad y sexo en la tropa (machos adultos, hembras adultas, juveniles e infantes) fue de una hora. Durante la muestra focal se registró el tiempo dedicado a cada una de las siguientes actividades: descanso, alimentación, locomoción, interacciones sociales, viaje y bramidos. Cuando el comportamiento fue alimentación, se específico la parte consumida (hojas jóvenes, hojas maduras, frutos jóvenes, frutos maduros y flores). La planta utilizada fue marcada y identificada a nivel de especie. Cuando el comportamiento fue viaje, aparte de la duración de este, se midió la distancia recorrida en metros.

Para determinar las variaciones en el uso del espacio disponible por parte de la tropa bajo estudio, medimos el tiempo de estancia de la tropa en sectores de 1.0 ha (100 x 100 m) en tamaño. La localización en el espacio de los árboles utilizados como fuente de alimento fue marcada en cada sector. La diversidad mensual en la dieta de los aulladores y la diversidad mensual en el uso de sectores por la tropa se expresaron con el índice de diversidad de Shannon (H´). El índice de Sorensen fue calculado para expresar la similitud intermensual en el uso de sectores por parte de los aulladores. El patrón de dispersión espacial de los árboles usados por los aulladores como fuente de alimento se determinó por medio del índice de dispersión de Morisita (Franco *et al*., 1989). Este permitió discernir si la distribución espacial de los árboles utilizados por la tropa era al azar, uniforme o agregada.

La prueba no paramétrica de Kruskal-Wallis (Mendenhall, 1994) se uso para probar la existencia de diferencias entre meses en el patrón general de actividades de los aulladores. Usamos la prueba U de Mann-Whitney (Mendenhall, 1994) para determinar la presencia de diferencias significativas en el tiempo invertido para cada actividad entre las diferentes clases de edades y sexos representadas en la tropa bajo estudio. Este estadístico se usó también para probar la existencia de diferencias mensuales en la distancia recorrida por los aulladores entre meses. El coeficiente de correlación de Spearman (r_s) se utilizó para determinar las posibles rela-

ciones entre el uso de sectores y el tiempo de alimentación en cada sector y el número de árboles usados por sector. El nivel de significancia que se aplicó en todos los casos fue de ≤ 0.05. Debido a que los datos para los meses de Diciembre y Enero fueron escasos, ambos meses se combinaron como una sola muestra. La ocurrencia de las actividades registradas fue expresada como el número de minutos por hora focal de observación.

Resultados

Durante los siete meses que duró el estudio, se completaron 49 días efectivos observando el comportamiento de los monos aulladores. Con relación a los registros focales se completaron 727 muestras focales distribuidos de la siguiente manera entre los individuos de la tropa: hembras adultas 383 focales (53%), machos adultos 213 focales (29%), juveniles 101 (14%), infantes 12 (2%) y adultos para los que no fue posible determinar el sexo 18 focales (2%). El tiempo total acumulado de observaciones focales fue de 18,146 minutos o 302 hrs, con un promedio de 2,592 minutos o 43 hrs por mes.

Patrón general de actividades

Las tasas medias mensuales para el patrón general de actividades fueron 44.9 min/hr para descanso, 7.9 min/hr para alimentación, 4.1 min/hr para locomoción, 2.1 min/hr para viaje, 0.8 min/hr para interacciones sociales y 0.1 min/hr para bramidos. En general, el patrón de actividades registrado fue similar entre los diferentes meses del periodo de estudio, no existiendo diferencias significativas entre estos ($H = 0.52$, g.l. = 5, $P > 0.05$) (Fig. 2). Las observaciones del comportamiento de alimentación indicaron que los aulladores de la tropa estudiada invirtieron el 72% del tiempo registrado de alimentación en el consumo de hojas. De estas el 38% y 34% fue invertido en el consumo de hojas jóvenes y hojas maduras respectivamente; los frutos maduros aportaron el 10% y los jóvenes el 5%. El consumo de flores contribuyó al 13% del tiempo de alimentación. La mayor diversidad de especies se encontró en el consumo de hojas maduras (17 especies) y de hojas jóvenes (12 especies), mientras que el número de especies utilizadas por los aulladores para consumo de frutos y flores varió de 2 a 5 especies (García del Valle, 2001).

Patrón general de actividades por edad y sexo

La tasa para la actividad descanso fue mayor en los individuos adultos (46.7 min/hr) y menor en los infantes (8.6 min/hr). Los infantes tuvieron tasas altas de alimentación (13.3 min/hr), locomoción (14.7 min/hr) e interacción social (23.4 min/hr) (Fig. 3). No encontramos diferencias significativas entre machos adultos y hembras adultas para cada una de las actividades generales registradas. Entre adultos y juveniles no se encontraron diferencias significativas en la actividad alimentación ($U = 2$, $p>0.05$) e interacciones sociales ($U = 11$, $p<0.05$), pero la actividad descanso fue significativamente mayor en los adultos que en los juveniles ($U = 0$, $p<0.01$) y la locomoción fue significativamente mayor en los juveniles que en adultos ($U = 3$, $p<0.05$). Entre juveniles e infantes no se encontraron diferencias significativas en las interacciones sociales ($U = 3.8$, $p>0.05$), pero la actividad locomoción fue significativamente mayor en los infantes que en los juveniles ($U = 1$, $p<0.05$). La actividad descanso fue significativamente mayor en juveniles que en infantes ($U = 0$, $p<0.05$) (Fig. 3).

Distribución de las actividades en el periodo diurno

En promedio las primeras actividades de los monos aulladores en el día consistieron en locomoción, viaje y alimentación, presentando la alimentación durante este periodo el mayor tiempo invertido en el día (29.9%) (Fig. 4). Transcurridas las primeras horas, estas actividades decrecieron, incrementándose el descanso entre 09:00 y 13:00 horas, disminuyendo en horas posteriores (Fig. 4). Entre 09:00 y 11:00 horas se presentó el mayor periodo de emisión de bramidos. La actividad alimentación presentó nivel bajos entre las 11:00 y13:00 horas, observandose un incremento en esta actividad después de las 17:00 horas. Las interaccio-

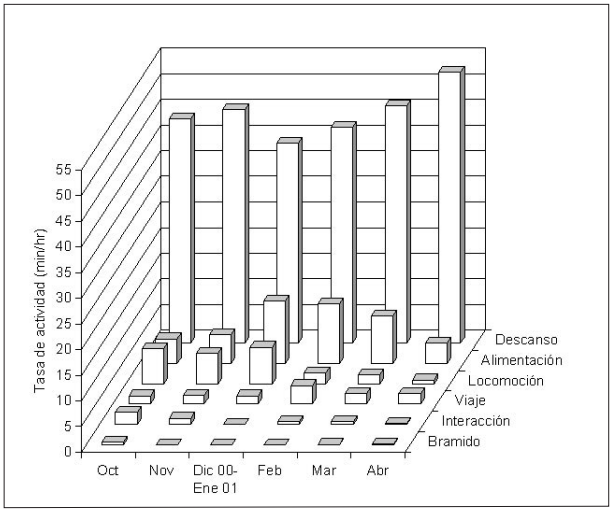

Figura 2. Perfiles mensuales del patrón de actividad general de la tropa de aulladores estudiada en el Parque Yumká.

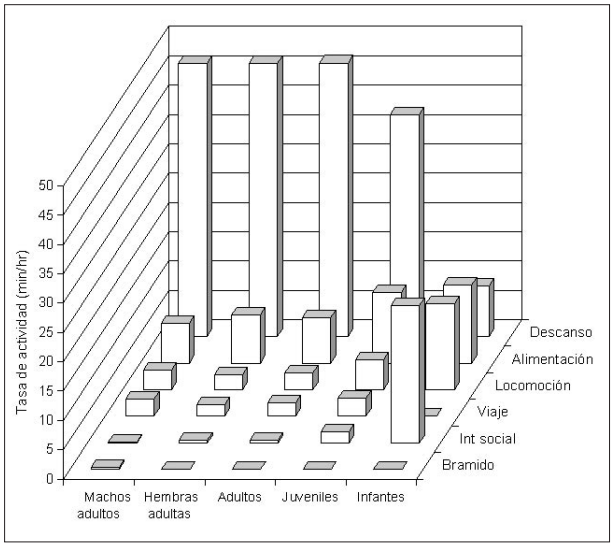

Figura 3. Perfil de actividad para individuos en las diferentes clases de edad y sexo en la tropa de monos aulladores estudiada en el Parque Yumká.

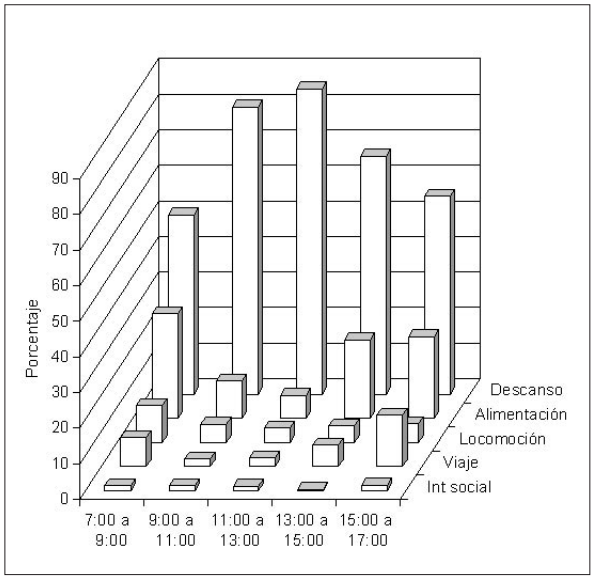

Figura 4. Perfil diurno de actividad para la tropa de monos aulladores estudiada en el Parque Yumká, Tabasco, México.

nes sociales fueron menos frecuentes a medio día (Fig. 4). La actividad viaje presentó sus mayores niveles entre 15:00 y 17:00 horas (Fig. 4). El tiempo registrado en la emisión de bramidos por los aulladores se repartió de la siguiente manera: 10% de 07:00 a 09:00, 44 % de 09:00 a 11:00, 24% de 11:00 a 13:00, 4 % de 13:00 a 15:00 y 18% de 15: 00 a 17:00 (Fig. 4).

Uso del espacio

Durante el periodo de estudio los aulladores usaron para sus actividades un 40 % de la superficie disponible (Fig. 5). El tiempo total de estancia cada sector de 1.0 ha varió de 8.9 a 3994 min. En el mes de Enero los aulladores usaron para sus actividades nueve sectores ó el 19% de la superficie disponible (Fig. 5). El mayor número de sectores (N = 18; 38% de la superficie disponible) utilizados por los aulladores fue registrado en el mes de Febrero. (Fig. 5). El coeficiente de similitud de Sorensen, calculado para determinar el grado de traslapo en el uso de sectores de un mes a otro varió de 0.40 (Enero y Marzo) a 0.67 (marzo y Abril). Para los meses Febrero-Marzo y Febrero-Abril el índice de similitud fue de $C_s = 0.50$.

Se encontró una asociación positiva entre las veces en que fueron usados los sectores por mes y el tiempo invertido en la actividad de alimentación por sector ($r_s = 0.62$, $p<0.05$). También se encontró una relación positiva entre las veces en que fueron usados los sectores por mes y los árboles usados por sector ($r_s = 0.81$, $p<0.001$) y una tercera asociación positiva fue detectada entre la diversidad (H´) mensual en la dieta de los aulladores y el número de sectores utilizados en cada mes ($r_s = 0.94$, $p = 0.02$). Estas estadísticas sugieren una estrecha relación entre los patrones de uso del espacio observados, la disponibilidad de los recursos alimentarios y la diversidad dietética manifestada por los aulladores. En el caso de las partículas alimentarias ingeridas por los aulladores, encontramos una asociación positiva entre el número de sectores usados por mes y el porciento de tiempo invertido por los aulladores en el consumo de hojas maduras ($r_s = 0.94$, $p = 0.02$). En el caso de las hojas jóvenes, la asociación fue negativa, pero no significativa ($r_s = -0.71$, $p = 0.13$). Para los frutos maduros la asociación no fue significativa ($r_s = 0.10$, $p = 0.44$).

La dispersión en el espacio de los árboles utilizados por los aulladores como fuente de alimento durante los meses de Enero a Abril presentó, de acuerdo al índice de Morisita, un patrón agregado ($Id_A = 1.35$, $Id_B = 1.59$, $Id_C = 1.02$, $Id_D = 1.13$). La distancia promedio recorrida por día por los

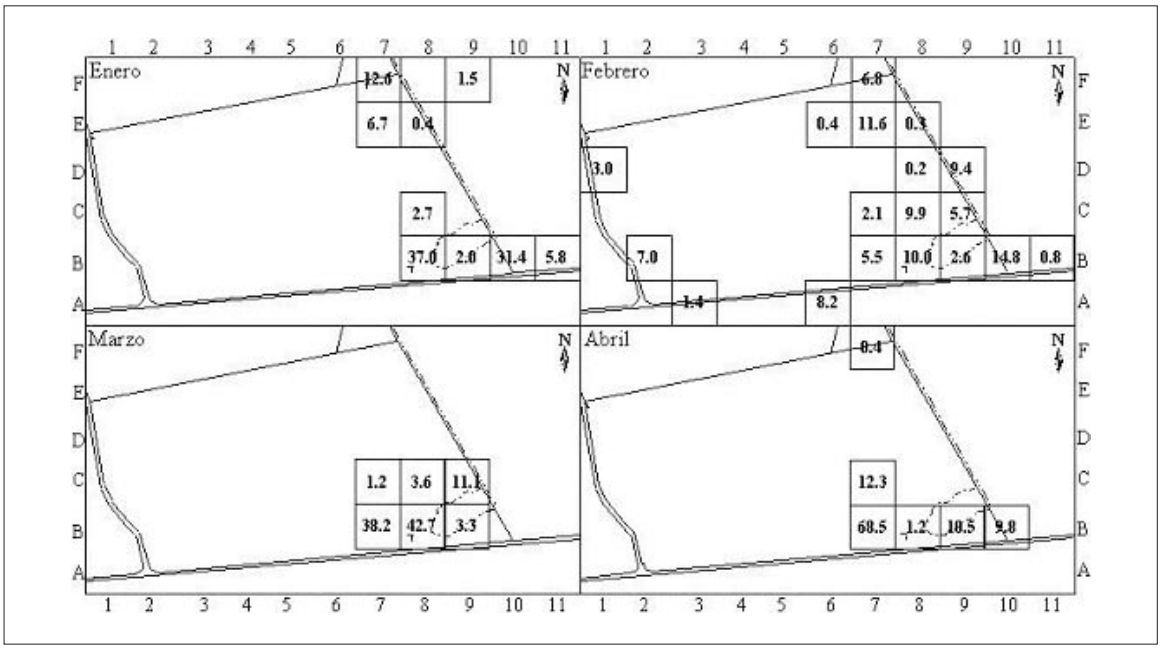

Figura 5. Variaciones mensuales en el uso del espacio por la tropa de monos aulladores estudiada en el Parque Yumká. Los sectores son áreas de 1.0 ha en extensión. Los números en cada cuadro indican el porcentaje de tiempo de estancia en cada sector.

monos aulladores en los eventos de viaje fue de 125.8 ±95.0 m. El mes con la mayor distancia promedio recorrida fue Febrero con 150 m y el mes con la menor distancia media recorrida fue Enero con 44 m.

Discusión

Los monos aulladores balancean la limitada energía que obtienen de una dieta rica en hojas con el despliegue de un gran repertorio conductual que les permite conservarla. Estas conductas incluyen: (1) un patrón regular de inactividad diaria, (2) el uso de los alimentos con alto valor energético cuando están disponibles, (3) un sistema de localización de alimento extremadamente eficiente, (4) posturas del cuerpo para conservar o disipar el calor, y (5) una "división de labores" entre machos adultos y hembras adultas, lo cual podría reducir las demandas energéticas de las hembras y permitirles invertir más energía en la reproducción (Milton *et al.*, 1979). Los patrones de actividad de *A. palliata* observados en el Parque Yumká son consistentes con estas aseveraciones. Por ejemplo, la dieta de los aulladores durante el periodo de estudio estuvo dominada por el consumo de hojas y la actividad descanso sobresalió mensualmente en el patrón general de actividad, ocupando más de tres cuartas partes del tiempo diurno, lo que indica un modo de vida de poca actividad o conservador de energía (Milton, 1980).

