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Articles

MITOCHONDRIAL DNA SEQUENCES AND THE TAXONOMIC STATUS OF *ALOUATTA SENICULUS* POPULATIONS IN NORTHEASTERN AMAZONIA

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Introduction

Red howlers (*Alouatta seniculus*) are found throughout most of the Amazon basin north of the Amazon and west of the Rios Madeira and Aripuanã, north as far as southern Panama. They occur in many types of habitat, ranging from rain forest to scrub and savanna woodland (Hill, 1962; Crockett and Eisenberg, 1987; Pope, 1992; Ferrari *et al.*, 1996). This widespread distribution and ecological flexibility is typical of a colonizing or pioneer species (Eisenberg, 1981; Crockett and Eisenberg, 1987).

The last taxonomic revision of *Alouatta seniculus* was that of Hill (1962), whose classification included nine subspecies (Fig. 1). It is still widely accepted, although recent genetic and morphological studies have begun to question its validity. In general, these studies have indicated that *Alouatta seniculus* is a complex species group rather than a single species, and that a number of Hill's subspecies are in fact true species (e.g., Minezawa *et al.*, 1985; Groves, 1993; Bonvicino *et al.*, 1995; Stanyon *et al.*, 1995).

Hill (1962) identified the red howler populations occurring between the Atlantic Ocean, to the east, and the Rios Branco and Negro, to the west, as possibly belonging to a single subspecies, *Alouatta seniculus macconnelli* Elliot, 1910; type locality - the Guyana coast. According to Hill (1962), *A. s. macconnelli* is distinguished from the other *A. seniculus* subspecies by the uniform coloration of the dorsal parts of pelage, and its orange-red underparts (Hill, 1962). He doubted, however, that it is separable from the form to the west of the Rios Negro and Branco, *A. s. stramineus* (Humboldt, 1812). Cruz Lima (1945), Cabrera (1957) and Husson (1978) all regarded *A. s. macconnelli* to be a junior synonym of *A. s. stramineus*. However, based on their cytogenetic research, Lima *et al.* (1990) argued that the red howler from the east of the Rio Trombetas was a distinct form, and attributed to *A. s. macconnelli* by Lima and Seuánez (1991). Bonvicino *et al.* (1995) identified two distinct howler species separated by the Rio Trombetas, which they referred to as *Alouatta macconnelli* (to the east) and *Alouatta straminea* (to the west), on the basis of a multivariate analysis of cranial traits. Conversely, cytogenetic and biochemical studies of these populations have also indicated that they are relatively homogeneous, consistent with the hypothesis that they belong to a single species (Sampaio *et al.*, 1996).

In recent years, mitochondrial DNA sequencing has been used extensively in phylogenetic studies of closely-related species (in the case of New World monkeys, for example: Ashley and Vaughn, 1995; Peres *et al.*, 1996; Tagliaro *et al.*, 1997). In this paper, we use sequences of the mitochondrial cytochrome oxidase subunit II (COII) gene to assess phylogenetic and taxonomic relationships among populations of red howlers from the Rios Uatumã, Trombetas and Jarí, encompassing the geographic distribution of the two species proposed by Bonvicino *et al.* (1995). We chose the COII gene sequences because, as noted in a number of publications on primates (for example, Ruvolo *et al.*, 1993; Ashley and Vaughn, 1995),

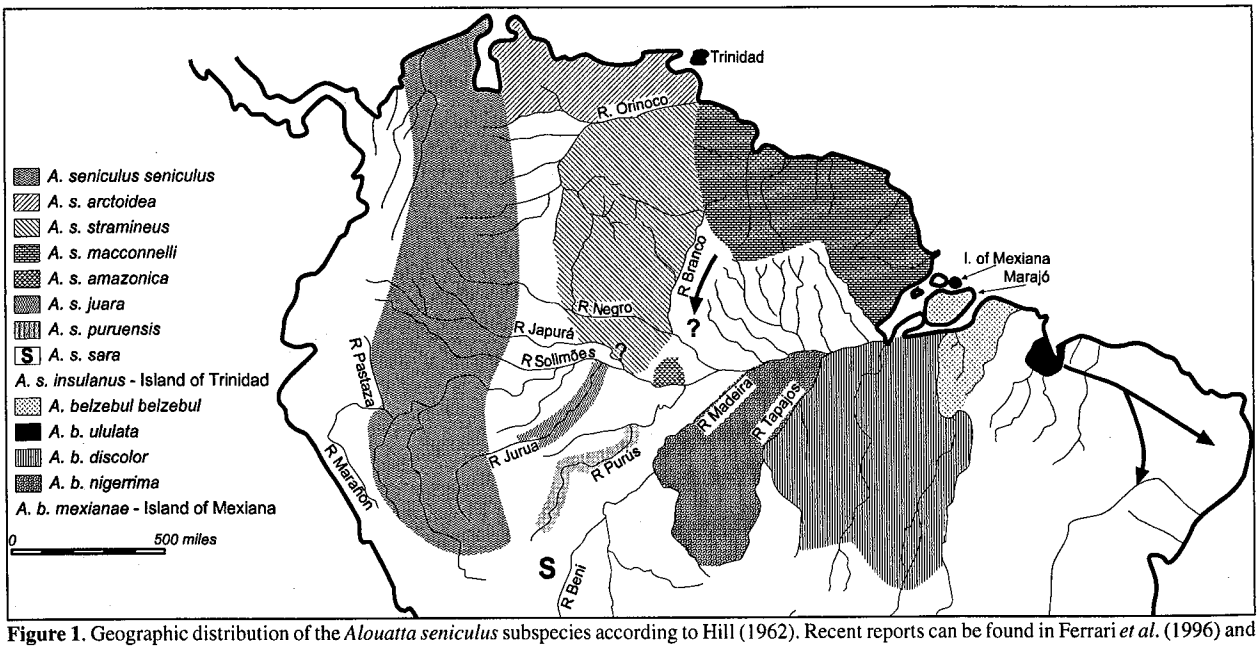

Figure 1. Geographic distribution of the *Alouatta seniculus* subspecies according to Hill (1962). Recent reports can be found in Ferrari *et al.* (1996) and Fernandes *et al.* (1995).

Cover photograph by Marc G. M. van Roosmalen: The black-crowned dwarf marmoset, *Callithrix humilis*.

Table 1: Code and collecting localities of the specimens used in the present study.

Code	Taxon	Origin
Ase JMR1	*Alouatta seniculus*	Rio Jari, Right Bank
Ase JMR2	*Alouatta seniculus*	Rio Jari, Right Bank
Ase JML1	*Alouatta seniculus*	Rio Jari, Left Bank
Ase UMR1	*Alouatta seniculus*	Rio Uatumã, Right Bank
Ase UMR2	*Alouatta seniculus*	Rio Uatumã, Right Bank
Ase UML1	*Alouatta seniculus*	Rio Uatumã, Left Bank
Ase UML2	*Alouatta seniculus*	Rio Uatumã, Left Bank
Ase UML3	*Alouatta seniculus*	Rio Uatumã, Left Bank
Ase TML1	*Alouatta seniculus*	Rio Trombetas, Left Bank
Ase TMR1	*Alouatta seniculus*	Rio Trombetas, Right Bank
Ase TMR2	*Alouatta seniculus*	Rio Trombetas, Right Bank
A. paniscus 1	*Ateles paniscus*	Rio Trombetas, Right Bank
A. paniscus 2	*Ateles paniscus*	Rio Trombetas, Right Bank

their marked variability makes them appropriate for phylogenetic studies at the specific level.

Materials and Methods

Laboratory Procedures

Blood samples were obtained from howling monkeys captured on both banks of the Rios Uatumã, Trombetas and Jari, northern tributaries of the Rio Amazonas (see Table 1), and from two spider monkeys (*Ateles paniscus*). DNA was extracted following the protocol suggested by Sambrook *et al.* (1989).

COII genes from the mtDNA of these samples were amplified using PCR (Polymerase Chain Reaction). Oligonucleotide primers were designed based on the published COII sequence of *Alouatta palliata* (Adkins and Honeycutt, 1994): primer 1, 5'C C A G C C C A A C T A G G C T T A 3', and primer 2, 5'G G C T C A T A C T T C A A A G T C T T G G 3'. The samples were subjected to 30 cycles of amplification, under the following conditions: denaturation - 94°C, 1 min; annealing -50°C, 45 sec.; extension - 72°C, 1 min., 30 sec.; final extension - 72°C, 10 min. The amplified DNA fragments were purified, cloned in p-GEM T vectors and competent cells, and single stranded DNA was obtained through infection with Helper Phage. The sequencing reactions were carried out using the dideoxy chain termination method (Sanger *et al.*, 1977).

Sequence Analysis

The sequences were aligned in relation to that published by Adkins and Honeycutt (1994) for *Alouatta palliata*, using the XESEE sequence editor (Cabot and Beckenbach, 1989). Pairwise divergence values were estimated by Kimura's 2 parameter method (Kimura, 1980) and used to compute a phylogenetic tree by the neighbor-joining method (Saitou and Nei, 1987) using the *Ateles paniscus* sequences as the outgroup. The most parsimonious tree was estimated using the DNAPARS program of Felsenstein's (1993) PHYLIP package. Bootstrap analyses of the topologies produced by these methods were conducted in order to evaluate their consistency, and "strength of grouping" values (the minimum number of additional substitutions required to break up the group defined by each node) were obtained with the SOG program (J. Czelusniak, pers. comm.).

Results

Data Analysis

The COII nucleotide sequences are deposited at the GENBANK database under the accession numbers AF054291-AF54302. One hundred and fifteen of the 620 base pairs examined were variable, and eighty-six of these were informative for parsimony analysis. Sequence variation is very low between the *A. seniculus* samples, although only two samples - Ase UMR1 and Ase UML2 - were identical. Of the eighteen variable sites in this species, thirteeen were apomorphic mutations, leaving only five informative sites. Pairwise comparisons between red howler samples revealed similar differences between haplotypes to those found in the same gene in humans. The maximum number of nucleotide substitutions in the *A. seniculus* sequences is six, the same number found in human COII sequences (Ruvolo *et al.*, 1993).

Phylogenetic Reconstruction

Genetic distances between the *A. seniculus* samples are very low, ranging from zero to 1.15%. Distances between populations are similar to those observed within populations, and some individuals from different localities are less divergent than some individuals from the same population. Genetic distances between *A. seniculus* and *A. palliata* range from 7.94% to 8.38%, while those between

Table 2: Estimated percentage of nucleotide divergence among pairwise COII sequences.