Comparando con otros estudios, las altas tasas de descanso así como los niveles de las tasa de alimentación y el patrón de movimiento de los aulladores, son consistentes con aquellas reportadas para el género *Alouatta* en otras localidades en Centro y Sud América (Altmann, 1959; Bernstein, 1964; Chivers, 1969; Richard, 1970; Mittermeier, 1973; Glander, 1975; Smith, 1977; Schlichte, 1978; Milton, 1980; Gaulin y Gaulin, 1982; Mendes, 1989; Ortíz-Martínez *et al.*, 1999).

El perfil de actividad de los aulladores en el parque Yumká fue consistente en su manifestación de mes a mes durante el periodo de estudio. Actividades como descanso y alimentación covariaron negativamente a través del año, ocupando siempre el descanso la mayor parte del tiempo diurno. La persistencia de estos patrones sugiere la necesidad constante de compensar los beneficios energéticos obtenidos por la alimentación con la conservación de energía a través del descanso para lograr el mantenimiento de la homeostasis. Las actividades locomoción, viaje e interacciones sociales siempre ocurrieron en un tercer plano con respecto al descanso y la alimentación. Estos patrones fueron evidentes en los dos sexos y en las diferentes clases de edad, excepto por los infantes. Es interesante notar que una vez que los aulladores dejan de ser lactantes (después del año de edad), la dieta rica en hojas los lleva a adoptar un modo de vida conservador de energía.

Para las actividades locomoción y viaje se detectó la existencia de un patrón bimodal a través del periodo diurno, dato consistente con lo reportado por otros autores para estas actividades en *A. palliata* en Los Tuxtlas, Veracruz (Ortíz-Martínez *et al.*, 1999; Estrada *et al.*, 1999), en Centro América (Bernstein, 1964; Mittermeier, 1973), en *A. seniculus* (Gaulin y Gaulin, 1982) y en *A. fusca* (Mendes, 1989; Bicca-Marques, 1993; Chiarello, 1993). Nuestros resultados indican que la mayor tasa de alimentación se presentó en las primeras horas del día. Gaulin y Gaulin (1982) sugieren que esto es debido a una respuesta a la necesidad de satisfacer requerimientos metabólicos después del largo período nocturno de privación de alimento. Estos autores sugieren además que una tasa alta de alimentación por la mañana puede ser una estrategia que prevé cambios en las condiciones de clima, que podrían interrumpir esta actividad por períodos de tiempo impredecibles. El viaje y la locomoción están relacionados a la búsqueda del alimento y por lo tanto covarían a través del periodo diurno (Gaulin y Gaulin, 1982; Mendes, 1989; Bicca-Marques, 1993).

Las interacciones sociales también se presentaron de manera bimodal a través del día, un periodo de actividad a media mañana y otro a media tarde, después del periodo de alimentación matutino y durante el vespertino. Cabe señalar que durante los periodos de descanso los juveniles e infantes tenían periodos breves de juego y exploración, involucrando en algunas ocasiones a los adultos.
El descanso diurno de los aulladores presentó tasas altas después de los períodos de mayor movimiento y alimentación, un patrón observado también para *A. fusca* (Mendes, 1989) y para *A. palliata* (Ortíz-Martínez *et al.*, 1999). Así, el descanso se incrementó después de las primeras horas del día presentando su tasa mayor a media mañana. Las primeras actividades de los monos aulladores se realizaron con la salida del sol. El reacomodo de la tropa en el árbol durante este período indicó una búsqueda de sitios con mejor exposición a los rayos solares, observación descrita también por Mendes (1989). Las actividades de locomoción y viaje de la tropa se incrementaron paralelamente al aumento de la temperatura ambiente. Pero, a media mañana, cuando la temperatura ambiente fue mayor, como efecto de la incidencia más directa del sol sobre la Tierra, los aulladores descansaron más, y la postura más común fue acostado ventral, una postura adecuada para disipar calor.

Se ha descrito que las distancias que recorren los aulladores a través de su área de suministro puede ser un buen indicador de la dispersión espacial y temporal de los recursos alimenticios (Estrada, 1984). Los árboles de las especies usadas por los aulladores del Parque Yumká presentaron un patrón de dispersión espacial agregado, indicando una alta dispersión en el espacio de los recursos preferidos. Los aulladores respondieron a estos aspectos de sus recursos viajando distancias variables cada día, que los llevaron a distintas secciones dentro de su área de suministro. Durante el periodo de estudio la tropa estudiada utilizó un 40% de la superficie selvática disponible o 19 ha, pero este uso varió mensualmente de 6 a 18 ha.

Aun cuando la presencia de otras tropas puede influir también en las variaciones observadas en el uso del espacio,

nuestros datos sugieren que es muy probable que estas variaciones más bien estuvieron relacionadas a la diversidad dietética mensual, a la dispersión espacial de los árboles utilizados y a la fenología de las partes de las plantas que les sirven de alimento. En este último caso, los aulladores incrementaron, en el caso de las hojas maduras, no sólo el número de especies utilizadas pero también el espacio utilizado, invirtiendo más tiempo y recorriendo más distancias en su búsqueda. Los comportamientos arriba indicados se dieron a pesar de la mayor predecibilidad de las hojas maduras en la selva. Esto último pudo ser el resultado del alto contenido de fibra, poca energía y presencia de compuestos secundarios en estas partes de las plantas y de la necesidad de los aulladores de balancear, a través de una diversificación en sus fuentes de hojas maduras, su dieta y minimizar la ingestión de fibra y compuestos tóxicos (Glander, 1975; Milton, 1977, 1979, 1980; Braza *et al.*, 1981; Gaulin y Gaulin, 1982; Estrada, 1984).

Uno de los problemas básicos que deben ser resueltos por todos los organismos vivientes es el de obtener suficiente energía apropiada en el momento oportuno y a un costo mínimo. La repartición que hace un organismo de sus recursos (tiempo/energía) entre varias demandas conflictivas es de interés fundamental, ya que determina la manera en que el organismo se conforma a los diversos aspectos de su ambiente y por lo tanto nos indica mucho acerca de su nicho ecológico y plasticidad de respuesta a las presiones ambientales. Los monos aulladores del Parque Yumká, en Tabasco, parecen haber tenido éxito en esta dirección y una buena prueba de ellos es la persistencia y crecimiento de la población en el lugar por ya cerca de cinco décadas (Estrada *et al.*, 2001). Esto significa que el estudio de su comportamiento y caracterización de aquellos rasgos del entorno ecológico en el que existen, nos permitirá comprender la manera en que responden a la disponibilidad de los recursos, al espacio disponible y al crecimiento demográfico. Esta información nos puede dar herramientas metodológicas, teóricas y empíricas para crear modelos de conservación que promuevan la conservación de poblaciones aisladas de estos primates en otras localidades en Tabasco y en otras zonas de Mesoamerica.

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Dieta do *Callithrix penicillata* (Primates, Callitrichidae) em Áreas de Cerrado no Distrito Federal, Brasil

Sinara Lopes Vilela
Dóris Santos de Faria

Introdução

O mico estrela ou sagui-do-cerrado (*Callithrix penicillata*) é a menor espécie de primata no Brasil Central, pesando entre 350 e 500 gramas (Stevenson e Rylands, 1988; Faria, 1989). No bioma Cerrado é encontrado em matas de galeria (Lacher *et al.*, 1981, 1984; Rylands, 1984; Faria, 1984a, 1986, 1989; Queiroz, 1991; Passamani, 1996), cerradões e cerrado propriamente dito (Fonseca e Lacher, 1984; Passamani, 1996; Miranda, 1997; Vilela, 1999).

A alimentação do *C. penicillata* baseia-se em frutos, insetos, néctar (Faria, 1986, 1989; Miranda, 1997, Vilela, 1999) e exsudatos de plantas (Faria, 1984b, 1986, 1989; Fonseca e Lacher, 1984; Lacher *et al.,* 1984; Rylands, 1984; Santee e Faria, 1985; Goldizen, 1986; Stevenson e Rylands, 1988; Passamani, 1996). O exsudato é um importante recurso alimentar para o gênero *Callithrix* (Passamani, 1996; Ferrari, 1988), pois é rico em carboidratos e serve como fonte de energia especialmente em épocas de escassez de alimentos (Coimbra-Filho e Mittermeier, 1977). O néctar se assemelha ao exsudato em termos de valores nutricionais, porém com valor energético mais baixo. Parece ser uma fonte alimentar sazonal, especialmente em habitats onde exsudatos são mais escassos (Ferrari e Strier, 1992). Muitos primatas complementam sua dieta com néctar, principalmente em épocas de menor disponibilidade de alimentos (Terborgh, 1983; Prance, 1985; Ferrari e Strier, 1992; Miranda, 1997; Vilela, 1999).

Apesar da dieta deste pequeno primata ter sido bem estudada em matas de galeria (Faria, 1984, 1986, 1989; Santee e Faria, 1985; Stevenson e Rylands, 1988; Castro *et*

al., 1997), poucas ainda são as informações existentes sobre a mesma no cerrado (Fonseca e Lacher, 1984; Passamani, 1996; Miranda, 1997; Vilela, 1999; Miranda e Faria, 2001). Sabe-se que os saguis gastam cerca de 70% do seu tempo em alimentação, sendo o consumo de exsudatos a atividade predominante (Fonseca e Lacher, 1984). Miranda (1997) estudando os mesmos grupos de *C. penicillata* descritos neste trabalho, observou que frutos de espécies exóticas também fazem parte da dieta. O autor verificou que os frutos do jamelão, *Syzygium jambolana* (Myrtaceae), uma espécie exótica comum foram os mais consumidos. Além disso, estes animais complementam a dieta com néctar das flores de *Mabea fistulifera, Cecropia* spp. (ver Miranda e Faria, 2001), *Styrax ferrugineus* (Miranda, 1997) e *Caryocar brasiliense* (Vilela, 1999). Outras fontes de alimento incluem gafanhotos (Orthoptera), pupas, louva-a-deus (Mantodea), bulbos de *Cyrtopodium* sp. (Vilela, 1999; Miranda e Faria, 2001), ovos de pássaros e aranhas (Araneae) (Miranda, 1997).

Tabela 1. Famílias estudadas, formas de vida e área de ocorrência, relacionadas com a época de consumo e o tipo de item alimentar utilizado pelos micos na Reserva Ecológica do IBGE. Novembro de 1997 a setembro de 1998.

	Estação chuvosa (meses)						Estação seca (meses)				
Famílias (forma de vida e área)	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**
Vochysiaceae											
Vochysia rufa (B, 2)							E	E	E	E	E
Vochysia elliptica (B, 1, 2)								E	E	E	
Vochysia thyrsoidea (B 1, 2)			E	E	E	E	E	E	E	E	E
Qualea parviflora (B, 1, 2)					E	E			E	E	E
Qualea grandiflora (B, 1, 2)						E		E	E		
Qualea multiflora (B, 1)					E					E	E
Leguminosae											
Sclerolobium paniculatum (B, 1)									E		
Hymenaea stigonocarpa (B, 1)											E
Enterolobium gummiferum (B ,1)							E	E		E	E
Inga sp. (B, 1)										E	
Araliaceae											
Schefflera macrocarpum (B, 1, 2)			E	E	E	E	E	E	E	E	E
Caryocaraceae											
Caryocar brasiliense (B, 1, 2)	N	N									N
Styracaceae											
Styrax ferrugineum (B, 1, 2)						N					
Melastomataceae											
Miconia ferruginata (B, 1, 2)	F	F	F			F	F	F	F	F	F
Miconia albicans (A, 2)		F	F	F							
Myrtaceae											
Syzygium jambolana (B,1)	F	F	F	F	F	F					
Moraceae											
Brosimum gaudichaudii (A, 1)	F	F							F	F	
Rubiaceae											
Alibertia concolor (A, 2)	F	F	F	F							
Erythroxylaceae											
Erythroxylum exaltatum (A, 1)			F	F	F	F					

F = consumo de frutos
N = consumo de néctar
E = consumo de exsudato

A = arbusto
B = árvore

1 = cerrado denso
2 = cerradão

Este trabalho teve como objetivo descrever as espécies arbóreas e arbustivas utilizadas como recurso alimentar pelo *C. penicillata* no bioma cerrado, identificando as variações ocorridas no tipo de item consumido entre as fisionomias de cerrado e cerradão nas estações chuvosa e seca, além de descrever outras fontes de alimento utilizadas pelos saguis.

Métodos

O trabalho foi realizado na Reserva Ecológica do IBGE (15°57'S, 47°53'W) localizada a 35 km de Brasília. Hà duas estações bem definidas, uma chuvosa (outubro a abril) e uma seca (maio a setembro). A precipitação média anual é de 1600 mm e a temperatura varia de 18 a 22°C. Os meses de setembro e outubro são os mais quentes (20 a 22°C) e o mês de julho o mais frio (16 a 18°C) (SEMATEC, 1994).

De novembro de 1997 a setembro de 1998, dois grupos de *Callithrix penicillata* foram acompanhados em uma área de cerrado denso e outra de cerradão, durante oito dias por mês (4 dias em cada área), do amanhecer ao pôr-do-sol, totalizando cerca de 12 horas diárias, variando com a disponibilidade de luz existente durante o dia. Neste período foi feito um registro qualitativo diário das espécies arbóreas e arbustivas utilizadas como alimento em cada área, e o tipo de item consumido por estes pequenos primatas nas duas estações climáticas.

Resultados

Em ambas as áreas foram observadas um total de 19 espécies de plantas arbóreas e arbustivas utilizadas por *C. penicillata*, sendo o exsudato consumido em 11 espécies, frutos em seis espécies e néctar em duas espécies (Tabela 1). Apesar do consumo de alimentos acontecer em todos os estratos, desde espécies com 0,60 m de altura como *Brosimum gaudichaudii* (Moraceae), parece haver uma preferência dos micos por espécies de maior porte, como *Vochysia thyrsoidea* (Vochysiaceae), *Schefflera macrocarpum* (Araliaceae) e *Syzygium jambolana* (Myrtaceae), com aproximadamente 7 a 10 m. de altura.

Foram observadas variações no tipo de item alimentar consumido durante as estações do ano. Houve maior uso de exsudato na estação seca, e um maior consumo de frutos na estação chuvosa, apesar de *Miconia ferruginata* (Melastomataceae) e *Brosimum gaudichaudii* (Moraceae) terem frutificado também na seca, abril a julho e julho/agosto, respectivamente. De todas as espécies frutíferas cujos frutos foram consumidos, a única utilizada em todos os meses da estação chuvosa foi o jamelão, *Syzygium jambolana* (Myrtaceae), uma planta exótica presente no cerrado denso estudado, a qual apresenta frutificação somente na estação chuvosa. Outra espécie exótica também bastante utilizada de janeiro a abril foi a fruta de pomba, *Erythroxylum exaltatum* (Erythroxylaceae).

Como mostra a tabela, algumas espécies arbóreas foram consideradas exsudatíferas permanentes, sendo consumidas em ambas as estações, como é o caso de *Vochysia thyrsoidea, Schefflera macrocarpum* e *Qualea* spp. No entanto, apesar dos dados indicarem *Vochysia rufa* e *Vochysia elliptica* como exsudatíferas sazonais, é possível que sejam permanentes e que outros fatores estejam envolvidos em sua utilização, como proximidade espacial com outras espécies. Espécies da família Leguminosae foram utilizadas somente na estação seca.

Um fato importante registrado neste estudo foi o consumo por *Callithrix penicillata* de néctar de *Caryocar brasiliense* (Caryocaraceae) e *Styrax ferrugineum* (Styracaceae). A alimentação foi complementada com ingestão de animais invertebrados como gafanhotos (Orthoptera), louva-a-deus (Mantodea) e cupins (Isoptera). O consumo de Orthoptera e Mantodea ocorreu em ambas as estações sendo registrado o consumo de Isoptera apenas uma única vez na estação seca (julho).