		1	2	3	4	5	6	7	8	9	10	11	12
1	*A. palliata*	-											
2	*Ase* JML1	8.38	-										
3	*Ase* JMR1	8.17	**0.49**	-									
4	*Ase* JML2	8.35	**0.65**	**0.49**	-								
5	*Ase* UMR1	7.98	**0.65**	**0.49**	**0.65**	-							
6	*Ase* UMR2	8.17	**0.82**	**0.65**	**0.81**	**0.16**	-						
7	*Ase* UML1	8.18	**0.49**	**0.33**	**0.49**	**0.49**	**0.65**	-					
8	*Ase* UML3	8.18	**0.82**	**0.98**	**1.15**	**0.49**	**0.65**	**0.98**	-				
9	*Ase* TML1	8.20	**1.15**	**0.98**	**1.15**	**0.82**	**0.98**	**0.98**	**0.98**	-			
10	*Ase* TML2	7.94	**1.07**	**0.89**	**1.07**	**0.71**	**0.89**	**0.89**	**1.07**	**0.71**	-		
11	*Ase* TMR1	8.35	**0.65**	**0.49**	**0.65**	**0.65**	**0.81**	**0.49**	**1.15**	**1.15**	**1.07**	-	
12	*A. paniscus* 1	14.19	16.68	16.39	16.61	15.74	15.96	16.20	15.99	16.46	16.37	16.61	-
13	*A. paniscus* 2	14.03	16.30	16.02	16.24	15.37	15.58	15.83	15.83	16.30	16.10	16.24	0.16

Note. Divergence values were corrected for multiple hits by the method of Kimura (1980). The pairwise comparisons among *A. seniculus* sequences are highlighted in bold.

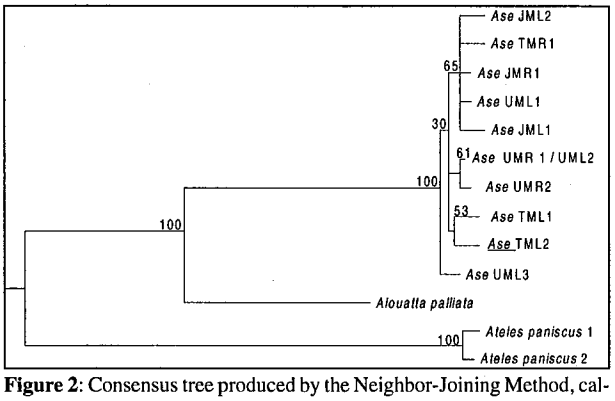

Figure 2: Consensus tree produced by the Neighbor-Joining Method, calculated with the distances corrected with the algorithm of Kimura (1980). Numbers refer to bootstrap values from 500 replications. Branch lengths are proportional to evolutionary distances between taxa.

howlers and spider monkeys are of the order of 15% (Table 2).

The tree constructed using the neighbor-joining (NJ) method (Fig. 2), grouped all *A. seniculus* samples in a single branch, separated significantly from both *Alouatta palliata* and the outgroup (*Ateles paniscus*). The topology of this branch is not coherent with the geographic distribution of the different samples, however. The bootstrap values at the node separating *Ateles* from the *Alouatta* samples, and the node separating *Alouatta palliata* from the red howlers are highly significant (100%), but all the relationships between different *Alouatta seniculus* samples are only weakly supported.

The parsimony analysis produced three most-parsimonious trees, 125 steps long (consistency index: 0.976). Figure 3 presents the 50%-majority consensus among these trees. The results obtained with the maximum parsimony (MP) method are similar to those found with NJ, with the same basic topology and similar confidence values, and with regard to the relationships of *Alouatta palliata* and *Ateles paniscus*, and the relationhsips between these and the *Alouatta seniculus* sequences. The number of substitutions needed to break up the Alouattini clade is 53 and

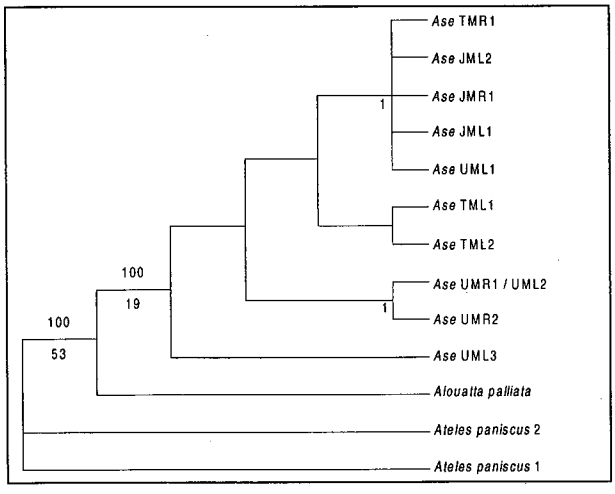

Figure 3: Fifty percent majority-rule maximum parsimony consensus tree. Numbers above branches represent bootstrap values from 500 replications. Numbers below branches are SOG values, the number of additional steps before a particular group collapses.

the grouping formed by the red howler clade is 19. However, the consensus topology supports only two groupings in the *Alouatta seniculus* clade: that between Ase UMR1/ UML2 and Ase UMR2 (supported by a single mutation), and a polytomic clade composed of the three specimens from Jari, one from Uatumã and one from Trombetas. Indeed, no synapomorphies are restricted to a single population and therefore cannot be used as genetic markers for phylogenetic distinction.

Discussion

The data presented here reveal a strong genetic homogeneity among the populations. The low number of nucleotide differences, phylogenetic continuity (tree topology), and the complete absence of any geographic partitioning of the sequences are interpreted as lending further support to the classification of the populations as belonging to a single species. According to Avise *et al.* (1987), geographic populations which exhibit the levels of sequence variability found here have had relatively extensive and recent historical interconnections through gene flow. Interestingly, the pattern of variability observed is typical of species that are both able to cross zoogeographic barriers and disperse widely (Avise *et al.*, 1987; Avise, 1994). *Alouatta seniculus* is not only one of the ecologically most flexible of Amazonian primates (Eisenberg, 1981; Crockett and Eisenberg, 1987), but is also able to disperse across major rivers, in marked contrast with most other taxa (Ayres and Clutton-Brock, 1992; Fernandes *et al.*, 1995).

Biochemical and Karyological Data

The populations analyzed here were included in the protein electrophoresis study of Sampaio *et al.* (1996). The study revealed that *A. seniculus* exhibits the highest degree of genetic variability of any neotropical primate, with an average heterozygosity (*H*) of 10%. A similar degree of heterozygosity (H = 9.9%) was encountered in *A. seniculus* populations from Venezuela (Pope, 1992). The genetic variability detected in the three populations studied here was nevertheless fairly homogeneous, and genetic distances were very similar, ranging from zero to 0.2% (Sampaio *et al.*, 1996).

The karyological data also corroborate the close similarity of these populations. *A. seniculus* from Uatumã and Jari have the same diploid number (47, 48, 49), and share similar sex chromosome structure ($X_1X_2Y_1Y_2/X_1X_1X_2X_2$). The Uatumã population, however, presents a reciprocal homozygote translocation between chromosomes 2 and 20 (Lima *et al.*, 1990; Lima and Seuánez, 1991). This chromosome translocation was interpreted by Bonvicino *et al.* (1995) to support the classification of these populations as distinct species. Interestingly, recent cytogenetic data from howler monkey specimens living on both banks of the Rio Trombetas reveal that these two populations show the same cytotypes as those found on the Uatumã (M. Lima, unpublished data). From the cytogenetic viewpoint, then, the Rio Trombetas is not a significant zoogeographic barrier for these red howler populations, as

proposed by Bonvicino *et al.* (1995).

The sum of the evidence strongly supports the existence of only a single species within the geographic area considered here. The homogeneity of the biochemical data clearly indicates continuous gene flow between the populations studied. While the chromosome translocations found in the Uatumã and Trombetas populations may constitute a reproductive barrier, further studies would be required to confirm this. Our mtDNA data are unable to discriminate these populations at any level, and indicate that any divergence between them occurred very recently. Further studies will be required in order to assess the taxonomic significance of the morphological and cytogenetic variations encountered in this area, interpreted as clinal variation by R. Gregorin (pers. comm.), on the basis of cranial measurements and pelage coloration.

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The Evolutionary History of Platyrrhines: Old Controversies and New Interpretations

Marcelo F. Tejedor

The living New World monkeys, Infraorder Platyrrhini, are represented by sixteen genera in subfamilies and families which even today are disputed (Cabrera, 1958; Hershkovitz, 1977; Rosenberger, 1981; Thorington and Anderson, 1984; Ford, 1986; Schneider *et al.*, 1995; Tejedor, 1996a). Their interrelationships have been the subject of considerable debate mainly because of the morphological diversity and the scarcity and fragmentary nature of the fossil record, that should otherwise contribute to constructing phylogenies. However, in recent years, new fossil discoveries and intensive studies of the existing evidence has led to considerable advances in our understanding of the platyrrhine radiation. South American fossil platyrrhines are known from several localities of the late Oligocene through Recent, at sites in Argentina, Bolivia, Chile, Colombia, Brazil, Cuba, Jamaica and Hispaniola. There are considerable gaps in the record between the middle Miocene (Colloncuran Land Mammal Age - LMA) and late Miocene (Huayquerian LMA), but subsequently the absence of fossil platyrrhines is notable until the Pleistocene of Brazil and the Caribbean islands. Although we now know more about the diversity of platyrrhines in the past, the record still consists of a limited number of specimens representing more than 20 extinct genera during the last 26 million years. Table 1 shows the temporal and geographic relationships between the known fossil species as well as the available sources.

The phyletic and geographic sources of platyrrhines are still a matter of speculation, but the oldest "pre-catarrhine" and "pre-platyrrhine" anthropoids are known from Africa and Asia. Therefore, platyrrhines, as anthropoids, should find their ancestral stock in Africa or Asia based on the current evidence. Dental evidence from these potential ancestors strongly favor the morphology found in the Santacrucian genera *Carlocebus* and *Homunculus* and in the living *Callicebus* as closest to the ancestral morphotype for the infraorder, for several reasons exposed elsewhere (Hartwig, 1993; Tejedor, 1997). Controversy persists because the oldest South American records, *Szalatavus* and *Branisella,* came from Bolivia and differ considerably from *Callicebus, Homunculus* and *Carlocebus,* being probably ancient representatives of the Callitrichinae (see Takai and Anaya, 1996). On other other hand, the subsequent *Chilecebus*, from the Chilean Andes (late Deseadan-Colhuehuapian LMA), shows several primitive characters not easily comparable to other fossil forms. Of course, this means that the earliest platyrrhines should have been considerably younger than the oldest Deseadan records of 26 Ma (million years ago) in Bolivia (Kay *et al.*, 1995). The absence of significant derived characters as compelling evidence for assessing early platyrrhine relationships is another unresolved problem. The similarities between *Callicebus, Homunculus* and *Carlocebus* are based largely on superficial resemblances and shared primitive characters (Tejedor, 1996b) which do not justify a phylogenetic link. But these symplesiomorphies strengthen the arguments in favor of a close common origin for the three latter genera. This would not appear to be a convincing solution, but it is also unusual to find several primitive characters shared by three genera of fossil platyrrhines together.