Discussão

O uso de exsudato de Vochysiaceae e Araliaceae também na estação chuvosa pode ser devido a alta densidade de indivíduos destas espécies nas áreas de vida dos grupos (Miranda e Faria, 2001) e, consequentemente, maior facilidade de acesso e uso das mesmas. Alguns autores relatam que a preferência por determinadas espécies vegetais está relacionada à abundância das mesmas nas áreas de vida (Lacher *et al.*, 1984; Fonseca e Lacher, 1984) e ao tamanho dos indivíduos, pois troncos com maior dimensão apresentam mais feridas produzidas pelos micos quando comparados com indivíduos de menor porte (Passamani, 1996). Espécies da família Vochysiaceae parecem ser as mais exploradas (Faria, 1984b; Fonseca e Lacher, 1984).

O elevado consumo de frutos de *Syzygium jambolana*, observado tanto neste trabalho como no de Miranda (1997), deve-se provavelmente a alta disponibilidade dos mesmos durante a estação chuvosa, época de frutificação dessa espécie, e a facilidade de acesso. Vários indivíduos desta espécie foram plantados ao redor do prédio onde funciona o refeitório da Reserva e se ligam a um corredor de árvores nativas que estão inseridas na área de vida do grupo do cerrado denso, oferecendo alimento fácil e sem grandes custos. Faria (1986) observou que as áreas mais freqüentadas na estação chuvosa eram as que possuíam mais espécies frutíferas e, na estação seca, as que possuíam mais espécies gomíferas. Apesar de não haver dados quantitativos pensamos acontecer o mesmo com os grupos de saguis no cerrado. O néctar das flores de *Styrax ferrugineum* (Styracaceae) e *Caryocar brasiliense* (Caryocaraceae) foi utilizado na área do cerradão, em ambas as estações, provavelmente para suprir a falta de recursos ocasionados pelas queimadas que ocorrem a cada dois anos nesta área. Estas duas espécies apresentaram floração tanto na estação chuvosa como na estação seca. Invertebrados também foram de suma importância na alimentação desses grupos de primatas, sendo uma fonte de recursos contínuos e abundantes durante todo o ano.

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Fecal Collection in Free-ranging Common Marmosets, *Callithrix jacchus*

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Introduction

The development of techniques to determine steroids in feces has made it possible to obtain data on the biology of reproduction for different species living in natural conditions (Clarke *et al.*, 1991; Van Schaik, 1991; Shideler *et al.*, 1994, 1995; Ziegler *et al.*, 1994; Strier and Ziegler, 1997, among others) with considerable repercussions on the study of endangered species. For *Callithrix jacchus,* the use of fecal steroids to study the reproductive conditions of females was validated by Ziegler *et al.* (1996), while the diurnal variation in progesterone and cortisol – but not for estradiol – in feces was demonstrated by Sousa and Ziegler (1998). In order to establish the use of fecal sampling as a routine procedure for common marmosets, the habits of defecation of the animals, as well as the influence of physiological and environmental variables interfering with sampling, need to be known in order to prevent discontinuity of hormonal monitoring. The aims of this paper therefore are to investigate if parturition and environmental changes such as temperature and rainfall could interfere with the timing of the first fecal discharge in females living in free-ranging groups.

Methods

Animals
Feces were systematically collected from six adult females of two groups: QT (n = 4) and PB (n = 2). The composition of the QT group changed during the two periods of fecal collection, ranging from 12 to 15 individuals of different ages (adults, subadults, juveniles and infants). See Table 1 for details about the groups.

Only the time of first defecation was recorded and considered for statistical data analysis. However, since we were monitoring hormone levels in these females, when the observer was unable to collect the first fecal discharge, the second or third sample was collected, as long as it was excreted before 0900 h.

Another important cautionary measure taken when collecting feces from wild marmosets was the need to monitor where the animals slept the night before fecal collection. In order to collect the first sample, the observer must already be waiting under the sleeping tree when the animals wake up. The observer must be attentive because the animals usually defecate at the beginning of their active phase, and he/she must continue to observe the animals closely until the first defecation occurs. During the first period of fecal collection from the QT group (August, 1996 to November, 1997) the animals slept in the same tree during the entire period, whereas in the second period (April, 1998 to June, 1999) they used five different trees for sleeping.

The other group monitored was the PB group, which used six trees during the period of fecal sampling (December, 1997 to April, 1999). Only two females were monitored at the same time in each group by one observer since they defecated almost at the same time and the observer needed to be aware of where the feces fell. Fecal material was usually collected under the tree where the animals slept, but on some occasions the observer had to use a ladder to pick up feces caught on leaves.

Statistical analysis
The Student *t* test was used to compare the time of first defecation of females living in the wild before and after parturition. The Pearson test was performed to correlate the time of first defecation with the variation in temperature and rainfall. In both tests the p value was set at 0.05.

Results

In the natural environment, fecal collection was not always possible due to the interference of environmental conditions such as heavy rainfall, high trees or a high density of leaves, which sometimes impaired the identification of the animal or the localization of the fecal matter. In fact, during the fruiting season, feces were composed almost entirely of seeds, with the consequent difficulty in obtaining enough fecal material to make up the minute amount of 0.1 g required for the technique. Another problem faced was when the animals changed the tree where they slept, their presence being detected only when they had already defecated from a nearby tree. In these cases, the animals were followed until they produced another sample, while using 0900 h as a time limit for collection. There was relation between the time the animals left the sleeping tree and the time the samples were collected (n = 79; r^2 = 0.033; p = 0.110).

For three females living in the natural environment, the time of first defecation in the morning changed slightly, being late on the day before or the day after parturition. However, these changes were evidently not associated only with parturition, since they occurred independently of this activity. Statistical analysis using the *t* test did not show any differences when the time of sample collection was compared two weeks before and after the birth of the infants (t = 2.87; p = 0.61). We monitored seven parturitions, three from dominant reproductive females and one from a subordinate (probably daughter) female of the QT group, and two from the dominant female and one from a subordinate female of the PB group (Figure 1).

A weakly negative correlation was found between the time of first fecal discharge and environmental temperature for both groups (QT: r^2 = -0.267; p = 0.000; PB: r^2 = -0.213; p = 0.018). On the other hand, a positive correlation was detected between rainfall and first defecation, but only for the QT group (r^2 = 0.150; p = 0.006; PB: r^2 = 0.060; p = 0.506).

Discussion

The results of this study demonstrate that there is homogeneity in the time of first defecation in common marmosets, a fact that facilitates long-term hormonal monitoring using fecal material from wild animals. This finding is similar to that obtained by Sousa and Ziegler (1998) for captive females, and the highest frequency of defecation at the beginning of the day is probably associated with feeding activities which are very frequent at this time. According to Alonso and Langguth (1989) common marmosets begin the day eating fruits, followed by foraging of animal prey. Camarotti and Monteiro da Cruz (1997), studying the activity patterns of common marmosets, found that around 30% of the time was spent in foraging and feeding during two hours immediately before the groups went to the sleeping tree and two hours after leaving the sleeping tree.

Table 1. Free-ranging group compositions of *Callithrix jacchus* in the beginning of fecal collection of females.

	Animal	Sex	Age Months	Relatedness	Birth month	Period of fecal collection
QT group 1	GRE	F	>24	Reproductive female	_	10/08/96 - 20/09/97
	GOE	M	>24	Reproductive male	_	
	GIO	F	>18	_	_	21/08/96 - 12/11/96
	GAB	F	>18	_	_	
	GUS	M	>18	_	_	
	GRA	F	>18	_	_	04/09/96 - 24/09/97
	GILD	F	17	Offspring of GRE/GOE	Apr/95	
	GAR	F	17	Offspring of GRE/GOE	Apr/95	
	GIG	F	11	Offspring of GRE/GOE	Oct/95	
	GIS	F	6	Offspring of GRE/GOE	Mar/96	
	GER	F	6	Offspring of GRE/GOE	Mar/96	
	GIOV	M	>1	Offspring of GRE/GOE	Aug/96	
	GEO	M	>1	Offspring of GRE/GOE	Aug/96	
	GOD	M	*	Offspring of GRE/GOE	Jul/97	
QT group 2	GRE	F	>40	Reproductive female	_	20/04/1998 - 04/06/99
	GOE	M	>40	Reproductive male	_	
	GUS	M	>18	_	_	
	GER	F	25	Offspring of GRE/GOE	Mar/96	20/04/98 - 08/05/99
	GIS	F	25	Offspring of GRE/GOE	Mar/96	16/12/98 - 15/02/99
	GIOV	M	20	Offspring of GRE/GOE	Aug/96	
	GEO	M	20	Offspring of GRE/GOE	Aug/96	
	GOD	M	9	Offspring of GRE/GOE	Jul/97	
	GIL	M	4	Offspring of GRE/GOE	Dec/97	
	GIB	M	4	Offspring of GRE/GOE	Dec/97	
	GAB	M	*	Offspring of GRE/GOE	Jun/98	
	GLE	F	*	Offspring of GRE/GOE	Jun/98	
	GED	M	*	Offspring of GRE/GOE	Jan/99	
	F2	?	*	Offspring of GRE/GOE	Jan/99	
	F3	?	*	Offspring of GER	Feb/99	
	F4	?	*	Offspring of GER	Feb/99	
PB group	PAT	F	>24	_	_	18/12/1997 - 06/10/98
	PAL	F	>24	_	_	24/12/97 - 01/08/98
						11/10/98 - 08/04/99
	PIT	F	>18	_	_	
	PLA	M	>18	_	_	
	PIT	M	>18	_	_	
	PTO	M	1	Offspring of PAT	Nov/97	
	PAM	F	1	Offspring of PAT	Nov/97	
	F1	?	*	Offspring of PAT	Mar/98	
	F2	?	*	Offspring of PAT	Mar/98	
	PIA	M	*	Offspring of PAT	Apr/98	
	POP	M	*	Offspring of PAT	Apr/98	
	PLI	M	*	Offspring of PAT	Feb/99	
	PIN	M	*	Offspring of PAT	Feb/99	

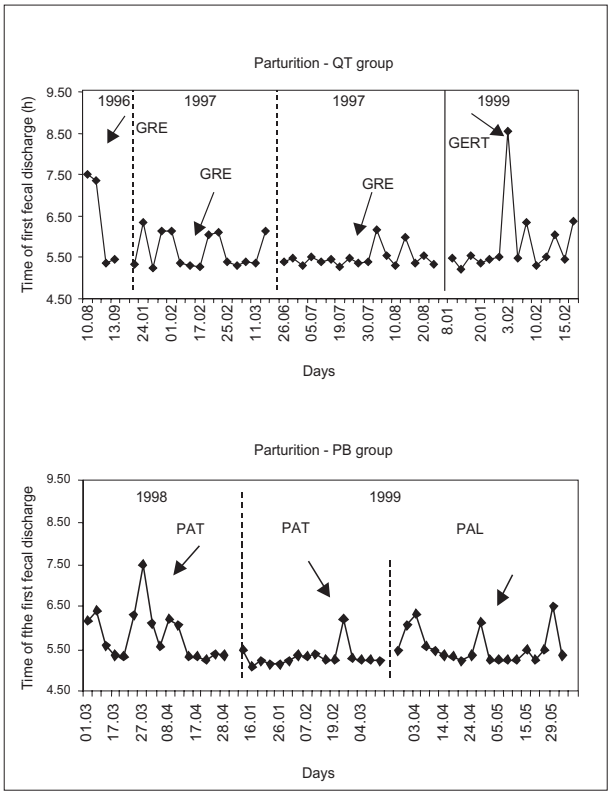

Figure 1. Mean time [+ SEM] of the first fecal discharge of females 2 weeks before and after parturition of females living in free-ranging groups. Arrows indicate the day of parturition. For group QT three parturitions were of female GRE (dominant female) and one of GERT (subordinate female). For group PB, the two first parturitions were of female PAT and the last one of PAL (subordinate female).

Torii *et al.* (1998) stated that the selection of the sampling method for hormonal studies is essential, and they suggest urine collection from common marmosets as an excellent source of endocrinological data. However, for studies in the wild it is not possible to collect urine because these animals are small and the voided urine usually drops on the branches or cannot be collected because it is rubbed during scent-marking behavior. Common marmosets are small primates and use the middle strata of the forest (Stevenson and Rylands, 1988), preventing the systematic collection of urine. As such, fecal sampling is the best alternative for monitoring endocrine parameters in small primates for extended periods. During this study, we were able to collect feces from common marmosets living in an experimental plantation area or on forest edge. Feces are more difficult to collect in closed forest areas.

Delay in the first defecation is related to a drop in environmental temperature and rain. Although day length does not vary in the tropics as it does in temperate regions, it has been found to affect activity patterns in these marmosets (Moreira *et al.*, 1996; Sousa *et al.*, 1999; Menezes *et al.*, 2000), and environmental cues may be influencing the expression of physiological functioning (Moore-Ede *et al.*, 1982), in this case defecation patterns. Besides lower temperatures and rain, defecation may be slightly advanced or delayed during the peri-parturition interval, but not to the extent that it interferes with extended data monitoring in free-living common marmoset females.

In conclusion, our findings demonstrate that fecal collection can be used for long-term endocrinological studies on free-ranging common marmosets females. This method is useful for small primates, and can contribute to hormonal monitoring in species which are difficult to maintain in captivity, and for endangered species contributing to an understanding of reproduction and reproductive patterns, vital for demographic management.

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Neotropical Ethnoprimatology: An Annotated Bibliography

Bernardo Urbani

This bibliographic review was compiled after the introduction of the word "Ethnoprimatology" by Leslie E. Sponsel (1997). I am including papers which take in Sponsel's concept, all of them restricted to the Neotropics. In annotating these reference, the following entries are included: Ethnic group(s) / Primate species / Key word(s) / Locality(ies) / and Country(ies). The selected works are only those which have ethnoprimatology as a central theme, other ethnozoological studies which mention primates among other mammals are not listed.

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Neotropical Primate Remains in Cave Deposits: An Annotated Bibliography

Bernardo Urbani

The discovery of New World fossil primates has recently begun to be noticed by primatologists and speleologists, because of its interesting implications in both disciplines. The papers in this bibliography are only those printed in speleological publications, most still practically unknown among the primatological community. The listed entries considered are Primate species / Key words / Locality(ies) / Country(ies).

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Prehispanic *Alouatta seniculus* / Archaeological interpretations / Guacharo Cave / Venezuela.

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News

Primate Observations in Guyana and Panama

Guyana

As part of Conservation International's (CI) Rapid Assessment Program (RAP), a RAP Training Course was held at Mabura Hill Township, West Pibiri Creek, Guyana

at the Tropenbos Ecological Station (5°00'40.9"N, 58°36'50.0"W) from 4–18 September, 2001. Located in the interior of central Guyana, West Pibiri Creek was previously an active logging concession operated by Demerara Timbers Limited (DTL) for the selective extraction of valuable hardwoods such as greenheart. The population of the Mabura Hill Township is estimated to be about 700. The research staff of the Tropenbos-Guyana Programme (TGP) living there make up only 3% of the population.

I observed primates on a number of occasions while setting up a grid of camera traps to record large mammals and terrestrial birds. All observations were within 8 km of the research station. For most of the primate sightings I was in the forest, although some were seen from logging roads. I observed red howler monkeys (*Alouatta seniculus*) once and heard their loud and long (30 seconds or more) pre-dawn chorus every day. Black spider monkeys (*Ateles paniscus*) were seen daily. A single, male white-faced saki (*Pithecia pithecia*) was observed clearly for several minutes. Golden-handed tamarins (*Saguinus midas*) were seen from the logging road. Common squirrel monkeys (*Saimiri sciureus*), wedge-capped capuchins (*Cebus olivaceus*), tufted brown capuchins (*C. apella*), and a group of approximately 23 bearded sakis (*Chiropotes satanus*) were also observed.