Soriacebus is, to date, the earliest relative of the Pitheciinae (Rosenberger *et al.*, 1990, but see Kay, 1990 for an alternative view). It is possible to argue that the lower molar structure of *Soriacebus* does not characterize the living pitheciines, but the lower premolar structures of *Cebupithecia* and *Nuciruptor* also differ from that of extant pitheciines (Meldrum and Kay, 1997), even though they are undoubtedly pitheciines. In this case, it is interesting to remember that specializations of the anterior dentition in the Pitheciinae possibly preceded those of premolars and molars, being, as Kinzey (1992) suggested, an adaptive response for sclerocarpic foraging. The shared

features of the anterior dentition of *Soriacebus*, *Cebupithecia* and *Nuciruptor* are certainly homologous with those of *Pithecia*, *Chiropotes* and *Cacajao*. The fact that *Callicebus* could be closest to the living pitheciines has been proposed by Rosenberger (1981a) and was reinforced by recent molecular studies (Meldrum, 1995; Schneider *et al.*, 1995), but meaningful comparisons could probably only be made in the incisal morphology. It is possible that procumbent, high-crowned and mesiodistally compressed incisors are primitive for all platyrrhines, and the Pitheciinae has evolved further these traits, demonstrating an early divergence from the remaining clades.

It is interesting to note that there are several specimens of Colloncuran platyrrhines from Patagonia (Pardiñas, 1991; Kay and Johnson, 1996) which are still undescribed, and certainly represent a new taxon.

There is no question concerning the phylogenetic relationships between *Stirtonia* and *Alouatta*, as well as between *Saimiri, Neosaimiri* and *Laventiana*. Although Rosenberger *et al.* (1991a) suggested that *Laventiana* is generically distinct, some authors have argued that it should be allocated to *Neosaimiri* (Takai, 1994; Meldrum and Kay, 1997). Each of these points of view has the same phylogenetic implications in relating *Neosaimiri* and *Laventiana* with the living *Saimiri*. The Patagonian *Dolichocebus* shares important cranial synapomorphies also with *Saimiri* (Rosenberger, 1979). There are several reported occurrences of callitrichines in Colombia. The poorly known *Micodon*, the surprising *Lagonimico*, and more recently *Patasola* have confirmed that the Callitrichinae have been differentiated certainly since the middle Miocene (Laventan stage-age), and probably since the Deseadan of Bolivia, as mentioned above. However, *Lagonimico* is a particular case (Kay, 1994). The conclusion about the phyletic position and adaptations of *Lagonimico* does not agree with the hypothesis of "phyletic dwarfing" (Ford, 1980) proposed to explain many distinctive morphological features of the living callitrichines, especially those associated with body size reduction. *Lagonimico* was larger than *Callimico*, the largest living callitrichine, and exhibited features previously

Table 1. Temporal and geographic relationships between the described fossil species of platyrrhines. For each case, the available sources and possible affinities with extant forms is detailed.

Species	Locality	Age	Sources	Living related species
Branisella boliviana	Salla Luribay, Bolivia	Desdeadan (late Oligocene)	Holffstetter (1969) Rosenberger (1981b), Wolff (1984)	Callitrichinae?
Szalatavus attricuspis	Salla Luribay, Bolivia	Deseadan (late Oligocene)	Rosenberger *et al.* (1991b)	Callitrichinae?
Chilecebus carrascoensis	Río Las Leñas, Chile	Late Deseadan-Colhuehuapian (early Miocene)	Flynn *et al.* (1995)	?
Tremacebus harringtoni	Sacanana, Argentina	Colhuehuapian (early Miocene)	Rusconi (1935), Hershkovitz (1974)	*Aotus*
Dolichocebus gaimanensis	Gaiman, Argentina	Colhuehuapian (early Miocene) Fleagle & Bown (1983)	Bordas (1942), Kraglievich (1951),	*Saimiri*
Soriacebus ameghinorum & *Soriacebus adrianae*	Río Pinturas, Argentina	Santacrucian (early Miocene)	Fleagle *et al.* (1987), Fleagle (1990)	Pitheciinae
Carlocebus carmenensis & *Carlocebus intermedius*	Río Pinturas, Argentina	Santacrucian (early Miocene)	Fleagle (1990)	*Callicebus*
Homunculus patagonicus	Santa Cruz Formation (several localities), Argentina	Santacrucian (early Miocene) Fleagle *et al.* (1988), Tauber (1991)	Ameghino (1891, 1906),	*Callicebus*
Cebupithecia sarmientoi	La Venta, Colombia	Laventan (middle Miocene)	Stirton (1951)	Pitheciinae
Nuciruptor rubricae	La Venta, Colombia	Laventan (middle Miocene)	Meldrum & Kay (1997)	Pitheciinae
Mohanamico hershkovitzi	La Venta, Colombia	Laventan (middle Miocene)	Luchterhand *et al.* (1986)	?
Aotus dindensis	La Venta, Colombia	Laventan (middle Miocene)	Setoguchi & Rosenberger (1987)	*Aotus*
Micodon kiotensis	La Venta, Colombia	Laventan (middle Miocene)	Setoguchi & Rosenberger (1985)	Callitrichinae
Lagonimico conclucatus	La Venta, Colombia	Laventan (middle Miocene)	Kay (1994)	Callitrichinae
Patasola magdalenae	La Venta, Colombia	Laventan (middle Miocene)	Kay & Meldrum (1997)	Callitrichinae
Neosaimiri fieldsi	La Venta, Colombia	Laventan (middle Miocene)	Stirton (1951), Takai, 1994	*Saimiri*
Laventiana annectens	La Venta, Colombia	Laventan (middle Miocene)	Rosenberger *et al.* (1991[a])	*Saimiri*
Stirtonia tatacoensis & *Stirtonia victoriae*	La Venta, Colombia	Laventan (middle Miocene)	Stirton (1951), Hershkovitz (1970), Kay *et al.* (1989)	*Alouatta*
Protopithecus brasiliensis	Toca da Boa Vista, Brazil	Pleistocene	Lund (1840), Hartwig & Cartelle (1996)	*Alouatta* & Atelinae
Caipora bambuiorum	Toca da Boa Vista, Brazil	Pleistocene	Cartelle & Hartwig (1996)	Atelinae
Xenothrix macgregori	Long Mile Cave, Jamaica	Pleistocene	Williams & Koopman (1952), MacPhee & Fleagle (1991)	*Callicebus*?
Antillothrix bernensis	Cueva de Berne, Dominican Rep Caverne Sawo, Haití	Holocene	Rímoli (1977), Mac Phee *et al.* (1995)	?
Paralouatta varonai	Pinar del Río, Cuba	Pleistocene	Rivero & Arredondo (1991)	*Alouatta*
Ateles anthropomorphus	Boca del Purial, Cuba	Recent	Ameghino (1910), Arredondo & Verona (1985)	*Ateles*

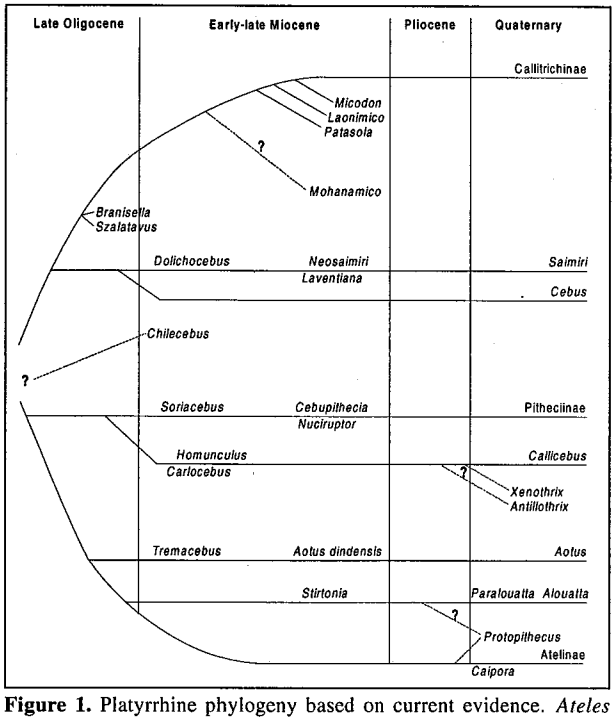

Figure 1. Platyrrhine phylogeny based on current evidence. *Ateles anthropomorphus* is not included because it could pertain to a living species of *Ateles* (see MacPhee and Rivero, 1996).

supposed to be linked with body size reduction such as hypocone loss in the upper molars. Another controversy has arisen with the discoveries of *Aotus dindensis* and *Mohanamico*. While Setoguchi and Rosenberger (1987) found resemblances between. *A. dindensis* and the living owl monkeys, Kay (1990) suggested that it should be congeneric with the previously described *Mohanamico* (Luchterhand *et al.*, 1986), considering the latter as a possible pitheciine (Meldrum and Kay [1997] considered the pitheciine status of *Mohanamico* less probable). On the contrary, Rosenberger *et al.* (1990) hold the view that *Mohanamico* could be related to *Callimico*. All these arguments imply that two extinct taxa (or only one, *sensu* Kay) could be compared with representatives of three different subfamilies: Aotinae, Callitrichinae and Pitheciinae. At present, the affinities of *Mohanamico* are uncertain, and it is convenient to maintain *Aotus dindensis* as a separate genus. Geographically and temporally distant from Colombia, the Colhuehuapian genus *Tremacebus* is also linked with *Aotus* based on shared cranial characters, especially its large orbits (Rosenberger and Fleagle, 1981).

Protopithecus and *Caipora* are larger than any living platyrrhine, being more than 20 kg. in body weight (Hartwig and Cartelle, 1996; Cartelle and Hartwig, 1996). *Caipora* is certainly a giant ateline comparable to *Ateles* and *Brachyteles*, but *Protopithecus* exhibits a mosaic of features with a skull typical of *Alouatta* and a postcranium similar to *Ateles* or *Brachyteles*. They represent the only fossil evidence for the *Ateles-Brachyteles-Lagothrix* clade. Two isolated teeth of another giant platyrrhine were found in the Rio Acre (Huayquerian, LMA), western Amazonia, but the authors found that the morphology is similar to *Cebus* (Kay and Frailey, 1993).

There are no platyrrhines in the Caribbean islands today, but in Pleistocene-Recent times some strange forms inhabited Cuba, Jamaica and Hispaniola. *Xenothrix* is at this moment perhaps the most unusual platyrrhine, without third molars but with extremely bunodont teeth and reduced incisors and canines. Proposals have been made for its affinity with the callitrichines (Williams and Koopman, 1952), *Callicebus* and *Cebus* (Rosenberger, 1977), and with *Callicebus* and the extinct *Paralouatta* and *Antillothrix* (Horovitz *et al.*, 1997). MacPhee and Fleagle (1991) described several postcranial specimens collected in the type locality of *Xenothrix* that were tentatively assigned to this genus. These specimens are morphologically distinct from all living platyrrhines and were reallocated in the monotypic Family Xenotrichidae (after Hershkovitz, 1970). *Antillothrix* (MacPhee *et al.*, 1995), formerly described as "*Saimiri*" *bernensis* by Rímoli (1977), is cladistically considered the sister taxon of *Paralouatta*, *Callicebus* being its closest living relative (MacPhee *et al.*, 1995). However, *Paralouatta* has strong cranial resemblances with the living *Alouatta* (Rivero and Arredondo, 1991). Finally, new data on the exact age of *Ateles anthropomorphus* (Ameghino, 1910; Arredondo and Varona, 1983) concluded that it was introduced in Cuba after the Spanish colonization and probably as recently as the 19th century (MacPhee and Rivero, 1996). One notable exception is an isolated talus from the lower Miocene of Cuba, the only Caribbean record of primates prior to the Pleistocene (MacPhee and Iturralde-Vinent, 1995). The biogeographic implications of the latter discovery are extremely important to explain the supposed endemism of some Caribbean platyrrhines.

As shown above, there are different views on platyrrhine phylogeny and about the phylogenetic relationships of some genera in particular. Although our knowledge of the evolutionary history of platyrrhines is based largely on fragmentary, especially dental, remains it is possible to recognize the generic differences in the majority of the above described extinct forms. Some authors may disagree considerably in their opinions, such as is the case with *Aotus dindensis* and *Mohanamico*, or some hypotheses may still be speculative, such as that of the "phyletic dwarfing" for the callitrichine lineage. An example is *Lagonimico* probably the largest callitrichine ever known, that preserves some characters believed to be associated with body size reduction in the Callitrichinae. There are some problems also in understanding the trends toward increasing body size in the Atelinae, because even though they are among the largest New World monkeys today, the finding of *Protopithecus* and *Caipora* shows that much larger atelines were alive during the Pleistocene. In this case, the size change through time was more complex than has been commonly understood. However, there is clear evidence of the early relatives of *Saimiri* (*Dolichocebus*, *Neosaimiri*, *Laventiana*), *Aotus* (*Tremacebus*, *Aotus dindensis*), *Alouatta* (*Stirtonia*, *Paralouatta*), *Callicebus* (*Homunculus*, *Carlocebus*) and pitheciines (*Soriacebus*, *Cebupithecia*, *Nuciruptor*). Interpretations for the remain-

ing extinct forms require more detailed studies. A scheme representing the living and fossil platyrrhine interrelationships is shown in Figure 1.

It would be possible to find the answers to many of the controversies if we accept a broader radiation of platyrrhines, a greater diversity in the past, and the probability that the history of the infraorder is older than we know from the current evidence. Firstly, it is necessary to reach a consensus regarding the polarity of dental characters for a better understanding of what is primitive or derived, in order to facilitate phylogenetic reconstruction. This is, of course, not only the main problem but the most complicated because of the scarcity of the fossil record. New discoveries from pre-Deseadan sedimentary deposits of South America, especially, would help to explain the complex radiation of these primates.

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Presencia de *Alouatta caraya* Fuera de Su Area de Distribución Natural

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Los monos aulladores (género *Alouatta*) poseen una extensa distribución geográfica desde el nivel del mar hasta los 3200 metros de altura, tanto en pluviselvas como en bosques semideciduos con clima estacional, en selvas de inundación y en ambientes coaccionados por el hombre (Neville, 1972; Glander, 1978; Eisenberg, 1979; Milton, 1980; Mittermeier y Van Roosmalen, 1981; Gaulin y Gaulin, 1982; Wolfheim, 1983; Piantanida *et al.*, 1984; Brown, 1984; Crockett y Eisenberg, 1987; Rumiz, 1990; Hirsch *et al.*, 1991; Redford y Eisenberg, 1992; Zunino *et al.*, 1995). En ciertas regiones de Meso y Sudamérica, *Alouatta* es el único género observado entre los primates neotropicales y en especial *A. caraya* se encuentra en el límite sur de distribución, siendo su localización más austral en Alegrete, Brasil (29°56'S; 55°59'W) (Bicca-Marques, 1990). Todos estos datos reflejarían la capacidad descrita del género a adaptarse a diversas condiciones ecológicas, aún en áreas perturbadas por el hombre (Eisenberg, 1979; Rodríguez-Luna *et al.*, 1996).

Contrastando con la situación presentada en hábitats naturales, *Alouatta* presenta problemas para adaptarse al cautiverio (Crandall, 1964; Dumond, 1967). Trabajos pioneros sobre el mantenimiento de *A. caraya* en estas condiciones dan cuenta de los cuidados que se le debe brindar, aunque no siempre se alcanza el éxito en su supervivencia y reproducción (Benton, 1976; Lindbergh, 1976; Shoemaker, 1978; 1982; Colillas, 1983). En la aclimatación de los aulladores al cautiverio, se han señalado como claves las oportunidades que se les brinde en relación a la complejidad estructural de la jaula, diversidad en la dieta y ambiente social adecuado, aspectos que posibilitan la autorregulación del animal con su ambiente y se mencionan como casos extremos de estas oportunidades, las situaciones de semi-libertad. Al respecto Lindbergh (1976) enfatiza su importancia, aún en climas templados, para la conservación *ex situ* de *A. caraya* y por otra parte menciona que los monos mantenidos en estas condiciones pueden estar mejor preparados, llegado el caso, para liberaciones en hábitat naturales que aquellos monos mantenidos en jaulas de zoológicos.

El objetivo del presente trabajo es informar sobre la presencia de *Alouatta caraya* en un bosque del noreste de la provincia de Buenos Aires, Argentina, detallando el clima, la vegetación del área e historia del grupo y aportando un nuevo caso para la discusión acerca de la adaptabilidad de *A. caraya* en condiciones ambientales extremas.

El área de estudio corresponde a un segmento de bosque de 12 ha incluido en un parque llamado Pereyra-Iraola, localizado 40 km al sur de la ciudad de Buenos Aires (34°51'S, 58°05'W) (Fig. 1). El clima de la región es templado y se sitúa dentro de los límites de la provincia fitogeográfica Pampeana, que ocupa las llanuras del este de Argentina en el rango latitudinal sur 31°-39°. Los datos climáticos que se aportan corresponden a una estación meteorológica situada aproximadamente 20 km al sur del parque (La Plata, aero, 34° 58'S; 57° 54'W). Estos indican que la temperatura media anual es de 15.9 °C, con una amplitud anual de 14.2 °C y la precipitación anual es de 1092.6 mm (Servicio Meteorológico Nacional, período 1981-1990) (Fig. 2). En especial el área citada se caracterizaría originalmente por la presencia de pastizales salpicados por isletas de tala (*Celtis spinosa*) (Cabrera, 1971). Sin embargo la vegetación original del área fue modificada a mediados del siglo XIX introduciéndose

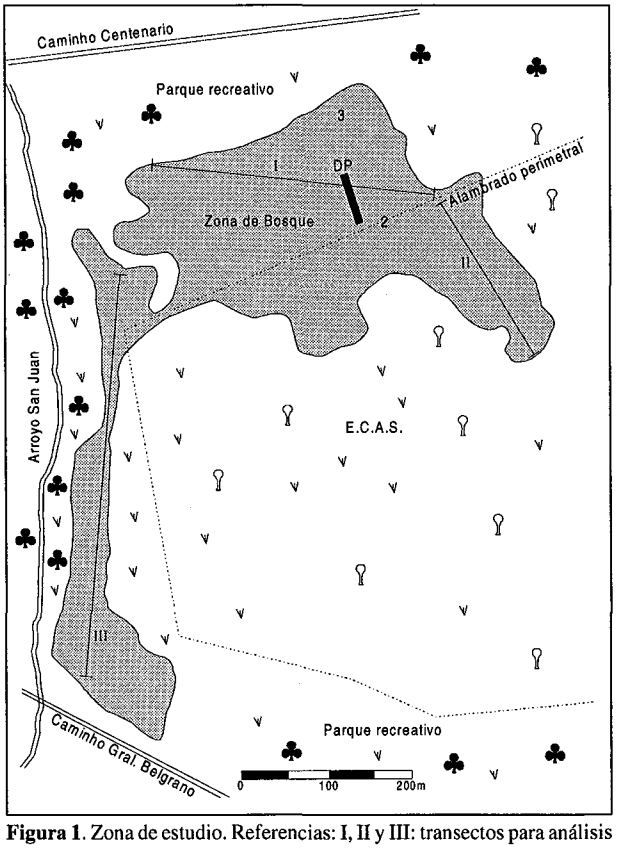

Figura 1. Zona de estudio. Referencias: I, II y III: transectos para análisis de composición florística. DP: franja tomada para representar el diagrama perfil (Figura 3). 1, 2 y 3: corresponden a sitios dentro del bosque en los cuales fueron observados los monos. ♣: árboles exóticos. ⅄ : herbáceas. ♀:*Celtis spinosa* y *Phytolacca dioica*

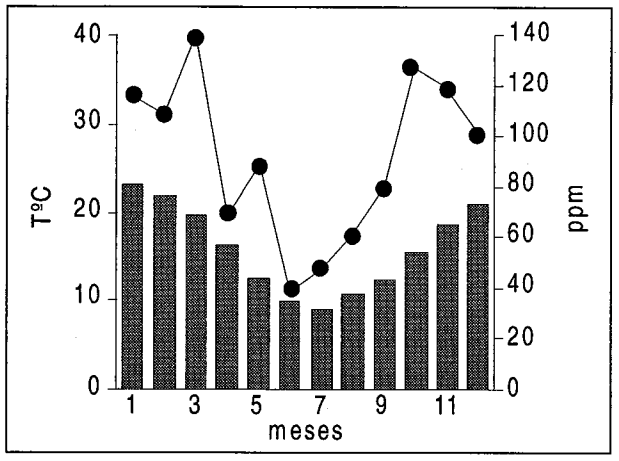

Figura 2. Climatograma correspondiente a los datos obtenidos por la estación meteorológica La Plata aero (Servicio Meteorológico Nacional, período 1981-1990). Referencias: la línea continua indica precipitación media mensual, expresado en mm y las barras indican la temperatura media mensual en grados centígrados.