We conducted our RAP study from 21–29 September, 2001 at the beginning of the dry season at Pobuwau Creek (3°16'3.1"N, 58°46'42.7"W) located on the Kwitaro River (a tributary of the Rewa River, which in turn runs into the Rupununi, an affluent of the Essequibo), in Region 9 in southern Guyana, and at Cacique Mountain (3°11'29.5"N, 58°48'42.0"W) six miles southwest of Pobuwau Creek. Both sites were approximately 130 m elevation and vegetation was lowland, seasonally inundated, evergreen tropical forest. River was at high water but dropping rapidly, and fell approximately 1.5m during our brief visit. Also while deploying camera traps, I observed black spider monkeys (*A. paniscus*) daily, common squirrel monkeys (*S. sciureus*), tufted brown capuchin (*C. apella*), three golden-handed tamarins (*S. midas*), and bearded saki monkeys (*C. satanus*). Red howler monkeys (*A. seniculus*) were heard just before dawn each day, as regular as an alarm clock.

Darién, Panama

The last week of December, 2001, I visited Darién National Park, Darién, Panama (7°48'N, 77°40'E). The park headquarters, located near a grass airstrip, were reached by a small chartered airplane after a 45-minute flight from Panama City. I observed two red-naped or Geoffroy's tamarins (*Saguinus geoffroyi*) from the park headquarters. I also observed white-throated capuchin (*Cebus capucinus*), and small groups (2–3 individuals) of brown-headed spider monkeys (*Ateles fusciceps*) daily. Mantled howler monkeys (*Alouatta palliata*) were heard every day for much of the day, but the chorus was much shorter and weaker than the dramatic calls of the red howler monkeys in Guyana.

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Brazilian Researchers Detect Rabies Transmission from Common Marmosets to Humans

Increased contact between wild primates and humans through hunting and the butchering of animals, wildlife tourism, and through animals losing their shyness and becoming "pests" provides increasing opportunities for the mutual transmission of pathogens. Such transmission is of both conservation and public health concern (Ferner, 2000; Peeters *et al.*, 2002; Wallis and Lee, 1999). The origin of human AIDS (Gao *et al.*, 1999) probably provides the most severe example of the dramatic consequences of pathogen transmission from wild primates to humans.

In a recent paper in the journal *Emerging Infectious Diseases*, Silvana Favoretto from the Instituto Pasteur, São Paulo, and her colleagues reported eight fatal cases of rabies' transmission from common marmosets, *Callithrix jacchus*, to humans (Favoretto *et al.*, 2001), and a high number of patients who sought rabies prophylaxis after having been bitten by marmosets and other primates in the Brazilian state of Ceará. In the fatal cases, transmission occurred through unprovoked bites from free-ranging individuals and from pets, or when people tried to capture wild marmosets. The genetic and phylogenetic analyses by Favoretto *et al.* provided evidence that the rabies virus transmitted by the marmosets "represents a unique and independent endemic rabies cycle" (p.164). The paper left open the question as to whether *C. jacchus* acts as a natural reservoir for rabies or whether their infection and transmission to other hosts is only occasional. This question can only be answered through the regular screening of wild populations. However, the findings of Favoretto *et al.* should make us aware of the potential risks associated with the close contact and handling of wild primates during field research. This is a risk not only with the Old World monkeys and apes which are phylogenetically closer to humans, but also with our more distant relatives, the New World monkeys. I recommend all New World primate field workers read and take note of the implicit warnings in the published study of Favoretto *et al.* (2001).

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Taxonomy of Capuchin Monkeys, *Cebus* Erxleben, 1777

José de Sousa e Silva Jr. defended his doctoral thesis on the taxonomy of capuchin monkeys in July, 2001, at the Department of Genetics of the Federal University of Rio de Janeiro, Brazil. His supervisor was Professor Rui Cerqueira, and the study was supported by the Department of Zoology of the Museu Paraense Emílio Goeldi, Belém, and the Brazil Science Council (CNPq). The following is a liberal English translation of the abstract.

The genus *Cebus* has been considered to be one of the most confused taxonomic groups of the Neotropical mammals. According to those who have studied the diversity of this genus, the principal source of confusion is their considerable polymorphism. Although there are ontogenetic changes and sex differences, the variation is mostly individual, even within the same populations. The separation of *Cebus* into tufted and untufted species' groups was generally accepted following the 1949 publication of Hershkovitz. According to him, the tufted group, even with considerable polymorphism, was represented by just one species, *Cebus apella*, and the untufted group by three species, *Cebus capucinus*, *Cebus albifrons* and *Cebus nigrivittatus*, with five, 13 and five subspecies, respectively. This taxonomic arrangement was widely accepted despite the poor resolution of numerous biological and nomenclatural aspects.

The aim of this study was to examine the diversity amongst the numerous taxa described in this genus to establish a definition of natural groupings. The basic evolutionary unit used was the species, although a subgeneric differentiation was also considered convenient. A total of 2,369 museum specimens were examined, along with more than 1,000 live animals in both captivity and the wild, and 1,558 registers of localities were used to determine geographic distributions. A preliminary analysis of morphological characters using a transect method was used to examine the validity of the taxa, resulting in hypotheses about differentiation within the genus which were then tested with a new transect analysis using all the characters and specimens available. The consistency of the results was evaluated through morphometric analyses using analysis of variance and, in the tufted capuchin group, a discriminant analysis within each sex. Information on karyotypes was obtained through published studies. Data on the cytochrome oxidase II gene resulting from a parallel study at the Federal University of Pará were also taken into account. Behavioral, ecological and life history data were obtained from the literature and from direct observation of live animals.

The results showed that the majority of characters differentiated the forms of *Cebus*, with abrupt transitions of each state at the limits to their geographic distributions. Patterns of variation and differentiation were concordant within the different groupings to a greater or lesser degree. As such, the characterization of the taxa was multidisciplinary, being defined by data sets which were hypothetically independent. The tufted and untufted groups were provisionally elevated to at least subgeneric status due to considerable differentiation in numerous biological aspects, their geographic distributions and the detection of probable species' groups within each. The nominate subgenus, *Cebus*, is referable to the untufted group, and *Sapajus* Kerr, 1792, is the name available for the tufted capuchins. The species of each subgenus have peripatric or parapatric distributions, and the principal differences between them are easily seen. The subgenus *Cebus* was divided into four species: *Cebus (Cebus) capucinus* (Linnaeus, 1758), *Cebus (Cebus) albifrons* (Humboldt, 1812), *Cebus (Cebus) olivaceus* Schomburgk, 1848, and *Cebus (Cebus) kaapori* Queiroz, 1992. The subgenus *Sapajus* was divided into seven species: *Cebus (Sapajus) apella* (Linnaeus, 1758), *Cebus (Sapajus) macrocephalus* Spix, 1823, *Cebus (Sapajus) libidinosus* Spix, 1823, *Cebus (Sapajus) cay* Illiger, 1815, *Cebus (Sapajus) xanthosternos* Wied, 1820, *Cebus (Sapajus) robustus* Kuhl, 1820, and *Cebus (Sapajus) nigritus* (Goldfuss, 1809).

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Monogamy and Golden Lion Tamarins

In May 2000, Karen L. Bales defended her doctoral thesis on aspects of monogamy, dominance, hormones and maternal care in wild golden lion tamarins. It was presented to the Faculty of the Graduate School of the University of Maryland, College Park. Her supervisor was James M. Dietz of the Department of Biology, and the research, carried out in the Poço das Antas Biological Reserve from June 1996 to March 1999, was supported by the National Science Foundation, the University of Maryland Graduate School, Sigma Xi, TransBrasil Airlines and Friends of the National Zoo. The following is an abstract of the thesis.

Studies of mammalian monogamy focus on three different areas: mating exclusivity (monogamy as a mating pattern); pair-bonds (monogamy as a social relationship); and biparental care (monogamy as a rearing pattern) (Gubernick, 1994). In this dissertation I used golden lion tamarins (*Leontopithecus rosalia*) to address questions examining the interrelationships between these three areas. In chapter one I presented the results of an experimental test to determine which animal in each group had priority access to a prized food resource. Rather than being determined by female energetic state, access to food was determined by which animal had founded the group ("territory ownership"). Discovery of this new system for determination of intersexual dominance raised questions about the costs and benefits of living in male- vs. female-founded groups, which I examined in the second chapter. Female-founded groups were predominant in the population and appeared to be more stable, while male-founded groups were less common and more transitional. Females in female-founded groups had higher inclusive fitness, lower levels of stress hormones, and received more grooming behavior. Males in male-founded groups showed the lowest levels of sociality and were perhaps seeking extra-group copulations or other resources. Females in male-founded groups received increased survivorship benefits compared to floaters, but did not receive any of the other benefits gained by females in female-founded groups. In the third chapter, I explored one of the other central concepts of monogamy; biparental care. In a social system where females have the option of relinquishing all infant care except lactation to other group members, what factors affect their decision about how much to invest in each infant? I examined hormonal, social and functional variables which are hypothesized to affect maternal investment. Prenatal investment (measured by birth weight) was predicted by litter size, cortisol levels and estrogen levels. Post-natal investment (measured by maternal carrying and nursing) was predicted by maternal condition, group size, litter size and provisioning status of the mother. Callitrichid mothers provide extra care for their infants either because they have to (because of small group size), or because they can (because of good condition).

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Olfactory Communication, Feeding Behavior and Energy Budgets of Golden Lion Tamarins

Kimran E. Miller defended her doctoral thesis in December 2001: a study of olfactory communication, feeding behaviors and energy budgets of wild golden lion tamarins (*Leontopithecus rosalia*). It was presented to the Faculty of the Graduate School of the University of Maryland, College Park. Her supervisor was James M. Dietz of the Department of Biology. The research was carried out from May 1993 to May 2000, supported by grants from NSF (SBR-9727687), the Eugenie Clark Foundation, NSF Research Training Grant (BIR-9602266), Latin American Studies Center, Friends of the National Zoo and Copenhagen Zoo. The following is an abstract of the thesis.

Studies on cooperative breeding have examined issues including why many cooperative breeders are philopatric and why some species are singular breeders, while others are plural breeders. The direction of studies on cooperative breeding has moved from how dominant animals reproductively suppress subordinates to the degree of reproductive skew and costs associated with reproduction. In this dissertation, I examined several topics related to cooperative breeding, ecological constraints and costs associated with reproduction in wild golden lion tamarins (*Leontopithecus rosalia*, GLTs), in Poço das Antas Biological Reserve, Brazil. In the first chapter, I tested four hypotheses relative to the function of scent marking. GLTs appear to use scent marking for the purpose of marking food resources, but not for territory defense. Reproductive females seemingly use scent marking in intergroup communication, while reproductive males use scent marking in intragroup communication. Reproductive females may use scent marking to protect their position in their group from immigrating females, thereby maintaining singular breeding. In the second chapter, I tested the influence of intrinsic and extrinsic factors on time spent feeding on plant matter, feeding on animal prey and searching for prey. Intrinsic factors are associated with characteristics of the individual, while extrinsic fac-

tors are associated with the environment. Factors including time spent traveling, day length, group size and age influence feeding in wild GLTs. In the third chapter, I tested two hypotheses regarding the way in which females may be energetically constrained during reproductive events. Both a reduced energy intake and increased energy expenditure seem to constrain females that are pregnant or lactating. This study suggests that reproductive females may in part maintain their singular breeding through scent marking. Also, the influence of ecological factors such as rainfall, in addition to high costs associated with reproduction, may influence birth seasonality. Births may occur only after females have consumed sufficient energy to offset costs associated with reproduction and food resources that are potentially temporally unstable.

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Use of Space by *Alouatta guariba clamitans* Cabrera, 1940, in Temperate and Subtropical Habitats in Southern Brazil

In September 2001, Ana Alice Biedzicki Marques defended her doctoral thesis comparing seasonal variation in the ranging behavior, activity patterns and diet of groups of the brown howling monkey, *Alouatta fusca*, in two forests on the Sul-RioGrandense plateau in southern Brazil. It was presented to the postgraduate course on Ecology, Conservation and Wildlife Management of the Institute of Biological Sciences at the Federal University of Minas Gerais, Belo Horizonte. Part of the comparative analysis was made possible through previous studies of howling monkeys at the Aracuri Ecological Station for her Master's degree, under the supervision of César Ades of the University of São Paulo. Her supervisor was Anthony B. Rylands, and her research was supported by the US Fish and Wildlife Service, the Margot Marsh Biodiversity Foundation, the Fundação O Boticário de Proteção à Natureza, the Brazil Science Council (CNPq) and the Brazilian Higher Education Authority (CAPES). The following is a summary of her thesis.

Brown howler monkeys (*Alouatta guariba*) occupy varied habitats along the Atlantic forest, from Bahia to Rio Grande do Sul. *A. guariba clamitans* groups were studied at two localities in Rio Grande do Sul. The first was the Aracuri Ecological Station on the Southern Plateau. The climate there is temperate, and there are two main two types of forest: broad leaved forest and *Araucaria* pine forest. The second site was the Itapuã State Park, on the coast where the climate is subtropical. Forest types there are more varied and include mesophytic hillside forest, moist forest and sandy soil scrub forest (*restinga*). The data were collected by scan sampling, with 5 minutes of observation at 15 minute intervals. The study at Aracuri was carried out from August 1993 to August 1994, and at Itapuã between April 1999 and March 2000. Information was collected on the influence of air temperature and habitat on the diet, activity patterns and use of space of one group of howlers at each site. The study group at Aracuri ranged in size from 10 to 13 individuals and that at Itapuã, from 7 to 10 individuals. At Aracuri, the howler's diet was largely folivorous (55%), with fruits comprising 16% and flowers 10%. The most important species was *Araucaria angustifolia* (27% of the diet). At Itapuã, fruits comprised 47% of the total feeding records, followed by leaves (34%), and flowers (12%). Fruits of *Syagrus romanzoffiana* and *Ficus organensis* made up 26% of the records. Resting was the most frequent behavioral category in both groups, but they showed significant seasonal differences. At Aracuri, moving and resting differed significantly between seasons. Moving was more frequent in the autumn, while the howlers spent more time resting in the spring. In Itapuã, the only seasonal difference was in feeding, which was less frequent in springtime. Over the year, the home range of the Aracuri group was 13.51 ha, and the largest seasonal home range (12.36 ha) was in the autumn from March to June. At Itapuã, the home range over the year was 8.56 ha, and the largest seasonal home range (8.23 ha) was in the summer, from December to March. The daily ranges of the Aracuri group were also larger on average (957.6 m as opposed to 768.7 m at Itapuã). Although influencing activity patterns, with extreme cold during the winter at Aracuri and higher temperatures in the summer at Itapuã, climatic stress was found to be less important in the determination of the use of the space than the dispersion, type and availability of food resources.

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Field course on the Ecology of New World Primates - Curso de campo sobre Ecología de Primates Neotropicales

A field course on the "Ecology of New World Primates" was held from 17 October to 6 November 2001 at the Estación Biológica Quebrada Blanco (EBQB), Reserva Comunal Tamshiyacu-Tahuayo, in north-eastern Peru. The course was supported by a grant from the Margot Marsh Biodiversity Foundation and represented a follow-up to the theoretical course held at the Universidad Nacional de la Amazonía Peruana (UNAP) in Iquitos in October 2000 (see *Neotropical Primates* 8: 120–121, 2000). The field course was directed by Eckhard W. Heymann from the Deutsches Primatenzentrum (DPZ, German Primate Center) as part of research and teaching activities in the framework of the memorandum of understanding between DPZ and the Faculties of Forestry Engineering and Biological Sciences of UNAP. 10 students and one staff member from UNAP participated in the course. Activities carried out during the field course included:

- Observations on the ecology and behaviour of two species of tamarin monkeys;
- habitat sampling (vegetation plots; transects);
- phenological observations of primate feeding trees;
- collection and examination of primate fecal samples;
- experiments on secondary seed dispersal and seed predation
- evening lectures by doctoral students and alumni from DPZ (Maren Huck, Janna Kirchhof, Petra Löttker, Emérita R. Tirado Herrera) and a counterpart student from UNAP (Marcos R. Oversluijs Vasquez); and
- opportunistic observations on ecological phenomena in a tropical rain forest.

The course also provided ample opportunity to become familiar with practical problems associated with primatological field studies and with problems of primate conservation.