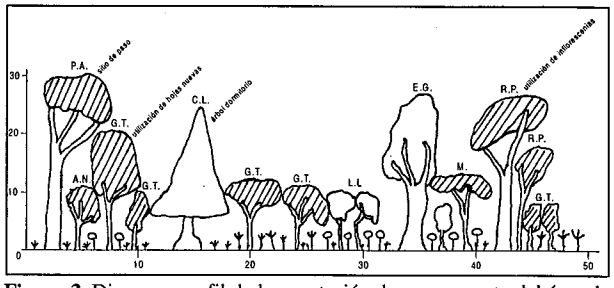

Figura 3. Diagrama perfil de la vegetación de un segmento del área de estudio donde los monos fueron avistados. El perfil corresponde a una franja de 50 x 5 m. Referencias: P.A. *Platanus acrifolia*; A. R. *Acer negundo*; G. T. *Gleditsia triacanthos*; M: *Morus* sp.; C.L. *Cupressus lusitanica*; L. L. *Ligustrus lucidum*; y R. P. *Robinia pseudo-acacia*. ⸸ Herbáceas; ʕ*Ligustrus lucidum* de menos 20 cm. DAP; ⸸ *Gleditsia triacanthos* de menos de 20 cm DAP. ⊘ Caducifolia; ○ perennifolio.

especies de árboles de distintas regiones del mundo, constituyendo así un jardín botánico privado. En la década de los 40s fue expropiado por el estado nacional y parte del mismo, incluida el área de estudio, se destinó a esparcimiento del público (Rosemberg *et al.*, 1996).

Con el objetivo de analizar los recursos potenciales de este grupo de monos, se realizó un inventario y muestreo de los árboles dentro del bosque, con la finalidad de conocer la composición florística y estructura. Para valorar la abundancia de cada especie se analizaron los transectos I, II y III. Los dos primeros dos corresponden a zonas del bosque donde alguna vez se observaron éstos monos, en cambio la tercera se trazó con la finalidad de conocer la composición florística de otro segmento del mismo, del que no se posee indicio de uso por parte de los monos (Fig. 1). Cada transecto tuvo una longitud variable en función de la extensión del segmento del bosque en el cual se trazó y cada 5 metros se registró la especie y el diámetro a la altura del pecho (DAP) de cada árbol contabilizado. Adicionalmente se elaboró un diagrama perfil que permite visualizar la estructura de un segmento del bosque en el cual se ha observado con mayor frecuencia a los monos (Fig. 3). Se registraron 21 especies de árboles y una especie de enredadera (*Lonicera* sp.). Entre los árboles, 15 (71.4 %) fueron registrados en los transectos, de los cuales sólo *Celtis spinosa* corresponde a una especie autóctona. En el transecto I la especie con mayor densidad relativa fue *Acer negundo* (50 %), en los transectos II y III fue *Gleditsia triacanthos* (Tabla 1).

En 1988 se escaparon dos ejemplares adultos de *A. caraya* (macho y hembra) desde la Estación de Cría de Animales Silvestres (ECAS) y a partir de entonces comenzaron a vivir en el bosque descrito, aledaño a dicho centro (Lescano, com. pers., Fig. 1). El primer contacto que se tuvo con la tropa para este estudio fue en octubre de 1995 siendo su composición de 4 individuos: 1 macho adulto (fundador) (Fig. 4), 2 hembras adultas (una de ellas fundadora) y una hembra juvenil. En agosto de 1996 se produjo el nacimiento de otra cría, ascendiendo el tamaño grupal a 5 ejemplares (Lescano, com. pers.). El grupo no fue seguido sistemáticamente y sólo se cuenta con observaciones eventuales sobre uso de espacio y comportamiento alimentario. Se las ha observado comer hojas nuevas y maduras de *Morus* sp. y *Gleditsia triacanthos*, frutos de *Morus alba* e inflorescencias de *Robinia pseudo-acacia*.

La información presentada complementa las referencias previas acerca de la capacidad de *A. caraya* para

Tabla 1. Análisis florístico del área de estudio. Referencias: La tabla presenta las especies, señalando la familia a la cual pertenecen, halladas en cada transecto (T1, T2 y T3) especificando su densidad relativa (Dr, número total de ejemplares de una especie presentes en el transecto dividido por el número total de especies presentes en la transecta y multiplicado por 100) y diámetro a la altura del pecho promedio expresado en cm (Dap). Para ver la localización de cada transecto remitirse a la Figura 1.

Especie	Familia	T1		T2		T3	
		Dr	Dap	Dr	Dap	Dr	Dap
Acer negundo	Aceraceae	50	65.2	2.4	148.7	11.9	113.6
Gleditsia triacanthos	Leguminosae	18.6	71.2	38.7	59.8	45.2	127.3
Ligustrum lucidum	Olacaceae	15.7	49.5	4.8	101.7	2.3	45
Morus sp.	Moraceae	7.1	55.2	0.8	60	4.8	61.5
Fraxinus americana	Olacaceae	2.9	59	28.2	85.1	2.4	150
Celtis australis	Ulmaceae	1.4	43	1.6	57	2.4	67
Cupressus lusitánica	Cupresaceae	1.4	365	1.6	167.5	4.8	115
Platanus acerifolia	Platanaceae	1.4	385	6.5	201.6	-	-
Pinus sp.	Pinaceae	1.4	133	-	-	-	-
Ulmus sp.	Ulmaceae	-	-	6.5	79.8	-	-
Eucalyptus globulus	Myrtaceae	-	-	3.2	208	9.5	260
Quercus robur	Fagaceae	-	-	2.4	185.3	-	-
Populus alba	Salicaceae	-	-	1.6	77	2.4	350
Celtis spinosa	Ulmaceae	-	-	0.8	25	14.3	64.2
Populus deltoide	Salicaceae	-	-	0.8	333	-	-
Otras especies no presentes en las transectas							
Araucaria angustifolia	Araucariaceae						
Lonicera sp.	Caprifoliaceae						
Acacia caven	Leguminosae						
Acacia melanoxylon	Leguminosae						
Robinia pseudo-acacia	Leguminosae						
Populus tremula	Salicaceae						
Salix humboldtiana	Salicaceae						

adaptarse a las más diversas condiciones ambientales, en este caso a un ambiente de clima templado con temperaturas medias mensuales en los meses invernales de junio, julio y agosto de 9.7°C, 8.9°C y 10.7°C respectivamente (Fig. 2). Las bajas temperaturas no parecen ser un factor determinante en la supervivencia de este grupo de *A. caraya,* aspecto coincidente con lo mencionado por Lindbergh (1976) en relación a una hembra adulta de esta especie que se escapó de su alojamiento en el Centro de Primatología Verlhiac, Francia, viviendo en un parque aledaño al mismo y tolerando, en perfecto estado de salud, temperaturas diurnas inferiores a 10°C y temperaturas nocturnas inferiores a 0°C. Evidentemente estas condiciones climáticas no podrían haber sido toleradas si los monos no tuvieran los recursos alimentarios adecuados para su nutrición. Por el momento no se poseen datos sobre las estructuras vegetales consumidas en todo el año y en especial en invierno, teniendo en cuenta que la mayor parte de los árboles son caducifolios. Sólo podemos hacer inferencias acerca de su dieta a partir de las fragmentarias observaciones personales, asociando a éstas, observaciones en otros primates alojados en jaulas externas en ECAS y por la información presente en trabajos sobre aulladores habitando bosques naturales y semi-naturales. Al respecto una de las especies de árboles exóticos consumidas por estos monos corresponde al género *Gleditsia,* registrado en los 3 transectos analizados. Este género está presente también el NE de Argentina con la especie *G. amorphoides* que corresponde a un componente de la dieta natural de *A. caraya,* siendo utilizadas sus hojas nuevas y maduras (Zunino, 1989) y sus inflorescencias (Giudice, obs. pers.). Otro género presente en el área de distribución natural es *Celtis* (*C. pubescens* y *C. spinosa*), del cual los monos usan hojas nuevas, hojas maduras, inflorescencias y frutos (Zunino, 1986). En Peryra-Iraola está presente una de esas especies, *Celtis spinosa*, la cual se ha registrado en dos de las tres transectos analizados. Posiblemente tanto *G. triacanthos* como *C. spinosa* aporten distintos recursos alimentarios a lo largo del año a la dieta de este grupo. Se ha observado que los frutos maduros de *Celtis spinosa* son espontáneamente consumidos *Cebus apella paraguayanus* alojado en ECAS bajo las copas de estos árboles, en los meses de marzo y abril. Esta preferencia también podría darse en el grupo de aulladores descrito. Por otra parte, un recurso que parece influir en los desplazamientos de los monos, corresponde a los frutos de *Morus alba*, ejemplares de *Morus* sp. también están presentes en los 3 transectos analizados. *M. alba* fructificó en los meses de octubre y noviembre. Esta utilización de *A. caraya* de un alimento que no es parte de su dieta en condiciones naturales fue un aspecto reportado por Bicca-Marques (1994) para un grupo de aulladores negros que vivía en un bosque semi-natural y en el cual se observó preferencia por los frutos de *Citrus sinensis,* en determinadas épocas del año. Bicca-Marques y Calegaro-Marques (1994) reportaron la inclusión en la dieta de aulladores negros de *Eucalyptus* sp., género que está presente en el bosque estudiado y que prodría entonces aportar alimentos a los monos.

Figura 4. Macho adulto (fundador) del grupo de estudio. Foto Aldo Mario Giudice.

Otro aspecto importante en la adaptación del grupo al bosque citado, tiene ver con que su estructura que brinda la posibilidad de desplazarse por los árboles a lo largo del bosque, sin descender al suelo, aspecto que da seguridad a los monos, poniéndolos a salvo de perros vagabundos. Relacionado con la fisonomía del bosque, se debe mencionar la presencia de ejemplares de *Cupressus lusitánica* de más de 20 m de altura con copas cerradas, en los cuales se observó dormir a los monos. La presencia de estos árboles podría aportar seguridad a los monos durante sus horas de descanso.

Los datos presentados señalan la capacidad adaptativa de *A. caraya* a condiciones ambientales particulares como el rango térmico y los recursos alimentarios. En este ambiente los aulladores negros han logrado una supervivencia prolongada en el tiempo (9 años) y una evolución favorable en la situación reproductiva a lo largo de ese período (nacimiento de 3 individuos), dos aspectos que en las jaulas de los zoológicos de Argentina generalmente no se ha observado (Giudice, obs. pers.). Recordando que los monos aulladores en los zoológicos argentinos llegan a través de donaciones y/o incautaciones (Arditi *et al.*, 1989; Giudice, 1993; Giudice *et al.*, 1995) y son posteriormente alojados en jaulas de tipo tradicional en las cuales manifiestan una elevada mortalidad, pensamos que muchas de estas instituciones que cuentan con parques arbolados y diversos en su composición florística, podrían implementar con *A. caraya* experiencias controladas de liberación, sirviendo para estos fines la metodología señalada por Rodríguez-Luna y Cortés-Ortiz (1994) en sus programas de translocación de *A. palliata* en México y de esta forma evaluar la eficacia de este tipo de alojamiento en el mantenimiento a largo plazo de la especie. Por otra parte, y coincidiendo con Bicca-Marques (1994), este tipo de procedimientos llevados a cabo en los zoológicos podría servir para reproducir especies de aulladores amenazadas de extinción, como es el caso en la Argentina de *A. fusca clamitans* (Di Bitteti y Arditi, 1993; Brown *et al.*, 1993).