Un curso de campo sobre "Ecología de Primates Neotropicales" se realizó entre el 17 de octubre y el 06 de noviembre 2001 en la Estación Biológica Quebrada Blanco (EBQB), Reserva Comunal Tamshiyacu-Tahuayo, nor-oriente peruano. Este curso representaba una extensión del curso teórico realizado en octubre 2000 (véase *Neotropical Primates* 8: 120-121, 2000) y fue subvencionado por una beca de la Margot Marsh Biodiversity Foundation. El curso fue dirigido por Eckhard W. Heymann del Deutsches Primatenzentrum (DPZ, Centro Alemán de Primates) y se realizó como parte de las actividades de investigación científica y de enseñanza, realizadas en el margen de la carta de entendimiento entre DPZ y las Facultades de Ingeniería Forestal y de Ciencias Biológicas de la UNAP. Participaron 11 estudiantes y un docente de la UNAP en el curso.

Actividades realizados durante del curso comprendían:

- Observaciones ecológicos y comportamentales de dos especies de *Saguinus*;
- muestreo de habitat (parcelas de muestreo de vegetación; transectos)
- observaciones fenológicas de árboles alimenticias de primates;
- recolección y examinación de muestras fecales de los *Saguinus*;
- experimentos sobre dispersión secundaria y depredación de semillas;
- charlas por estudiantes de doctorado y alumni del DPZ (Maren Huck, Janna Kirchhof, Petra Löttker, Emérita R. Tirado Herrera) y de un estudiante contraparte de la UNAP (Marcos R. Oversluijs Vasquez); y
- observaciones oportunísticas de fenómenos ecológicos en un bosque tropical.

El curso también daba la oportunidad de familiarizarse con los problemas prácticos asociados con estudios primatológicos de campo y problemas de conservación de primates.

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Atlas of the Colombian Amazon

The Fundación Puerto Rastrojo is pleased to present the CD-ROM "Atlas of the Colombian Amazon." A consultative tool, the Atlas contains information about different aspects of the Colombian Amazon, including the physical environment, public services, colonization processes, economy, indigenous settlements, National Parks and institutional presence (amongst others). The Atlas contains more than 35 interactive maps, as well as a database with 47.000 species localities and a collection of 112 photos illustrating the variety of landscapes, ways of life and activities of the Colombian Amazon. We hope that this multimedia application will be useful for researchers, students, public and private institutions and the general public. The use of the maps, photos, data and texts included in the CD-ROM is free of restriction, as long as reference is made to the source. Fundación Puerto Rastrojo is a Colombian NGO which has spent the last 20 years working in the Colombian Amazon carrying out conservation, research and training programmes.

The Atlas is available in Spanish. For more information please contact Fundación Puerto Rastrojo(FPR), Cra. 10 No. 24–76, Of. 1201, Bogotá, Colombia, Tel: (57 1) 284-9010, 560-7054, Fax: (57 1) 560-7055, e-mail: <rastrojo @uolpremium.net.co>.

European Zoos' Commitment to Conservation of the Atlantic Rainforest - EAZA Rainforest Campaign

The mission of the European Association of Zoos and Aquaria (EAZA), Chairman Miklós Persányi, Director Koen Brouwer, is to promote co-operation for furthering wildlife conservation, particularly through internationally-coordinated breeding programmes of wild animals, through the European Endangered Species Programmes (EEP); to promote education, in particular environmental education; to promote regional collection planning activities; to contribute to relevant meetings and discussions of the supra-international organizations, such as the United Nations, The World Conservation Union – IUCN, the European Union, and the Convention of International Trade in Endangered Plant and Animal Species (CITES); and to advise, as required, the European Union, or other representative committees such as the European Parliament and the European Council.

At their annual conference in Prague in September 2001, the EAZA, through its Conservation Committee, chaired by Jo Gipps, Bristol Zoo, launched a major, two-year, fund-raising campaign in support of the conservation of the threatened fauna and flora of the endangered Atlantic forest of Brazil, eastern Paraguay and northern Argentina (2001-2002). The Atlantic rain forest was chosen because of its status as a priority area for the World Association of Zoos and Aquaria (WAZA), and focuses particularly on the conservation programs for the four lion tamarin species, *Leontopithecus*. The zoo community worldwide has played a fundamental role in the overall conservation programs for these species in terms of behavior research, reintroduction, translocation, metapopulation management, scientifically-managed captive-breeding, and their participation in the international lion tamarin committees and support for conservation efforts in the field (see Mallinson, 1996; Kleiman and Mallinson, 1998). Most zoos keeping one or more of the species also use them as flagships for their conservation efforts. The goals of the campaign are to raise awareness about the conservation needs and conservation programmes in the Atlantic rain forest, and to raise money for the Lion Tamarins of Brazil Fund, established in 1991 by the founder of the Jersey Zoo, Gerald Durrell, as a mechanism targeting specifically the institutions holding lion tamarins in captivity to mobilize financial support for ongoing field conservation and research efforts, and to launch critical new initiatives (Mallinson, 1994).

The Campaign Planning Group includes: David Field (Dublin Zoo, Ireland), Bengt Holst (Copenhagen Zoo, Denmark), Kristin Leus (Antwerp Zoo, Belgium), Jeremy J. C. Mallinson (until recently of the Durrell Wildlife Conservation Trust, Jersey) and, as Liaison for the EAZA Executive Office, Corinne Bos (Amsterdam Zoo, The Netherlands). It is hoped that the EAZA Rainforest Campaign will have a long-lasting effect through a better understanding of the existing conservation programmes and a more direct involvement of the European zoo world. The campaign will thus contribute to the fulfillment of the accepted obligation of zoos "to contribute to animal conservation." It will continue until the 2002 EAZA Annual Conference (see "Meetings").

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Brasileiro Ganha Prêmio Ambiental

O pesquisador brasileiro Laury Cullen Jr, do IPÊ - Instituto de Pesquisas Ecológicas, Nazaré Paulista, São Paulo, recebeu no dia 14 de março de 2002, o prêmio Whitley Gold Award, das mãos da princesa Anne, da Inglaterra, na Royal Geographical Society, em Londres. Trata-se de um dos prêmios internacionais de conservação mais conceituados, atribuído pela Fundação Whitley Laing, dos milionários ingleses Edward Whitley, escritor de biografias best-sellers, e John Laing, empresário de estradas de ferro.

O prêmio reconhece os conservacionistas, que melhor conciliam a preservação ambiental, com a pesquisa biológica e projetos sustentáveis de desenvolvimento. Cullen Jr trabalha no Pontal do Paranapanema, no oeste paulista, com diversos projetos inovadores, envolvendo as espécies protegidas no Parque Estadual do Morro do Diabo, incluindo o mico-leão-preto (*Leontopithecus chrysopygus*), e os assentamentos e fazendas ao seu redor. Ele coordena, por exemplo, o projeto "Detetives Ecológicos", que rastreia onças e antas para determinar os melhores locais para os corredores de fauna. Também faz treinamento dos assentados para instalação de pequenos bosques dentro das glebas (Projeto Bosques Trampolim) e com todos os vizinhos do parque, para aumentar as áreas de mata em torno dos limites da unidade de conservação (Projeto Abraço Verde).

Junto com o brasileiro, também foram premiados Carlos Soza, da Guatemala, com o prêmio "População e Meio Ambiente"; John Mauremootoo, das Ilhas Maurício, com o "Conservação da Natureza Internacional" e Lourdes Mujica Valdes, de Cuba, com o "Conservação de Aves". Cada um receberá 25 mil libras. Silas Kpanan, da Libéria, ganha o prêmio de "Direitos Humanos e Meio Ambiente", no valor de 20 mil libras.

Laury Cullen Jr recebe 50 mil libras em reconhecimento por seu "comprometimento com sua causa e habilidade no lobby junto a governantes, agricultores e fazendeiros, em prol da proteção de um ambiente ameaçado, que abriga 7% da biodiversidade mundial", diz a nota distribuída pelos organizadores do evento.

A Fundação Whitley Laing ainda concedeu prêmios de continuidade a cinco grandes vencedores de anos anteriores, cada um no valor de 20 mil libras. Entre eles, está Cláudio Pádua, fundador do IPÊ, que recebeu o Whitley Gold Award em 1997. O dinheiro foi investido no fortalecimento institucional da entidade e em despesas com professores do seu Centro de Treinamento, em Nazaré Paulista.

Prêmio Ambiental Chico Mendes

Treze anos após a morte de Chico Mendes, o Governo Federal do Brasil decidiu reconhecer o trabalho de quem luta pelo desenvolvimento sustentável da Amazônia. Inspirado pelo ambientalista, o ministro do Meio Ambiente, José Sarney Filho, lançou no dia 20 de dezembro de 2001, o prêmio Chico Mendes de Meio Ambiente, que distribuirá R$100 mil para comunidades, organizações não-governamentais e pesquisadores que contribuem para preservar a floresta amazônica. De acordo com a Secretária da Amazônia, Mary Allegretti, o objetivo é dar visibilidade às propostas de desenvolvimento sustentável que surgiram a partir das idéias de Chico Mendes. "É hora de recompensar as pessoas que produzem boas notícias nesta área", disse Dra. Allegretti que chegou a trabalhar por sete anos com o ambientalista em Xapuri, no Acre. From: *Diário de Pernambuco*, Recife, 21/12/2001.

Uma Reserva na Mata Atlântica, Paraná, Brasil

Foi anunciada no dia 19 de novembro de 2001 a criação da RPPN - Reserva Particular do Patrimônio Nacional do Iguaçu I, com um total de 5.151 ha. A Reserva é de propriedade da Araupel S.A., companhia sediada no município de Quedas do Iguaçu, sudoeste do Estado do Paraná, com 28 anos de atuação nos setores de reflorestamento, produção de papel e celulose e produtos em madeira. Foi criada através do reconhecimento oficial do presidente do Ibama - Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, Hamilton Casara. Ela é a quinta reserva federal deste tipo criada no Paraná, sendo a maior dentre as RPPNs existentes no estado. Sua área, coberta por pinheiros do Paraná (araucária), abrange terras dos municípios de Nova Laranjeiras e Rio Bonito do Iguaçu. A criação da Reserva Particular do Iguaçu I representa uma esperança na conservação do pouco que ainda resta da Mata Atlântica paranaense. A nova Reserva localiza-se na área onde aconteceu o maior desmatamento em área contínua de Mata Atlântica dos últimos cinco anos, segundo o *Atlas dos Remanescentes Florestais da Mata Atlântica*, divulgado pela Fundação SOS Mata Atlântica e INPE - Instituto Nacional de Pesquisas Espaciais.

Tropical Ecology, Assessment and Monitoring – The TEAM Initiative

Despite decades of conservation action, there is no comprehensive effort underway to track large-scale changes in tropical forest ecosystems. Consequently, the conservation community has been significantly handicapped in its ability to identify, design and implement successful interventions. In order to build biodiversity conservation programs that are based on science, a guiding principle for Conservation International (CI) is that scientists and conservationists must be armed with current data that has been collected over time using standardized scientific methods. With this up-to-the minute information in hand, researchers and planners can distinguish the effects of human disturbance from the natural ebb and flow of biological processes and design conservation actions to address the most urgent and real conservation needs.

The Tropical Ecology, Assessment and Monitoring (TEAM) initiative, created by CI's Center for Applied Biodiversity Science (CABS), is now positioned to become a catalyst for achieving conservation goals worldwide. Specifically over the next ten years, TEAM will be establishing a network of field stations in tropical biodiversity hotspots and major wilderness areas. Existing field stations will be the foundation for this network, drawing on the expertise and infrastructure of of partner organizations.

The TEAM network will provide the conservation and scientific communities with the first standardized set of data on biodiversity collected at key sites across tropical forest ecosystems, effectively becoming the first global-level system to track the behavior of biodiversity over time. The TEAM network will complement CABS' Remote Sensing Monitoring Program to establish the first fully operational early warning system for global biodiversity that will identify emerging threats to populations, species, and communities, as well as changes in ecosystems before key areas for biodiversity are severely altered.

Because of its global coverage, and the quality of the data that will be collected through standardized scientific methods, the TEAM effort will become one of the most impor-

tant research endeavors ever conducted on the ecology, assessment, and monitoring of tropical ecosystems. Participating institutions will be strengthened by being part of the network, in part by becoming respected sources of expertise regarding conservation of biodiversity and sustainable economic development in the tropics.

TEAM advantages
Institutions participating in the TEAM initiative will receive funding for data collection that will contribute to global biodiversity monitoring. TEAM stations will serve as central locations for training and building the capacity for local conservation efforts, and will receive further support for building their technical and computational capabilities, which in turn will enhance their ability to add to the global database resource. In addition, staff at TEAM stations will receive support to participate in regional and international workshops on biodiversity monitoring and conservation planning, and stations will be elegible to receive block grants to enhance infrastructure or other self-determined needs.

Joining the TEAM initiative
Field stations interested in participating in the TEAM network must submit a proposal in response to a Request for Proposals (RFP) that outlines a set of basic criteria that each station in the network will have to meet. These criteria range from specifics about the station's scientific and educational capabilities to broader parameters concerning, for example, the conservation status and ecological importance of the sites where the station is located. A panel of experts will review each proposal and select stations to become part of the TEAM network on a competitive basis.

TEAM member obligations and responsibilities
Field stations that are part of the TEAM network will include in their operations the use of standardized protocols for collecting, assessing and monitoring biodiversity. The data collected through these efforts will become part of the global database that will be available to scientists and conservation practitioners. Each year, a team of CABS scientists will analyze the collected data, looking for short-term trends in indicators and identifying possible cycles in these indicators. TEAM data will always be available to the member stations, and summaries of analyzed data will be made available to the scientific community through the web and other means.

Team Initiative Oversight Committee: Edward O. Wilson (Chairman), Sandy Andelman, David Clark, Gustavo Fonseca, Adrian Forsyth, Claude Gascon, Thomas E. Lacher Jr., Elizabeth Losos, Dan Martin and Russell A. Mittermeier. *TEAM Initiative Staff*: Gustavo Fonseca (Senior V.P. for Science – CI and Executive Director of CABS), Thomas E. Lacher, Jr. (Senior Director), Jim Sanderson (Research Scientist), Puja Batra (Program Manager), Caroline Kuebler (Project Coordinator), Ariel Bailey (Administrative Assistant).

To receive more information about the TEAM initiative or how to apply to become part of the TEAM network, please see the CABS website at <www.biodiversityscience.org> or e-mail: <TEAM@conservation.org>.

Curso de Ecologia Quantitativa (Bioestatística) Aplicada á Biologia da Conservação

O IPÊ - Instituto de Pesquisas Ecológicas anuncia o Curso de Ecologia Quantitativa (Bioestatística) Aplicada á Biologia da Conservação, 14 a 23 de outubro, 2002. A formação e capacitação de profissionais atualizados para trabalhar com Biologia da Conservação sempre foram prioridades do Centro Brasileiro de Biologia da Conservação (CBBC). O curso será ministrado pelo IPÊ - Instituto de Pesquisas Ecológicas, em parceria com o Dr. Paulo de Marco Jr. (Universidade Federal de Viçosa) e Dr. Adriano Pereira Paglia (Universidade Federal de Minas Gerais), no Centro Brasileiro de Biologia da Conservação (IPÊ), município de Nazaré Paulista, próximo a cidade de São Paulo. O objetivo geral é abordar os conceitos de estatística e a aplicação dos testes estatísticos em trabalhos desenvolvidos pelos próprios participantes alem de gerar uma discussão profunda sobre metodologia científica, assegurando aos participantes as bases filosóficas necessárias para uma postura crítica em relação aos métodos. Ao lado desta abordagem teórica busca-se também dar aos participantes um domínio dos softwares mais comuns na área, de forma a facilitar seu trabalho e encurtar o caminho entre a coleta de dados em ecologia, história natural e biologia da conservação e sua publicação em periódicos científicos e de divulgação. Será dado também um cuidado especial a aspectos da comunicação cientifica, o que auxiliará os alunos na produção de seus trabalhos, inclusive teses de mestrado e doutorado. Ao final do curso, acompanhados dos professores, todos os alunos irão redigir um artigo científico sobre seus trabalhos, visando a praticidade e a forma correta de apresentar os resultados e as análises estatísticas em trabalhos científicos. *Prazo de inscrição*: 24 de setembro de 2002. *Vagas*: 18 participantes. *Candidatos*: Profissionais relacionados à conservação já desenvolvendo pesquisa em campo e alunos envolvidos em programas de mestrado e/ou doutorado em áreas afins. *Inscrição/Seleção*: Os interessados deverão enviar uma carta de intenções com dados pessoais para contato e uma descrição sucinta do seu projeto de pesquisa, dando maior ênfase na descrição dos dados que deseja analisar durante o curso (máximo uma página). *Preço*: R$ 500,00 (quinhentos reais) a vista, ou R$ 555,00 (quinhentos e cinqüenta e cinco reais) divididos em 3 parcelas de R$ 185,00. Encaminhar pelo e-mail ou pelo correio: IPÊ- Instituto de Pesquisas Ecológicas, Caixa Postal, 47, Nazaré Paulista, 12960-000 São Paulo, Brasil, Tel: (011) 4597-1327 ou (011) 9831-2187, e-mail: <curso@ipe.org.br>. Site: <www.ipe.org.br>.