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Distribution and Conservation of the Buffy Tufted-ear Marmoset, *Callithrix aurita*, in Lowland Coastal Atlantic Forest, Southeast Brazil

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Introduction

The buffy tufted-ear marmoset, *Callithrix aurita*, is endemic to southeastern Brazil. The species occurs in the Atlantic Forest region, one of the most threatened ecosystems in the world (Mittermeier, 1988; Fonseca, 1985), its distribution ranging from the northernmost part of the state of Rio de Janeiro, east and northeast of São Paulo state to the southeast of Minas Gerais (Hershkovitz, 1977; Vivo, 1991). *C. aurita* is the most southerly species of the genus (Muskin, 1984a). It is listed as "Endangered" by IUCN and by the Official List of Threatened Species in Brazil of the Brazilian Institute for the Environment (Ibama).

C. aurita is of the least known of the Atlantic forest callitrichids. Brief field studies have been carried out by Torres de Assumpção (1983), in São Paulo, and Muskin (1984a, 1984b) and Bueno (1989) in southern Minas Gerais. Corrêa (1995) and Coutinho (1996) carried out the first of the more detailed field studies in the Serra do Mar State Park, São Paulo, and Martins (1998) recently completed a study of the feeding ecology of a group of *C. aurita* in Muskin's (1984a, 1984b) and Bueno's (1989) study site in southern Minas Gerais. Here we report on some preliminary results from a long-term study on the species being carried out by LDB in the Serra da Bocaina, on the border of the states of São Paulo and Rio de Janeiro, particularly regarding the question of the altitudinal range of the species and its conservation status.

Altitudinal distribution in coastal Atlantic forest

The altitudinal distribution of the species is controversial. Olmos and Martuscelli (1995) record that it occurs only at altitudes ranging from 600 to about 1200 m in São Paulo, and Rylands (1994) considered the species restricted to montane forest from 500-800 m. However, there are museum specimens collected in the foothills of the Serra do Mar, south of Rio de Janeiro: in 1941, Pedra Branca, municipality of Paratí, and 1942, Mambucaba, municipality of Angra dos Reis (Table 1). These two past records are the only evidence to date for the species' occurrence in lowland forest (Coimbra-Filho, 1991; Vivo, 1991). From observations made in 1952, Coimbra-Filho (1991) suggested that the buffy tufted-ear marmoset may occur in other lowland areas within the state of Rio de Janeiro, although he considered the species as probably regionally extinct there. All the recent records of the species along the coastal Atlantic forest are restricted to montane forest (Table 1).

Another species which is ecologically similar to *C. aurita*, and even suspected to be a subspecies of *aurita*, is the buffy-headed marmoset, *C. flaviceps* (see Coimbra-Filho, 1991, Coimbra-Filho *et al.* 1993). The buffy-headed marmoset is also largely restricted to montane forest, and occurs mainly at altitudes over 500 m in the states of Minas Gerais and Espírito Santo (Mendes, 1993). Both of these marmosets face harsh seasonal extremes of temperature and rainfall (Ferrari *et al.* 1996). It is interesting to note that in tropical semideciduous forest in the interior, the buffy tufted-ear and buffy-headed marmosets also occur at lower elevations (Stallings and Robinson, 1991; Ferrari

Table 1. Museum localities and field observations of the buffy tufted-ear marmoset *Callithrix aurita* along the coastal Atlantic forest, southeastern Brazil.

Locality	State	Coordinates	Altitude (m)	Source
Serra de Macaé	RJ	22° 10'S - 42° 00'W	500	MNRJ
Teresópolis	RJ	22° 27'S - 42° 59'W	902	MNRJ
Petrópolis	RJ	22° 30'S - 43° 11'W	810	MNRJ
Mambucaba (Angra dos Reis)	RJ	23° 01'S - 44° 31'W	100	MNRJ
Pedra Branca (Parati)	RJ	23° 14'S - 44° 44'W	80	MNRJ
Bananal Ecological Station	SP	22° 48'S - 44° 22'W	1200	L.D. Brandão (pers. obs.)
Bocaina National Park	SP	22°40'S - 44° 24'W	1200	L.D. Brandão (pers. obs.)
Taquara (Serra da Bocaina)	SP	22° 43'S - 44° 24'W	1300	MZUSP
Fazenda Posse (S. J. Barreiro- Serra do Mar)	SP	22° 44'S - 44° 37'W	1200	MZUSP
Núcleo Cunha (Serra do Mar State Park)	SP	23° 14'S - 45° 03'W	1000	Corrêa (1985)
Alto da Serra (Serra do Mar)	SP	23° 47'S - 46° 19'W	1375	Hershkovitz, 1977
Fazenda Lagoa (S.L.Paraitinga - Serra do Mar)	SP	23° 15'S - 45° 20'W	800	Olmos & Martuscelli, 1995

State: RJ – Rio de Janeiro, SP- São Paulo. Sources: MNRJ - National Museum, Rio de Janeiro. MZUSP - Zoology Museum, Universidade de São Paulo.

et al. 1996). The buffy-headed marmoset has a much smaller range and it appears to be more restricted to higher elevations than the buffy tufted-ear marmoset. We have found new evidence which confirms the existence of the buffy tufted-ear-marmoset in lowland coastal forest of the foothills of the Bocaina mountain range.

Buffy tufted-ear marmoset in lowland coastal forests

In order to confirm the occurrence of *C. aurita* in lowland coastal forests, we carried out a survey from November 1996 to February 1997 along the coast from northern São Paulo to the coast of southern Rio de Janeiro. We visited all the villages along the coast between the two states, interviewing residents who knew the forest and its animals. Color photographs of different species of marmosets were shown to these people to check if they recognized the buffy tufted-ear marmoset. We also used a tape recorder with the species' vocalization, attempting to attract wild groups which might be occurring in the forest of this region.

None of the people interviewed between Ubatuba and Paratí recognized the species. Only in Mambucaba, municipality of Angra dos Reis, Rio de Janeiro, did we obtain evidence that the interviewees knew of the buffy tufted-ear marmoset. In Mambucaba, we also found an adult male in captivity, which had been taken from the forest four months previously, and later two more individuals, an adult male and a female, also being kept as pets. The person who caught these animals showed us the area where the species could be found.

From our own experience, finding wild groups of buffy tufted-ear marmosets is not easy. While we were surveying the forest around Mambucaba (elevation 165 m) where the captive marmosets had been caught, we located a group because one marmoset gave a very high-pitched rasping scream above us, while the usual repetitive mobbing vocalizations were not emitted. Alarm calls of this kind are reported for marmosets, and most often associated with aerial predators (Ferrari and Ferrari, 1990). The group at Mambucaba had already suffered the loss of three individuals, and probably, for this reason, the marmosets were very shy.

Threats and Conservation

The buffy tufted-ear marmoset has had most of its natural habitat destroyed. Most especially, the lowland habitats have been transformed or destroyed through human activities. Deforestation dates from the 1500s, when the first colonizers arrived on the coast of Brazil. Angra dos Reis, as a result of its geographical location, was one of the first coastal areas settled and explored. Mambucaba was an important center for trade between Indians and Europeans, and the region around Mambucaba has been settled since 1573. Trading booms from the earliest days of colonization peaked around 1830, with the expansion of coffee plantations, and the export of sugar-cane and "aguardente", an alcoholic sugar cane distillation (Machado, 1995). Nowadays, other factors contribute to deforestation in these areas, situated on a narrow stretch of forest between the mountains and the sea; the main one being real estate acquisition and the housing industry.

Beside, habitat loss throughout the species' range, it is now also threatened by hunters, who catch them illegally for pets. Because of its natural rarity, it is not as commonly found, however, as the ubiquitous and introduced common marmosets, *C. jacchus*, frequently up for sale in markets. The introduction of *C. jacchus*, occurring naturally only in northeast Brazil, may represent a threat to the buffy tufted-ear marmoset.

The evidence we have indicates that *C. aurita* still occurs in the lowland coastal forests of Rio de Janeiro, but not in the lowland coastal forest of São Paulo. The record for Ubatuba, São Paulo, needs further investigation (Olmos and Martuscelli, 1995).

The forested area of the state of Rio de Janeiro, originally 4.294.000 ha (97% of the state) was reduced to 896.200 ha (20,24%) by 1990 (Brazil, 1994). The area where the buffy tufted-ear marmoset was found is near to the Bocaina National Park of 110.000 ha, with 60% of the Park in Rio de Janeiro and 40% in São Paulo. Although the species does occur inside the Park, the lowland forest around Mambucaba is outside this protected area.

During our surveys, we also recorded the presence of the fork tailed-pigmy tyrant, *Ceratotriccus furcatus*, a highly threatened endemic bird species restricted to the northern coast of São Paulo and the southern part of Rio de Janeiro (Collar *et al.* 1992). Another threatened species observed was the blue-bellied parrot, *Triclaria malachitacea*, highly subject to illegal trafficking.

In spite of all the difficulties in applying conservation measures, the lack of trained forest guards and the need to create a conservation awareness, efforts are now underway through a partnership between the Brazilian Institute for the Environment (Ibama) and a local non-governmental organization, "Pró-Bocaina", for action in the region. At present, an agreement between these two institutions is resulting in the elaboration of a management plan to guarantee the effective protection of the Park. Initiatives at all levels, from governmental, to scientific and local communities will strongly reinforce the effectiveness of conservation measures, vital for the survival of the increasingly threatened buffy tufted-ear marmoset in the lowland coastal forest.

Acknowledgments

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Preliminary Observations on Handedness in Wild Tamarins (*Saguinus* spp.) and Titi Monkeys (*Callicebus cupreus*)

Júlio César Bicca-Marques
Claudio Arani Nunes
Karin Schacht

This paper reports on preliminary observations of handedness during feeding in wild populations of black-chinned emperor tamarins (*Saguinus imperator imperator*), Weddell's saddleback tamarins (*Saguinus fuscicollis weddelli*), and red titi monkeys (*Callicebus cupreus*

cupreus) in northwestern Brazil. Data were recorded on the hand(s) used to hold and bring to the mouth pieces of bananas left at experimental feeding sites. Records were collected by "behavior sampling" (Martin and Bateson, 1993) as part of a study on the cognitive aspects of foraging decisions in these primates. A total of 529 records (emperor tamarins - 208; saddleback tamarins - 167; titi monkeys - 154) were obtained from December 1997 through January 1998. The study was carried out at the Zoobotanical Park of the Federal University of Acre (UFAC) (9°56'30" - 9°57'19"S, 67°52'08" - 67°53'00"W; area 100 ha), Rio Branco, state of Acre, Brazil.

Prior to the beginning of the study, tamarins, except infants, were captured (capture methods detailed in Encarnación *et al.*, 1990), anaesthetized, weighed, measured, sexed, aged, and fitted with collars of different colors for individual recognition. A total of two emperor tamarin social groups (IA and IB, composed of four and five individuals, respectively, along with two solitary individuals ID and IE), and two saddleback tamarin groups (FU and FC of five and six individuals, respectively) were captured. Titi monkeys, however, were not trapped, and individuals could not be identified with certainty. Data on at least two titi monkey social groups were collected and analyzed only at the species level. Data on the tamarins were analyzed by individual and grouped by sex.

Emperor and saddleback tamarins were found to use one hand significantly more often than both hands to hold food and bring it to their mouths (emperor - $\chi^2 = 24.04$, d.f. = 1, $p<0.001$; saddleback - $\chi^2 = 43.83$, d.f. = 1, $p<0.001$). In contrast, titi monkeys used one hand or both hands equally ($\chi^2 = 0.47$, d.f. = 1, n.s.) (Figure 1). Saddlebacks showed a tendency to use only one hand for feeding more frequently than did emperor tamarins ($\chi^2 = 7.70$, d.f. = 1, $p<0.01$). Although using data for the solitary ID skews the species analysis, its exclusion did not change the results. Table 1 indicates that all classes of tamarins analyzed except for group IA and solitary IE, foraged and fed significantly more often using one hand than both hands. Considering those individuals for which sample sizes were large enough to test for statistical significance, only two

Table 1. Frequency of hand use (right, left, or both) by tamarin species, group, sex, and age, and respective levels of significance.

Class	Frequency of hand use			Level of significance	
	Right	Left	Both	One vs. both hands	Right vs. left hand
Saguinus imperator					
Group IA	29	17	12	$p<0.01$	n.s.
Group IB	25	12	22	n.s.	n.s.
Solitary ID	36	16	7	$p<0.001$	$p<0.05$
Solitary IE	10	8	11	n.s.	n.s.
Females	78	40	37	$p<0.001$	$p<0.02$
Males	22	13	15	$p<0.05$	n.s.
Adults	85	46	45	$p<0.001$	$p<0.02$
Immatures	15	7	7	$p<0.05$	n.s.
Saguinus fuscicollis					
Group FU	53	46	14	$p<0.001$	n.s.
Group FC	24	21	9	$p<0.001$	n.s.
Females	33	26	12	$p<0.001$	n.s.
Males	40	40	10	$p<0.001$	n.s.
Adults	56	50	18	$p<0.001$	n.s.
Immatures	21	17	5	$p<0.001$	n.s.

n.s.= not significant

out of eight emperor tamarins showed a higher use of one hand over two hands (ID: $\chi^2 = 17.16$, d.f. = 1, $p<0.001$; IA-PNK: $\chi^2 = 5.78$, d.f. = 1, $p<0.02$). In contrast, five out of six saddleback tamarins tended to hold the food with just one hand (FU-AZL: $\chi^2 = 10.56$, d.f. = 1, $p<0.01$; FU-BRA: $\chi^2 = 8.59$, d.f. = 1, $p<0.01$; FU-AMA: $\chi^2 = 7.22$, d.f. = 1, $p<0.01$; FU-ROS: $\chi^2 = 4.98$, d.f. = 1, $p<0.05$; FC-AEP: $\chi^2 = 4.92$, d.f. = 1, $p<0.05$).

These results may reflect differences in patterns of positional behavior among the three species. Titi monkeys generally ate bananas in a sitting posture, whereas saddleback tamarins fed more frequently while clinging to vertical trunks, a posture requiring at least one hand for support. Emperor tamarins appear to be intermediate between the other two species. A second variable that influenced the use of one or two hands when feeding in a sitting position was the size of the food item eaten. The monkeys often used both hands when holding relatively large pieces of banana.

Regarding the use of right or left hands, saddleback tamarins and titi monkeys did not exhibit a preference, and used each hand equally (saddlebacks: $\chi^2 = 0.35$, d.f. = 1, n.s.; titis: $\chi^2 = 0.18$, d.f. = 1, n.s.). In contrast, emperor tamarins showed strong right hand preference ($\chi^2 = 7.48$,

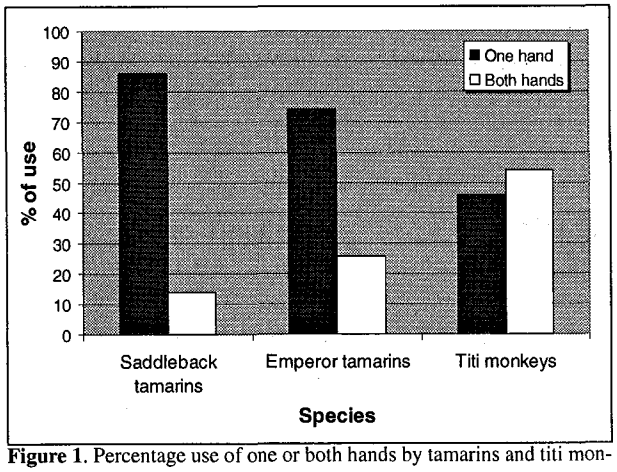

Figure 1. Percentage use of one or both hands by tamarins and titi monkeys.

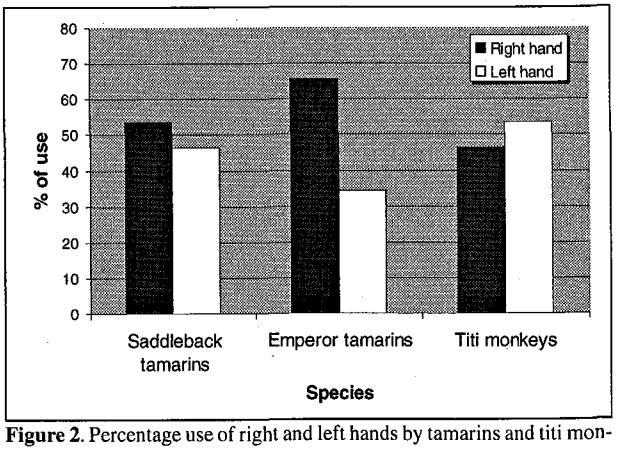

Figure 2. Percentage use of right and left hands by tamarins and titi monkeys.

d.f. = 1, $p<0.01$) (Fig. 2). Among saddleback tamarins there was no evidence of a hand preference by group, age or sex. In emperor tamarins, solitary ID, females, and adults showed a right-handed preference (Table 1). This significance by age and sex, however, disappears when the adult female ID is excluded from the analyses. Individual analyses showed that the right and left hands were used to the same extent by all saddleback tamarins tested (n = 5) and by three out of four emperor tamarins. These results, however, contrast with data from the individuals which indicate a higher frequency of use of one particular hand. While only one saddleback tamarin showed equal use of both hands, 17 tamarins (10 emperor and seven saddlebacks) showed a higher frequency of right-hand records and only three (one emperor and two saddlebacks) showed a higher frequency of left-hand records. This difference in right-left-hand use is statistically significant ($\chi^2 = 4.90$, d.f. = 1, $p<0.05$). A similar pattern of a right-handed preference was described by Singer (1996).

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News

A New Species of Marmoset in the Brazilian Amazon

A new species of marmoset has been described, the black-crowned dwarf marmoset *Callithrix humilis*, by Marc G. M. van Roosmalen, botanist and primatologist at the Botany Department of the National Institute for Amazon Research (INPA), Manaus, his son Tomas van Roosmalen, at Colgate University, New York, Russell A. Mittermeier, President of Conservation International, Washington D. C., and Chairman of the IUCN/SSC Primate Specialist Group, and Gustavo A. B. Fonseca, Professor of Mammalogy at the Federal University of Minas Gerais, and Director of Conservation International do Brasil, Belo Horizonte. This small marmoset (at 120-200 g adult weight it is larger than the pygmy marmoset but smaller than other *Callithrix* marmosets), was first encountered by Marc and Tomas van Roosmalen on 16 April 1996 in the town of Novo Aripuanã, where they saw a two-week-old infant, said to have been taken from the village of Nova Olinda on the west bank of the lower Rio Aripuanã, a tributary of the Rio Madeira. The marmoset was first seen in the wild in November 1996, during a survey of the lower Rio Aripuanã, near to Nova Olinda, where a group was feeding on the trunk exsudate of a morototó tree, *Didymoponax morototoni*. Marc and Tomas van Roosmalen were subsequently joined on this trip by Russell Mittermeier and Gustavo Fonseca, along with the journalist David Quammen who wrote up the story of the expedition in *Sports Illustrated* magazine (Quammen, 1997).

The type locality for *C. humilis*, is the "West bank of the lower Rio Aripuanã, one kiolometer south of the settlement of Nova Olinda, 41 km south-west of the town of Novo Aripuanã, Amazonas state, Brazil. This region is located in south-central Amazonia, Brazil, south of the Rio Amazonas and east of the Rio Madeira. Coordinates for the type locality are 05°30'63"S, 60°24'61"W. Altitude 45 meters.".

C. humilis was found to occur in dense primary *terra firme* forest as well as secondary forest surrounding plantations and fields. Local people confirmed that it it did not occur in inundated forests such as *várzea* and *igapó*; the habitat typical of *Cebuella pygmaea*. In this, and in a number of other behavioural and physical aspects, it is closer to the *Callithrix* marmosets than the pygmy marmosets. Amongst other pelage features, it is distinguished from *Cebuella* by the lack of a lion-like mane, exposed ears, and a well-defined mantle, by its darker, olive brown (not tawny agouti), even (as opposed to spotted) general coloration of the upper and outer parts of the body and by the orange yellow to golden chest, belly and inner sides of limbs. Van Roosmalen *et al.* (1998) provide detailed descriptions of the pelage, including changes with age, and compare it to *Cebuella* and other Amazonian *Callithrix*; all beautifully illustrated by the artist Stephen D. Nash, State University of New York, Stony Brook.

The known range of the species is from the west bank of the lower Rio Aripuanã, from the mouth, south to the Paraná Capimtuba. Interviews with local people also indicated its presence along the east bank of the Rio Madeira, from the mouth of the Rio Aripuanã, just south of the town of Novo Aripuanã, south to the mouth of the Rio Mataurá. The southern limit for the species is probably

the headwaters of the Rios Uruá, Mariepauá and Arauá.

Van Roosmalen *et al.* (1998) discuss the conservation status of this still little known species. They estimated the confirmed geographic distribution to be between 250,000 and 300,000 ha, the smallest range of any Amazonian primate species. It does not occur in any protected area, and, arguing that total numbers may not exceed a few thousand, the authors conclude that it should be considered "vulnerable" or even "endangered", and that efforts should be undertaken to protect its entire distribution.

The publication includes appendices of lists of the primate species and taxa for Brazil. Primate species now number 77, with 39 (51%) endemic to the country. A total of 130 taxa are now recognized for Brazil, 69 (53%) of them endemic. A third appendix lists all known callitrichids (57) and their distributions in the 11 countries where they occur. Forty-six callitrichids occur in Brazil, 15 in Peru, and 10 in Colombia. There are currently 18 species of marmosets, *Callithrix*; all endemic to Brazil, except for *C. argentata* which extends into Paraguay and Bolivia (Van Roosmalen *et al.*, 1998).