III Curso Latino-Americano em Biologia da Conservação e Manejo da Vida Silvestre

O IPÊ- Instituto de Pesquisas Ecológicas, a Smithsonian Institution e o Instituto Florestal de São Paulo, anunciam o III Curso Latino-Americano em Biologia da Conservação e Manejo da Vida Silvestre, 4 de novembro a 6 de dezembro, 2002. O curso será oferecido em português e sua parte introdutória será realizada no Centro Brasileiro de Biologia da Conservação do IPÊ, localizado no município de Nazaré Paulista, próximo a cidade se São Paulo. Grande parte de seu conteúdo será abordado no Parque Estadual do Morro do Diabo, localizado no Pontal do Paranapanema, oeste do Estado de São Paulo. Entre os representantes das diversas e integras fauna e flora do Morro do Diabo ainda existe o raro e endêmico mico-leão preto (*Leontopithecus chrysopygus*) bem como a maioria dos carnívoros e ungulados brasileiros, como a onça pintada, a onça parda, a jaguatirica, a anta, veados, queixadas e caetetus. Todos os participantes apresentarão um seminário de 30 minutos sobre seus trabalhos específicos na área de conservação da natureza. Os participantes usarão também seus conhecimentos adquiridos durante o curso para a elaboração de projetos de pesquisa de campo sobre os tópicos abordados durante o curso. *Para maiores informações*, acessar o site do IPE: <www.ipe.org.br <http://www.ipe.org.br> ou pelo e-mail: <conservacao@ipe.org.br>.

Clarice Bassi, IPÊ - Instituto de Pesquisas Ecológicas, Caixa Postal 47, Nazare Paulista, 12960-000 São Paulo, Brasil, Tel/Fax: 55 (11) 4597-1327.

Cayo Santiago

Dr. Melissa Gerald is the new Scientist-in-Charge of Cayo Santiago and Assistant Professor in the Department of Medicine at the University of Puerto Rico, Medical Sciences Campus. She received her BA in Anthropology and Psychology at the University of Wisconsin, Madison, in 1991. She pursued graduate training in the Department of Anthropology at UCLA and received her MA in 1994, and a PhD in 1999. For her doctoral research she experimentally investigated the social functions and proximate mechanisms underlying scrotal color in vervet monkeys at UCLA and the Barbados Primate Research Center. Following the completion of her PhD, Gerald received a Post-Doctoral Intramural Training Research Award at the National Institutes of Health, National Institute of Alcohol Abuse and Alcoholism, where she examined the relationships between neuroendocrine activity and reproductive performance in rhesus macaques. On Cayo Santiago, she will be collecting hormonal, behavioral and demographic data to investigate sexual selection and variability in female reproductive success on a longitudinal basis. Dr. Gerald expresses an interest in welcoming new and returning researchers to Cayo Santiago, and is accepting proposals at this time.

Melissa S. Gerald, Cayo Santiago, Caribbean Primate Research Center, P.O. Box 906, Punta Santiago, PR 00741USA, For FED EX: 20 Calle Marina, Punta Santiago, PR 00741, Phone: 787-285-1201 or 787-852-0690 FAX: 787-852-0690, e-mail: <cayo_santiago@yahoo.com>.

CBD and the Global Plant Conservation Strategy

The Parties to the Convention on Biological Diversity (CBD) adopted in plenary the Global Plant Conservation Strategy on 19 April, 2002. This is a much-awaited result and included a lot of work by many people, including many SSC members. It means that for the first time Governments have agreed to contribute to a set of global targets aimed at plant conservation, which will result in increased activity on this very fundamental and urgent need. The final plant strategy is to be posted on the CBD website. To see what was discussed and the draft Plant Conservation Strategy go to <www.biodiv.org/meetings/cop-06.asp>. For details of the strategy please see the IUCN/SSC website <www.iucn.org/themes/ssc/plants/whatsnew/globalstrategystory.html>.

Wendy Strahm, IUCN Plants Officer, Species Programme, Rue Mauverney, 28, CH-1196 Gland, Switzerland, Tel: +41 22 999.0157, Fax: +41 22 999.0015, e-mail: <was@iucn.org>.

Conservation Genetics Database

The Laboratory for Conservation Genetics has assembled a reference database of literature related to Conservation Genetics. This database is searchable on the web (http://www.rareDNA.com), and references (usually complete with abstracts) can be downloaded to personal citation management software. We plan to update the database approximately monthly, adding to the over 1700 references already in the database. Please let us know if you find the database useful, and let us know if there are particular references that are not included that you think should be.

Phil Morin and **Karen Chambers**, Laboratory for Conservation Genetics, Max Planck, Institute for Evolutionary Anthropology, Inselstrasse 22, D-04103 Leipzig, Germany, e-mail: <morin@rareDNA.com>, Web: <http://www.rareDNA.com>.

AZA Conservation Endowment Fund

AZA's Conservation Endowment Fund, established in 1984, provides financial support for regional and international field conservation programs, the improvement of training opportunities for zoo professionals and other key programs related to the Association's mission. Since its inception, the CEF has awarded over $2 million to 138

projects benefiting wildlife worldwide. Last year, thanks to donations from AZA members and supporters, the CEF was able to fund 17 projects ranging from field efforts for the Puerto Rican crested toad to a study on breeding strategies used in AZA conservation programs.

Please consider giving generously to this vital AZA fund for member grants. What you give is invested for members and their conservation efforts - a gift to the collective mission of the zoo profession. If you are not an AZA member but would like to contribute to the CEF, please contact Stacey Goldsamt, Assistant Director of Development and Marketing at <sgoldsamt@aza.org> or 301-562-0777 x244.

Society for Conservation Geographic Information Systems (SCGIS)

The Society for Conservation Geographic Information Systems (SCGIS) works to assist conservationists worldwide in using GIS through communication, networking, scholarships and training. Membership is open to any individual seeking assistance in the achievement of personal or organizational conservation goals. As a non-profit, SCGIS uses a fee-based membership to provide services directly to members. Currently, SCGIS provides services to its members in three primary ways: (1) an annual SCGIS Conference held in tandem with the ESRI User Conference, (2) scholarships and fee waivers to the SCGIS Conference, and (3) networking and professional development services, including the CONSGIS listserv, SCGIS web site, hard copy and electronic newsletters. In addition, SCGIS has a strategic partnership with the ESRI Conservation Program and the Conservation Technology Support Program (CTSP) to provide fee waivers for hardware, software, training, and technical assistance. Website: <www.scgis.org>.

Primate Societies

X Congresso Brasileiro de Primatologia "Amazônia: A Última Fronteira"

O X Congresso Brasileiro de Primatologia acontecerá em Belém, Pará, entre os dias 10 a 15 de novembro de 2002. O Congresso será o primeiro do milênio e o primeiro a ser realizado na Amazônia, bioma que abriga a maior parte das espécies de primatas brasileiros. Além de suas riquezas naturais, temos, na cidade de Belém, uma grande concentração de primatólogos brasileiros, distribuídos em três instituições de pesquisa: a Universidade Federal do Pará, o Museu Paraense Emílio Goeldi e o Centro Nacional de Primatas. Estes cientistas atuam em praticamente todos os campos de pesquisa relevantes à Primatologia, desde a ecologia e a conservação até a genética e a biomedicina. Esperamos, então, que o Congresso ofereça aos participantes uma oportunidade única de conhecer a diversidade dos primatas amazônicos, as florestas e a cultura local, como também as novas fronteiras e a excelência em pesquisa primatológica sendo desenvolvidas na região.

O Congresso está estruturado em palestras, mesas-redondas, mini-cursos e visitas científicas, abordando temas variados, que abrangerão amplas áreas de pesquisa com primatas. Os trabalhos serão apresentados na forma de painéis e de apresentações orais. Várias eminências científicas estarão presentes e sua participação virá a se somar para engrandecer em importância o evento. Haverá visitas científicas e um concurso de fotografias com o tema "Primatas brasileiros". Estamos consultando aos sócios da SBPr sobre a pauta de tópicos já delineados, aceitando sugestões e novas propostas, pelo endereço eletrônico: <ferrari@ufpa.br>.

Os Mini Cursos: Princípios de análise filogenética usando dados moleculares; Criação e reprodução de espécies ameaçadas em cativeiro; Escola Experimental de Primatas (cognição para iniciantes); Citogenética de primatas neotropicais; Paleontologia da Platyrrhini; Métodos em conservação e manejo; Comunicação vocal e química; Visão de cores; Bases anatômicas e neuroquímicas da memória e emoções em primatas; e Fisiologia do Estresse e Comportamento.

Palestras: Abordagens para estudos da cognição; A floresta amazônica; Centro Nacional de Primatas: equilibrando pesquisa biomédica e conservação; Educação Ambiental: uma visão amazônica; Genética de populações e conservação; Museu Goeldi: 135 anos de pesquisa e divulgação; Papel dos esteróides no comportamento de primatas; Pitecíneos: uma última fronteira amazônica; Proteínas priônicas em primatas não-humanos; Ecologia Cognitiva de Primatas Neotropicais.

Mesas Redondas: Citogenética de primatas neotropicais; Diversidade genética em primatas neotropicais; Ecologia de bugios, guaribas e barbados: todos iguais ou totalmente diferentes?; Sistemática de *Alouatta*; Macaco-prego na natureza; Filogenia de Platyrrhini: integrando moléculas e morfologia; Fragmentação de hábitat e manejo de populações; Dispersão de sementes; Cognição em *Cebus apella*; Bem-estar de primatas em cativeiro; Colônias auto-sustentadas: utopia e viabilidade; Pesquisa na Amazônia: abrindo a fronteira.

Comissão Organizadora: Stephen F Ferrari (Presidente), Vanner Boere (Secretário), José Rímoli (Tesoureiro). Maiores detalhes da programação, instruções para os autores, ficha de inscrição e valores, serão veiculados na página eletrônica e no impresso da 2ª. circular. Por favor, os interessados em divulgar em sua área de trabalho o cartaz do X Congresso, queiram remeter a solicitação.

A página eletrônica da SBPr está sendo reestruturada. Convidamos aos sócios que enviem sugestões, notícias, links, imagens e material que possam enriquecer este poderoso meio eletrônico de divulgação da primatologia

no Brasil. *Informações*: <www.unb.br/ib/cfs/sbpr/> ou Secretaria Geral: Vanner Boere, CFS/IB, Universidade de Brasília, 70910-900 Brasília, DF, Brasil, Tel: (0)61 3072294/ 3072887, Fax: (0)61 2741251, e-mail: <vanner@unb.br>.

Para os interessados em se associar à Sociedade Brasileira de Primatologia (SBPr), o valor é de R$40,00 a serem depositados no:Banco Real, Agência 0085, Campo Grande-Dom Aquino, Conta número: 5 025340 0. Solicitamos que o comprovante seja enviado via fax ou correio a: José Rímoli, Rua Cláudia 498, Giocondo Orsi, 79022-070 Campo Grande, Mato Grosso do Sul, Brasil. Solicitamos, ainda, a todos os sócios da SBPR que atualizem seus endereços junto à comissão organizadora.

Vanner Boere Souza, Comissão Organizadora, Laboratorio de Neurobiologia, CFS/Instituto de Biologia, Universidade de Brasília, 70910-900 Brasília, DF, Brasil.

The Italian Association of Primatology (API)

The Italian Association of Primatology was formed in 1982 in Rome, Italy. The aims of the Association are: a) to promote research on nonhuman primates, and to facilitate the cooperation between primatologists; b) to preserve and protect the interests of primatological studies, in the context of teaching and scientific research; c) to be actively involved in the protection of nonhuman primates, with special effort focused on those in danger of extinction; d) to promote the creation of breeding centers for nonhuman primates, under adequate scientific status; and e) to watch over scientific protocols involving nonhuman primates, with the aim of avoiding unnecessary suffering and to defend the life of species in danger of extinction.

API organizes regular meetings for its members (approximately every 18 months). Fifteen have been held since its founding in 1982. API is a regular member of the European Federation of Primatology, and the abstracts from its meetings are published in *Folia Primatologica*. A prize is given at each for the best student presentation. At 18-month intervals, API is also able to offer a small grant for research, conservation, and education projects. In 2004 the Society will be hosting the XXth Congress of the International Primatological Society (IPS), in Torino.

The present officers are as follows: *President* - Augusto Vitale (Istituto Superiore Sanità, Roma); *Vice President* - Gemma Perretta (CNR Istituto Medicina Sperimentale, Roma); *Secretary-treasurer* - Daniele Formenti (Dip. Biologia Animale, Pavia); *Council members*: Cristina Giacoma (Dip. Biologia Animale e dell'Uomo, Universita di Torino), Paola Bigatti (Dip. Biologia Animale e dell'Uomo, Universita di Torino) and M. Cristina Riviello (Istituto di Scienze e Tecnologie della Cognizione del CNR, Roma).

For more information, please contact the Secretary-Treasurer, Daniele Formenti, Dip. Biologia Animale, Piazza Botta 10, 27100 Pavia, Italy, Tel: +39 0382 506324, Telefax: +39 0382 506325, e-mail: <formenti@unipv.it>. Please visit the API web page: <http://www.unipv.it/webbio/api/api.htm>.

Augusto Vitale, Istituto Superiore Sanità, Lab. di Fisiopatologia, Viale Regina Elena 299, 00161 Roma, Italy, e-mail: <vitale@iss.it>.

7th Workshop of the European Marmoset Research Group

The 7th Workshop of the EMRG will be held on October 14–16th 2002 in Paris. The workshop is funded by the European Commission as a "High-Level Scientific Conference" for up to 100 participants, and there will be an emphasis on graduate and postdoctoral training in callitrichid biology and biomedical science. Topics of discussion and presentations will include: Brain structure, function and disease; Development and aging; Genetics and Colony management; Ecology and social organization. A substantial number of European Commission and EMRG training grants are available. For details of abstract (lecture and poster) submission, grant application and registration, please see the web page <http://www.dpz.gwdg.de/emrg/emrgcons.htm> or contact Christopher Pryce via e-mail <pryce@behav.biol.ethz.ch>.

Primate Field Studies Global Database – PSGB/ WRPRC

The Primate Society of Great Britain (PSGB) is compiling the 2002 edition of their guide to primate field projects: *Current Primate Field Studies* (a supplement to their newsletter *Primate Eye*). The guide will be compiled in collaboration with the Wisconsin Regional Primate Research Center (WRPRC), and will also be available electronically on the Field Studies section of the International Directory of Primatology website <http://www.primate.wisc.edu/pin/idp/index.html>. This will produce a single comprehensive global database that will maximise accessibility and minimize redundancy for both users and contributors alike.

We invite all those who are currently carrying out primate field studies, or who completed a field study during 2000–2002, to submit their project details to this scheme. Submissions should be made before 1 September 2002, either electronically or by hard copy. In the first instance, submissions can be made on the electronic form found on the International Directory of Primatology, website <http://www.primate.wisc.edu/pin/idp/scope.html> (those who already have an electronic entry in the IDP can use the online form for updating). If submissions are made by hard copy (a form is enclosed with this journal to help facilitate this option), the following information should be included:

(1) title of field study project, (2) country and location, (3) project start and end dates, (4) research objectives, (5) species studied (list Latin names), (6) other primate species found at site, (7) positions for field workers/volunteers, (8) sponsoring institutions, (9) name of project director together with their institution, address, city, state/province (not abbreviated), mailing code, phone number, fax number, e-mail address and website address, (10) the names of other research personnel on the project (including the contact person for these project details: if same as director, please list as same), (11) keywords that best describe the field study, and (12) miscellaneous comments (optional).
Submissions by hard copy should be mailed to: Eluned Price, 2 La Grange, La Rue de Cambrai, Trinity, Jersey JE3 5AL, Channel Islands, Great Britain, e-mail: <eldom@pied.freeserve.co.uk>.

Recent Publications

Fauna da Amazônia Brasileira

O Museu Paraense Emílio Goeldi, em Belém, Brasil, lançou em fevereiro de 2002 o periódico *Fauna da Amazônia Brasileira*. É uma série destinada a catalogar os diversos grupos de animais terrestres e de água doce da Amazônia Legal Brasileira, mostrando o "estado da arte" e a porcentagem de espécies em relação ao Brasil ou à região Neotropical. Espera, a médio prazo, oferecer um quadro atualizado do conhecimento que se tem da fauna amazônica, revelando quais grupos taxonômicos são menos conhecidos, as deficiências das coleções, a falta de especialistas, etc., possibilitando para o futuro alguma ação integrada para sanar essas dificuldades. A série não terá periodicidade certa, nem obedecerá a qualquer arranjo sistemático. As contribuições, que poderão ser escritas em português, espanhol, francês ou inglês, serão publicadas em seqüência, assim que foram aprovadas pelo Conselho Científico da revista. Cada número deve tratar de uma família individual. Todavia, dependendo da riqueza específica do grupo taxonômico, outros níveis supragénericos, supra- ou subfamiliares, poderão ser usados. Os editores responsáveis são Nelson Papavero e William Leslie Overal. Cópias da *Fauna* podem ser solicitadas na Biblioteca do Museu Goeldi, Caixa Postal 399, 66040-170 Belém, Pará, Brazil, e-mail: <mgdoc@museu-goeldi.br>.

In February, 2002, the Museu Emilio Goeldi, Belém, Pará, Brazil, launched a new scientific publication series, *Fauna da Amazônia Brasileira*. It is devoted to the cataloguing of the diverse terrestrial and freshwater animal groups from the Brazilian Legal Amazon, showing the "state of the art" and the percentage of species in relation to Brazil or to the Neotropical Region. Hopefully, in a reasonable time, a relevant picture of our knowledge of the Amazonian fauna can be obtained, revealing which taxonomic groups are less known, the deficiencies in term of collections, lack of specialists, etc., promoting future integrated action to cope with those difficulties. The series will not be published with a fixed periodicity, nor will it obey any systematic arrangement. Contributions, which may be written in Portuguese, Spanish, French or English, will be published sequentially, as soon as they are approved by the Scientific Council of the journal. Each number should treat an individual family. However, depending on the species-richness of the taxonomic group, other suprageneric levels, either supra or subfamiliar, may be used. The editors are Nelson Papavero and William Leslie Overal. Copies of *Fauna* can be requested from the Biblioteca, Museu Emílio Goeldi, Caixa Postal 399, 66040-170 Belém, Pará, Brazil, e-mail: <mgdoc@museu-goeldi.br>.

The Red Book

The Red Book: The Extinction Crisis Face to Face was launched at a ceremony led by David Anderson, Minister of the Environment, Canada, on 4 December 2001 at the Museum of Nature in Ottawa. ISBN 968 6397 64 7. The book, published through a collaboration between The World Conservation Union (IUCN) Species Survival Commission (SSC), CEMEX, SA, one of the world's largest cement companies, and Agrupación Sierra Madre, SC, a Mexican conservation organization, is an extraordinarily beautiful book. There are more than 100 stunning photographs from world-renowned photographers. It was produced by Patricio Robles Gil (General Direction), Ramón Pérez Gil (Coordination) and Antonio Bolívar (Editorial Direction). The text was written by Amie Bräutigam and Martin D. Jenkins. David Brackett (Chairman of the IUCN/SSC) wrote the foreword (pp.18–19), and special contributions were provided by George B. Rabb ("Facing the Challenge" pp.29–30), Gerardo Ceballos and Paul R. Erhlich (Population Extinction: A Critical Issue", pp.86–89), Arthur E. Bogan ("Extinction in the Making", pp.138–139) and Holly T. Dublin ("On Humans and African Elephants", pp.204–205). A dramatic face of *Cacajao calvus* covers the book. It is available from the IUCN bookstore (http://www.iucn.org/bookstore/index.html). For further information see: <http://www.iucn.org/redlist/redbook/>.

World Conservation – A Special Issue on the IUCN/SSC Red List

Formerly the *IUCN Bulletin*, Volume 32, Number 3 (32pp.), 2001, of *World Conservation* is dedicated to the IUCN Red List of Threatened Species. The editor is Nikki Meith, and contributing editors for this issue were Craig Hilton-Taylor and Anna Knee. It is divided into three parts: Lifeline for Biodiversity, Profiles in Red and Red List in Action. Without listing all articles, a flavor of this excellent review of the Red List, and the enormous efforts that go into documenting the threatened status of species worldwide, is given by the following sample. In the first section, A wake-up call [background to the Red List] – C. Hilton-Taylor, p.3; A tool for conservation action [purpose

and facts and figures] – A. Knee, p.4; The Colonel's card files make Red List history [origin of the Red List] – J. Burton, p.4; A conservation roadmap [review process and categories] – G. Mace, p.5; Partnerships: A new era [about the joint venture partnership of IUCN/SSC with the Center for Applied Biodiversity Science at Conservation International, BirdLife International, NatureServe, and the Ocean Conservancy] – D. Brackett, S. Stuart, A. Stattersfield, B. A. Stein & D. E. Guggenheim, pp.6–7. The second section has a number of essays on birds, mammals (including a short article on the Atlantic forest primates by A. B. Rylands, R. A. Mittermeier and W. R. Konstant), plants and marine species, and the groups which have been targeted for particular attention in the near future with regard to expanding the numbers of species assessed, such as alligators, iguanas, amphibians and molluscs. The final section includes: Taking off: New directions for the Red List – C. Hilton-Taylor, p.27; Biodiversity indicators – S. Mainka, p.27; and essays on regional expansion of the Red List assessments, through the Conservation Assessment and Management Plans (CAMPs) of the Conservation Breeding Specialist Group (CBSG) (Onnie Byers), in Latin America (Mariano Giménez-Dixon), Southern Africa (Janice Golding), South and South-east Asia (Vidhisha Samarasekara) and Viet Nam (Phil McGowan). The last essay is written by Achim Steiner, Director General of the IUCN, reviewing the global significance of the Red List and its role within the work, general philosophy and objectives of the IUCN.

An annual subscription to *World Conservation* (3 issues a year, ISSN 1027-0965) costs US$45.00 (incl. airmail postage). For subscription information contact: IUCN Publishing Division, Gland, Switzerland, e-mail: <Cindy.Craker@iucn.org>.

Books

Lessons from Amazonia: The Ecology and Conservation of a Fragmented Forest, edited by Richard O. Bierregaard Jr., Claude Gascon, Thomas E. Lovejoy and Rita Mesquita. 2001, 478pp. Yale University Press, NY. ISBN 0-300-08483-8 (Cloth). Price: $65.00. The foreword is by Edward O. Wilson, and prologue by Eneas Salati. This book presents the results of the longest-running and most comprehensive study of forest fragmentation ever undertaken, the Biological Dynamics of Forest Fragments Project (BDFF), north of Manaus, in central Amazonia, run jointly by the Smithsonian Institution and the National Institute for Amazon Research (INPA). Forest fragmentation is one of the biggest research fields in tropical conservation biology, and this book provides a remarkable overview of many of the key issues, presenting the experimental research, inventories and long-term monitoring of biotic and abiotic aspects of forest fragments of different sizes since 1979 when the project was begun. It is divided into five parts: 1. Theory and overview (4 chapters); 2. Forest ecology and genetics (4 chapters); 3. Fragmentation effects on plant communities (5 chapters), on invertebrate communities (5 chapters), and on vertebrate communities (4 chapters); 4. Management guidelines (6 chapters), and 5. Synthesis (1 chapter on principles of forest fragmentation and conservation in the Amazon). There are two very interesting chapters on primates: Primates in a fragmented landscape: Six species in Central Amazonia – Kellen A. Gilbert & Eleonore Setz, pp.262-270; The brown capuchin monkey (*Cebus apella*): Ecology and home range requirements - Wilson R. Spironello, pp.271-283. *Available from*: Yale University Press, in the US (toll-free) - Tel: 1-800-405-1619, Fax: 1-800-406-9145, e-mail: <customer.care@triliteral.org>; in Canada, Mexico, South America, Japan, South Korea, Taiwan, or Australia - Customer Service Dept., Tel: 401-531-2800, Fax: 401-531-2801; in the United Kingdom, Europe, Africa, or Asia - London office, Tel: 44-207-431-4422, Fax: 44-207-431-3755, e-mail: <sales@yaleup.co.uk>. Web site: <http://www.yale.edu/yup/books/084838.htm>.

Nouragues: Dynamics and Plant-Animal Interactions in a Neotropical Rainforest, edited by Frans Bongers, Pierre Charles-Dominique, Pierre-Michel Forget, and Marc Thery, 2001, Kluwer Academic Publishers. Price: US$115.00. ISBN 1-4020-0123-1 (hardbound). Nouragues is a tropical forest research station in French Guiana. It was established in 1986 for research on natural mechanisms of forest regeneration. Twelve years after the creation of the Nouragues field station, this book provides an overview of the main research results, and focuses on plant communities, vertebrate communities and evolutionary ecology, frugivory and seed dispersal, and forest dynamics and recruitment. *Contents*: Part I. Introduction. 1. The field station – P. Charles-Dominique; 2. Geography and climate – M. Grimaldi & B. Riera; 3. Scales of ambient light variation – F. Bongers, P. J. van der Meer & M. Thery. Part II: Plant Communities. 4. The lowland high rainforest: structure and tree species diversity - O. Poncy, D. Sabatier, M.-F. Prevost & I. Hardy; 5. The low forest (Nouragues Inselberg) – D. Larpin; 6. Plant communities on a granitic outcrop – C. Sarrhou; 7. Palaeoclimates and their consequences on forest composition – P. Charles-Dominique, P. Blanc, D. Larpin, M.-P. Ledru, B. Riera, T. Rosique, C. Sarthou, M. Servant & C. Tardy. Part III. Vertebrate Communities and Evolutionary Ecology. 8. Diet and population densities of the primate community in relation to fruit supplies – B. Simmen, C. Julliot, F. Bayart & E.Pages-Feuillade; 9. Comparative positional behaviour of five primates – D. Youlatos and J.-P. Gasc; 10. The bat community – A. Brosset, P. Charles-Dominique & A. Cocide; 11. The marsupial community – M.-L. Guillemin, M. Atramentowicz & D. Julien-Laferriere; 12. The avian community: an overview of species composition and guild structure; J.-M. Thiollay, M. Jullien, M. Thery & C. Erard; 13. The adaptive significance of flocking in tropical understorey forest birds: the field evidence – M. Jullien and J.-M. Thiollay; 14. Habitat selection, ambient light and colour patterns in some lek-displaying birds - M. Thery & J. A. Endler; 15. Distribution and life histories of amphibians and reptiles – M. Born and P. Gaucher; 16. Fishes of the Arataye river and their space-time organization - F. J. Meunier & T.

Boujard. Part IV. Frugivory and Seed Dispersal. 17. Relationships between seed dispersal and behavioural ecology - P. Charles-Dominique; 18. Frugivory and seed dispersal by three neotropical primates: impact on plant regeneration - C. Julliot, B. Simmen & Shuyi Zhang; 19. Frugivory and seed dispersal by bats – P. Charles-Dominique & A. Cockle; 20. Frugivory and seed dispersal by Kinkajous – D. Julien-Laferriere; 21. Frugivory and seed dispersal by terrestrial mammals – F. Feer, O. Henry, P.-M. Forget & M. Gayot; 22. Vegetarian species in the bird community with an emphasis on frugivory and seed dispersal - C. Erard & M. Thery. Part V. Forest Dynamics and Recruitment. 23. Tree-falls and canopy gaps: patterns of natural disturbance – P. J. van der Meer and F. Bongers; 24. The dispersal and recruitment of Cyclanthaceae and *Philodendron* (Araceae) understorey root-climbing vines - A. Cockle; 25. Post-dispersal seed removal in four frugivore-dispersed tree species - P.-M. Forget, F. Feer, S. Chauvet, C. Julliot, B. Simmen, F. Bayart & E. Pages-Feuillade; 26. Scatterhoarding and tree regeneration – P. A. Jansen & P.-M. Forget; 27. Effects of tree height and light availability on plant traits at different organisation levels; F. J. Sterck, T. Rijkers and F. Bongers. Appendices: 1. Floristic Checklist of the Nouragues area - P. Belbenoit, O. Poncy, D. Sabatier, M.-F. Prevost, B. Riera, P. Blanc, D. Larpin & C. Sarthou; 2. Practical guide to the palms – J.-J. de Granville; 3. Mammals of the Nouragues and Lower Arataye areas - F. Feer and P. Charles-Dominique; 4. Bird species (from Nouragues inselberg to Arataye River) – J.-M. Thiollay, M. Jullien, M. Thery & C. Erard; 5. Amphibian and reptile species at the Nouragues Nature Reserve - M. Born & P. Gaucher; 6. Fishes of the Arataye river; F. J. Meunier & T. Boujard. *Available from*: Kluwer Academic Publishers, Order Department, P.O. Box 358, Accord Station, Hingham, MA 02018-0358, USA, Tel: (781) 871-6600, Fax: (781) 871-6528, e-mail <kluwer@wkap.com>, website: <http://www.wkap.com>.

African Forest Biodiversity: A Field Survey Manual for Vertebrates, edited by Glyn Davies. Earthwatch Institute (Europe), Oxford. 2002, *c.*160pp. Authors: Leon Bennun, Glyn Davies, Kim Howell, Helen Newing and Matthew Linkie. The manual is designed to be carried into the field to guide survey work, and enable the user to consider the full range of vertebrates, excluding fish, found in African forests. It explains the basic techniques and basic standards needed for the development of essential inventory and monitoring programmes, and is particularly aimed at: people carrying out short reconnaissance surveys and expeditions; undergraduate and graduate students carrying out project and thesis work; research departments of forest, wildlife and national parks departments; forest and wildlife managers and technicians with responsibility for monitoring biodiversity. *For more information*: Julian Laird, Director of Programmes, Earthwatch Institute (Europe), 57 Woodstock Road, Oxford, OX2 6HJ, UK, Tel: +44 (0)1865 318800 Fax: +44 (0) 1865 311383, e-mail: <jlaird@earthwatch.org.uk>. Website: <http://www.earthwatch.org/europe>.

The New Encyclopaedia of Mammals, edited by David W. Macdonald, Assistant Editor Sasha Norris. 2001. Oxford University Press, Oxford. 930pp. ISBN 0 19 850823 9. Price £35.00. Unsurpassed in the breadth and depth of its text and the scope of its illustrations, this book treats every living species of mammal from aardvark to antechinus and from zebra and zorros, and all of the primates besides. Each entry gives a systematic account of a species' or group's form, diet, distribution, behavior, natural history and conservation status. The very latest discoveries of new species are also included, making this the most comprehensive and up-to-date resource available. The text is augmented by numerous illustrations which combine the best of wildlife photography with superb detailed color artwork. 'Factfile' panels with distribution maps and scale drawings give readers an instant overview of key data. It is the completely revised successor to *The Encyclopaedia of Mammals* published in 1984 (George, Allen and Unwin, London). The book itself claims to be the definitive reference work on mammals for the 21st Century and nobody could argue with that right now. It is a spectacular book and an extremely valuable, essential I would say, reference for any zoologist. Its price is accessible – it is a great bargain. The advisory editors were Hans Kruuk (Centre for Ecology and Hydrology, Banchory, UK), Richard Connor (University of Massachusetts, Dartmouth, USA), John Harwood (Gatty Marine Laboratory, University of St. Andrew's, UK), Guy Cowlishaw (Institute of Zoology, London, UK), John du Toit (Mammal Research Institute, University of Pretoria, South Africa), Jerry O. Wolff (University of Memphis, Tennessee, USA), Christopher R. Dickman (University of Sydney, Australia) and Gareth Jones (University of Bristol, Bristol, UK). The artwork is by Priscilla Barrett, Denys Ovenden, Malcolm McGregor, Michael R. Long and Graham Allen. The primates are given worthy entries as follows: Primates – G. Cowlishaw & T. H. Clutton-Brock, pp.290–301; Why primates have big brains: The role of neocortex size in social interactions – R. I. M. Dunbar, p.302; Seeing in color: The evolution of trichromatic color vision – Gerald H. Jacobs, pp.304–305; Grooming and family life: Exchanging services among female monkeys – L. Barrett & P. Henzi, pp.306-307; Strepsirhines – P. Honess pp.308–309; Lemur diversity – P. Kappeler, p.309; Typical lemurs – P. Kappeler, pp.310–313; The bygone wealth of Malagasy lemurs – J. I. Pollock, p.313; Typical lemur species – R. D. Martin & P. Kappeler, p.313; Sportive lemurs – P. Kappeler, pp.314–315; Dwarf and mouse lemurs – P. Kappeler, pp.318; Dwarf and mouse lemur species – R. D. Martin & P. Kappeler, p.318; Lemur dialects – Elka Zimmermann, p.319; Indri, sifakas, and woolly lemurs – P. Kappeler, pp.320–321; Aye-aye – P. Kappeler, pp.322–323; Bush babies, lorises and pottos – P. Honess, pp.324–327; Bush baby, loris and potto species – P. Honess, pp.328–329; Monkeys and tarsiers - G. Cowlishaw & T. H. Clutton-Brock, pp.330–331; Tarsiers – C. Niemitz, pp.332–333; Marmosets and tamarins – A. B. Rylands, pp.334–338, Marmoset and tamarin species – A. B. Rylands, pp.339–341; On the brink of extinction: Saving the lion tamarins of Brazil – D. G. Kleiman & R.

A. Mittermeier, pp.342–343; Capuchin-like monkeys – C. H. Janson, pp.344–349; Monkeys in the moonlight – P. C. Wright, p.349; Capuchin-like monkey species – C. H. Janson, pp.350–353; Leafeaters of the New World: Diet and energy conservation in howler monkeys – K. Milton, pp.354–355; Guenons, macaques, and baboons – R. I. M. Dunbar & T. E. Rowell, pp.356–359, 362–365, 368–371; Friendships between the sexes: Forming enduring relationships in an olive baboon troop – B. Smuts, pp.360–361; Just like us? The limits of the human-monkey analogy – R. Seyfarth & D. Cheney, pp.366–367; Guenon, macaque, and baboon species - R. I. M. Dunbar & T. E. Rowell, pp.374–375; A male-dominated society: The Hamadryas baboons of Cone Rock, Ethiopia – H. Kummer, pp.376–377; Monkeys in the snow – X. Domingo-Roura, pp.378–379; Colobus and leaf monkeys - D. Brandon-Jones, pp.380–387; China's endangered monkeys – F. E. Poirier, p.387; Colobus and leaf monkey species – D. Brandon-Jones, pp.388–391; Why primates kill their young: Incidences of infanticide in monkey and ape species – R. Palombit, pp.392–393; Fruitful cooperation: Interspecies associations in an African forest – R. Noë & R. Bshary, pp.394-395; Apes – R. D. Martin, pp.396–397; Gibbons – D. J. Chivers, pp.398-403; Defense by singing: Great calls and song bouts of the gibbons – G. Cowlishaw, pp.404–405; Chimpanzees – D. Watts & R. W. Wrangham, pp.406–412; Tool use - D. Watts & R. W. Wrangham, p.411; The bushmeat trade: Taking mammals to the marketplace – J. E. Fa, p.413; Gorillas – A. H. Harcourt, pp.414–419; Orangutans – C. P. van Schaik & J. MacKinnon, pp.420–423; Last chance for the orang, pp.424-426. *Available from*: Direct Sales Department, Oxford University Press, Saxon Way West, Corby, Northamptonshire NN18 9ES, UK. By e-mail: <book.orders@oup.co.uk>. Website: <www.oup.co.uk>.

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Meetings

II Simpósio de Ecologia Comportamental e de Interações, I Workshop - A Ecologia de Interações no Centro-Oeste do Brasil, 5-6 de julho de 2002. Instituto de Biologia Universidade Fereral de Uberlândia. Contato: II Simpósio de Ecologia Comportamental e Interações.A/C Prof. Dr. Kleber Del Claro, Instituto de Biologia, Universidade Federal de Uberlândia - UFU, Caixa Postal 593, 38400-902 Uberlândia, Minas Gerais, Brasil. Web site: <http://seci.intersimple.com/>.

16th Annual Meeting of the Society for Conservation Biology, 14-18 July, 2002, Canterbury, England at the University of Kent's campus. The theme of this meeting will be "People and Conservation" and will be co-hosted by the Durrell Institute of Conservation and Ecology (DICE), based in the Department of Anthropology at the University, and the British Ecological Society. For more information contact: Nigel Leader-Williams, SCB2002

Program Chair, e-mail: <scb2002@ukc.ac.uk> or Andrew Pullin, BES, e-mail: <a.s.pullin@bham.ac.uk>. Web site: <www.ukc.ac.uk/anthropology/dice/scb2002/>.

American Veterinary Society of Animal Behavior, 15 July, 2002, Nashville, Tennessee, USA. This meeting will be held in conjunction with the annual meeting of the American Veterinary Medical Association. The meeting format will include presentations, question and answer sessions and a poster session. Deadline for submitting abstracts is December 1, 2001. Authors will be notified by January 15, 2002. For more information contact: Dr. Margaret Duxbury, 1299 South Shore Drive Amery, WI 54001. Tel: (715) 268-9900, Fax: (715) 268-2691, e-mail: <mduxburyl@yahoo.com>.

Ecological Society of America 87th Annual Meeting joint with the Ecological Society of Mexico, 4-8 August, 2002. Arizona, USA. Details from: ESA, 1707 H St., NW, Suite 400, Washington, DC 20006, USA, Tel: + (202) 833 8773, Fax: +(202)833 8775, e-mail: <esahq@eas.org>

XIXth Congress of the International Primatological Society, 4-9 August 2002, Beijing, China. Organized by the Mammalogical Society of China and the Institute of Zoology, Chinese Academy of Sciences. The venue will be the Beijing International Convention Center, No. 8 Beichen Dong Road, Beijing 100101, China (website <www.bicccom.cn>). The theme of the Congress is "Caring for Primates", focusing on the progress and prospects of primatology and the conservation of non-human-primates. Deadline for symposium and workshop titles: 31 August, 2001. Deadline for submitting abstracts is the 31 March, 2002. On-Line registration will be available after 1 December, 2001. *Contact address*: Prof. Fuwen Wei, Secretary General, 19th Congress of the International Primatological Society, c/o Institute of Zoology. Chinese Academy of Sciences, 19 Zhongguancan Lu, Haidian, Beijing 100080, China, Fax: (86-10) 82627388, e-mail: <IPS_Beijing@panda.ioz.ac.cn>. Home page: <http://www.ips.ioz.ac.cn>.

Annual Meetings of the IUCN/SSC Conservation Breeding Specialists Group (CBSG) 10-13 August, 2002, **The World Zoo Organization** (WZO), 13-17 August 2002, and **The International Association of Zoo Educators (IZE)**, 17-22 August, 2002, Hofburg Palace, Redoutensäle, Vienna. Hosted by the Schoenbrunn Zoo. For more information: Austropa Interconvention, Conference Office, Friedrichstrasse 7, A-1010 Vienna, Austria, Fax: +43 1 315 56 50, e-mail: <austropa.congress@verkehrsbuero.at>.

The International Association of Zoo Educators, 17-22 August, 2002, Redoutensale, Vienna. Hosted by the Schoenbrunn Zoo. For more information contact: Austropa Intercovention, Conference Office, Friedrichstrasse 7, A-1010 Vienna, Austria. Fax: +(43) 1-315-56-50, e-mail: <austra.congress@verkehrsbuero.at>.

The American Zoo and Aquarium Association (AZA) Annual Conference, 10-14 September 2002, Fort Worth Zoological Park, Fort Worth, Texas. The conference program is geared toward the many disciplines in the zoological profession - directors, animal curators, keepers, society members, scientists, gift shop merchandisers and practitioners in public relations, development, education and government affairs will all find something of interest. Most of the AZA committees and special interests groups meet in conjunction with the Annual Conference. For more information: <http://www.aza.org/ConfWork/>.

19th Annual Conference of the European Association of Zoos and Aquaria (EAZA), 17-22 September 2002. Hosted by Barcelona Zoo, Spain. The European Taxon Advisory Group (TAG) Chairs will meet on 17 September, 2002. The main theme of the Conference will be Central and South America, with emphasis on their current fundraising and awareness campaign – the Atlantic forest of Brazil, Argentina and Paraguay. *Registration and accommodation*: The deadline for early registration to the Conference is 30 June 2002. The registration and hotel booking forms can be downloaded from the Resource Centre in the Member Area of the website (below). Alternatively they can be obtained on request from the EAZA Executive Office: <info@eaza.net>. Accommodation has been reserved in eight different hotels and three economically priced student residences. As Barcelona is a popular tourist destination, hotel booking before 30 June 2002 is necessary. Residences should be booked before 14 April 2002. The meetings will be held in the Pompeu Fabra University, next to Barcelona Zoo. Website: <http://www.eaza.net/index.html>.

III Congresso Brasileiro de Unidades de Conservação, 22-26 de setembro de 2002, Centro de Convenções Edson Queiroz, Fortaleza, Ceará. Realização; Rede Nacional Pró-Unidades de Conservação, Fundação O Boticário de Proteção à Natureza e Associação Caatinga. Patrocínio: The Nature Conservancy. O evento está organizado de maneira a permitir a apresentação e discussão de grandes temas do manejo de unidades de conservação através de conferências, palestras e das sessões paralelas: seminários e apresentação de trabalhos técnicos-científicos. Informações sobre Inscrições: Rowam Eventos, Telefax: 0** (41) 342-9078, e-mail: <3cbuc@brturbo.com>.

VIII Congreso Latinoamericano y II Congreso Colombiano de Botánica, 13-18 de octubre de 2002, Cartagena de Indias, Colombia. "Nuestros conocimientos al servicio de la sociedad". Informes: Enrique Forero, e-mail: <eforero@ciencias.unal.edu.co>, o <congrbot@ciencias.unal.edu.co>. Website: <http://www.icn.unal.edu.co/eventos/congrbot/>.

Colloque 2002 Société Francophone de Primatologie, 23-25 October, 2002, Doué-la-Fontaine. This 14th annual meeting of the Francophone Primate Society has the theme of "Reproduction of Primates", but also regular sessions

on paleontology, anthropology, conservation, medical research, ethology and ecology, as well as a round table on animal ethics. For more information visit the web site: <http://www.tourisme.fr/office-de-tourisme/doue-la-fontaine.htm>. For further information on the society visit: <www.sfdp.u-strasbg.fr>.

Xº. Congresso Brasileiro de Primatologia, 10-15 November 2002, Universidade Federal do Pará, Belem. Hosted by the Sociedade Brasileira de Primatologia (SBPr). For more information: Stephen Ferrari, Departamento de Psicologia, Universidade Federal do Pará, Campus do Guamá, Caixa Postal 8607, 66075-150 Belém, Pará, Brazil, e-mail: <ferrari@ufpa.br>. Note: On 8th July 2002, the organizing commission informed that the Congress had been moved forward to November from the previously announced dates of 25-30 August, 2002.

Foro de Primatologia 2002 - Estación de Biología "Los Tuxtlas," 21-22 de noviembre, 2002, Instituto de Biología "Los Tuxtlas", Universidad Nacional Autónoma de México. El objeto de esta reunión es actualizar e intercambiar información acerca de investigaciones en curso con primates nativos (*Alouatta palliata*, *A. pigra* y *Ateles geoffroyi*) en el sureste de México y revisar los problemas de conservación de las poblaciones. Esto permitirá determinar cual es el estado de conocimiento acerca de la distribución actual de las poblaciones y su estado de conservación, así como conocer los tipos de investigaciones básicas y aplicadas que se llevan a cabo actualmente con primates silvestres en el sur de México. Tres áreas son de interés específico: *Poblacion y ecologia* - reconocimientos demográficos relaciones primate-planta: recursos alimenticios, dispersión de semillas, otros; *Conducta* - ecología del comportamiento, conducta social; y *Conservación* - distribución actual de las especies, estado de conservación de las poblaciones, impacto demográfico de la fragmentación del hábitat, destrucción y fragmentación del hábitat, cacería y tráfico, proyectos de conservación. Se desea participar, comunicarse al correo <foro@primatesmx.com> ó al fax + (294) 942-4668. Indicar si participación es como asistente o como presentación de trabajo. Si es lo segundo, enviar resúmen (max 250 palabras) antes del 5 de Noviembre, indicando si se trata de presentación oral o tipo cartel. Número de asistentes al foro será limitado, por lo que se sugiere comunicar su participación con suficiente anticipación. Los participantes serán hospedados en las instalaciones de la Estación de Biología Los Tuxtlas. A los asistentes cuyos trabajos sean aprobados para presentación se les cubrirán gastos de estancia y alimentación en la Estación Los Tuxtlas del IB-UNAM.

Primate Society of Great Britain (PSGB) Winter Meeting 2002, 29 November, 2002, Zoological Society of London, Regent's Park, London, UK. The theme is "Primate Evolution and Adaptation". For information: Dr Sarah Elton, Department of Anthropology, University of Kent at Canterbury, Canterbury CT 2 7NS, Kent, UK, Tel: +44 (0)1227 823232, Fax: +44 (0)1227 827289, e-mail: <s.e.elton@ukc.ac.uk>.

Dynamics and Conservation of Genetic Diversity in Forest Ecosystems, 2-5 December, 2002, Strasbourg, France. The conference will be divided into two main parts: Part A, processes and mechanisms promoting genetic diversity in forest ecosystems and Part B, implementations in conservation strategies. Speakers will be presenting information on forest trees and other short generation species. A webpage for the conference is available at: <http://www.pierroton.inra.fr/genetics/Dygen/>. For further information contact: DYGEN conference secretariat, Dr. Marie-Pierre Reviron, INRA , BP 45, 33610 Cestas, France, Tel: +33 5 57 12 28 32, Fax: +33 5 57 12 28 81, e-mail: <reviron@pierroton.inra.fr>.

XXIth Annual Conference of the Australasian Primate Society, 6-8 December, 2002, Melbourne Zoo, Melbourne, Australia. Organizers are Amanda Embury (Royal Melbourne Zoological Gardens) and Debbie Williams (CSL). For more details and to download a registration form, please visit <www.primates.on.net>, or contact: Amanda Embury, APS Conference Organizer, c/o Melbourne Zoo. Australia, e-mail: <aembury@zoo.org.au>.

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

VI Congreso Internacional en Gestión de Recursos Naturales, 20 el 24 de enero de 2003, Hotel Villa del Rio, Valdivia, Chile. Este evento esta siendo organizado por el Centro de Estudios Agrarios & Ambientales (CEA) y cuenta con el auspício de importantes organizaciones nacionales e internacionales. Este VI Congreso esta estructurado en simposios: VIII Simposio de Manejo de Vida Silvestre y Conservación de la Biodiversidad, VI Simposio Iberoamericano de Educación y Comunicación Ambiental y VI Simposio de Desarrollo Sustentable, I Simposio de Humedales y Recursos Hidricos y I Simposio de Sistemas de Información Geográficos en la Gestión de Recursos Naturales. Toda la información relacionada con objetivos, programa, estadia, inscripciones, auspicios etc., esta en Internet en la dirección: http://www.ceachile.cl/congresoVI.html>. Claudia Gil Cordero, Comite Organizador VI CIGRN, Casilla 164, Valdivia. Chile, Tel: 56-63-215846, Fax: 56-63-299065, e-mail: <congreso@ceachile.cl> o <cea@ceachile.cl>. Visite nuestra pagina institucional en <www.ceachile.cl>.