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Vocalizations of Howling Monkeys, *Alouatta fusca*

In February 1997, Dilmar Alberto Gonçalves de Oliveira defended his M.Sc. thesis, "Long-distance vocalizations of the howling monkey, *Alouatta fusca*, in the Cantareira State Park, São Paulo", at the Institute of Psychology of the University of São Paulo, Brazil. The thesis was supervised by Prof. César Ades. The following is an abstract of the thesis.

The structure and contexts of the long-distance calls of brown howler monkeys (*Alouatta fusca clamitans*) were studied at the Cantareira State Park (São Paulo, SP, Brazil). Data on activity patterns and diet showed a predominance of resting over other behaviors and an almost completely folivorous diet throughout the study period (Autumn, 1996). Sonographic analyses showed that loud calls were composed of ten elements or notes (roars, alternate roars, incipient roars, roar accompaniments, hiccups, barks, extended barks, incipient barks, coughs, and oodles) that were emitted in six different types of sequences, distinguished by a predominant note or element. Extended barks and extended bark sequences are described for the first time. Bark sequences, observed in moderate to strong alarm eliciting contexts, were emitted by males and acted as a graded signal production system. Roar sequences occurred in close association with intergroup conflicts and were emitted by males, with a higher number of accompanying individuals than bark sequences. It was hypothesized that barks and roars have distinct behavioral functions and motivations. The structural features of *A. fusca*'s loud calls, especially the roars, suggest that they are used as honest signals of resource holding potential (RHP).

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Oliveira, D. A. G. 1997. Vocalizações de longo alcance do bugio (*Alouatta fusca clamitans*) na área do Parque Estadual da Cantareira (São Paulo, SP). Master's thesis, Instituto de Psicologia, Universidade de São Paulo, São Paulo. 94pp.

Ultrasonography and Reproductive Status in the Common Marmoset

Ann-Kathrin Oerke defended her doctoral dissertation on ultrasonographic studies of pregnancy and the reproductive cycle in the common marmoset (*Callithrix jacchus*) at the Institut für Tierzucht und Haustiergenetik of the Georg-August-Universität and the Deutsches Primatenzentrum, Göttingen, in December 1995. The following is a summary of her thesis:

Ultrasonography is a non-invasive method for assessing reproductive status, providing immediate results by direct visualization of the uterus and ovaries. In this study, the method was used to monitor pregnancy and ovarian function in a small New World monkey, the common marmoset, *Callithrix jacchus*. Three experiments were carried out in order 1) to monitor uterine changes, embryonic development and fetal growth throughout gestation, 2) to define parameters for early pregnancy diagnosis and 3) to monitor follicular growth, ovulation and formation of corpora lutea (Cls) during the ovarian cycle.

For all studies, ovarian cycles were controlled by administration of prostaglandin F 2α (PGF) and the time of ovulation was determined retrospectively by measurement of a defined rise in plasma progesterone. All scans were performed on unsedated females using a 7.5 Mhz probe for studies of pregnancy and a 10 Mhz probe for examinations of ovaries during the cycle.

The first experiment was carried out on eight pregnancies from ovulation to birth. Detection of pregnancy was possible by visualising the appearance of a double endometrial echo on average 15 days after ovulation. Measurements of uterus and uterine lumen were useful for determining the stage of pregnancy between day 30 and 90.

On day 33 embryos became directly visible and on day 54 embryonic heart beat was seen. These findings provided information on number and viability of embryos. Since fetal heads appeared in ultrasound images from Day 80 onwards, fetal growth could be reliably monitored by measurements of skull diameters. Ultrasound results confirmed embryonic development in the marmoset to be slower than that reported for other primates. This delay of development was also seen in the onset of organ function.

In the second experiment eight pregnancies were examined between ovulation and day 30, focussing on pregnancy diagnosis and early embryonic development. Ultrasound findings were related to the profiles of circulating chorionic gonadotropin (CG) and progesterone. By ultrasound, detection of pregnancy was possible between Days 11 and 15 after ovulation, whereas a defined rise in CG occured between Days 14 and 16 after ovulation. Individual CG-profiles were highly variable within and between pregnancies and provided no information on embryonic number or disorders in the development of multiple embryos. In ultrasound images, however, embryonic development was seen by appearance of echos between gestation sacs on Day 25. Accurate determination of embryo number was not possible at this stage. A relation between findings by ultrasound and pattern of CG secretion was neither seen within nor between individual pregnancies. The present results show that in comparison to measurement of CG, ultrasonography allows earlier detection of pregnancy in the marmoset and provides additional information on embryonic development. The advantage of this method for practical reasons is the less amount of time required until results are available.

The third experiment was divided into two parts. A validation of the method was performed on ovaries in eight females during the follicle phase and in five females during the luteal phase. Direct comparison of ultrasound results with findings at laparotomy revealed that determination of number and distribution of structures present on the ovaries was correct for 92% of the follicles and 78% of the CLs. In addition, a significant correlation was found for ultrasound and microscope measurements of follicles. Follicular growth, ovulation and formation of CLs was monitored in eight cycles. On Day 6 after PGF individual follicles were visible by ultrasonography. These follicles became measurable by Day 7 and follicle growth was recorded daily until ovulation. Diameters of ovulatory follicles increased from about 2 mm up to 4 mm. The day of ovulation was confirmed by comparing ultrasound observations with the profiles of plasma luteinizing hormone (LH) and progesterone. Whilst follicles were clearly seen and measured on the day of the LH-surge, changes in echogenic properties of the follicles occured one day later. On this day, being Day 10 to 12 after PGF for individual cycles, follicles had either disappeared or showed increased internal echogenicity with loss of distinct demarcation. As indicated by the defined rise in progesterone on the following day, these changes of follicular appearance occured on the day of ovulation. CLs were visualized one to two days later, but could not be accurately measured. This study is the first documentation of ovarian cyclic changes in a non-human primate by ultrasonography. The results demonstrate that despite the small size of the marmoset, ovarian follicles and CLs can be seen reliably. In correspondence with ultrasound observations described for women, visualization of individual follicles allows monitoring of follicle growth by measurement of follicle diameter. Detection of ovulation is possible by visualizing changes of follicular sonographic appearance. In contrast to other, direct, methods images of ovaries by ultrasound can be obtained non-invasively. Thus, the potential of ultrasonography for future studies on ovarian physiology will be of increasing scientific interest.

Copies of this thesis (in German) are available from: Cuvillier Verlag, Nonnenstieg 8, 37075 Göttingen, Germany, Tel.: 0551-54724-0, Fax: 0551-54724-21. Price: DM54.00.

Reference

Oerke, A.-K. 1995. Ultrasonographische Untersuchungen vom Gravidität und Zyklus beim Weissbüschelaffen (*Callithrix jacchus*). Doctoral dissertation, Institut für Tierzucht und Haustiergenetik, Georg-August-Universitat und Deutsches Primatenzentrum, Göttingen. 130pp.

Feeding Ecology of the Masked Titi, *Callicebus personatus*

Stefani Heiduck defendeu sua dissertação de doutorado sobre estratégias alimentares do guigó, *Callicebus personatus melanochir*, na Faculdade de Matemática e Ciências Naturais da Universidade Georg-August, Göttingen, Alemanha, em 1997. A pesquisa foi realizada na Estação Experimental Lemos Maia (CEPLAC/CEPEC), Una, sul da Bahia, Brasil. O seguinte é um resumo da dissertação:

O principal objetivo deste trabalho foi investigar o comportamento alimentar do guigó (*Callicebus personatus melanochir*) com base na teoria de otimização de forrageamento ("optimal foraging theory"). Utilizou-se diferentes hipóteses desta teoria objetivando-se conhecer as estratégias utilizados pelos guigós em seu processo alimentar. Discutiu-se também, a aplicabilidade da teoria em questão, e sobretudo, dos diferentes modelos a ela correlacionados, em primatologia.

O trabalho realizou-se na Estação Experimental Lemos Maia localizada no município de Una (Bahia - Brasil), enfocando um fragmento florestal em torno de 80 ha característico de Floresta Tropical Atlântica. No período de um ano, coletou-se de um grupo familiar de guigós, dados comportamentais correlacionados a diversas preferências alimentares, opções quanto a mancha ("patch"), distancias percorridas, assim como atividades

diversas. Considerando a sazonalidade anual, avaliou-se comparativamente a disponibilidade de alimentos no fragmento florestal em questão. Coletou-se amostras das espécies consumidas pelo grupo em estudo, visando-se a análise dos níveis de carboidratos, gordura, proteinas, como também dos teores de fibra e ácido tânico (tanino). Elaborou-se ainda, cálculos relativos aos teores energéticos dos itens alimentares em questão.

Quanto aos resultados, constatou-se que a preferência alimentar dos guigós envolvia polpas, sementes e folhas novas, e que a sazonalidade na quantidade de recursos disponíveis para o grupo em estudo era uma característica marcante. Desta forma, distinguiu-se uma época de alta e outra de baixa disponibilidade de alimentos e a partir desta constatação, analisou-se o comportamento dos animais visando adaptarem-se a esta alteração.

Observou-se não haver relação entre o processo seletivo das espécies consumidas pelo grupo e sua composição química ou qualquer outra característica marcante. Evidenciou-se sim, uma relação direta entre a disponibilidade destas espécies e seu consumo. Na época de baixa disponibilidade alimentar, a qual o item alimentar preferido, a polpa, era escasso, os animais consumiam mais sementes.

No decorrer do estudo, caracterizou-se a não seletividade no uso das manchas. Contudo, observou-se haver uma variação na persistência do grupo em cada mancha, numa relação direta entre o tamanho e disponibilidade de alimentos da mancha e o tempo de permanência do grupo nesta, ou seja, o grupo permanecia mais tempo nas manchas maiores e de melhor oferta de alimentos. Constatou-se também que na época de menor disponibilidade alimentar, o grupo freqüentou um menor número de manchas, as quais eram menores e com menos itens alimentares, permanecendo contudo, maior tempo nestas manchas, se comparamos à época de alta disponibilidade alimentar.

Na época de baixa disponibilidade de alimentos, o tempo utilizado na manipulação e consumo dos alimentos elevou-se, enquanto o tempo gasto em brincadeiras individualizadas diminuiu. O comportamento ativo, aqui representado pela soma de processos de alto custo energético como alimentação, locomoção e brincadeiras, não sofreu alteração anual significativa. Quanto à diminuição dos recursos alimentares, observou-se uma redução na distância diária percorrida pelo grupo, sendo esta, diretamente relacionada com o número de manchas diariamente visitadas.

Conclui-se entre outras, que os guigós otimizam a alimentação quando minimizam os custos na procura de alimentos. A preferência na utilização de espécies e manchas não está vinculada a um processo seletivo e sim, aparenta estar diretamente correlacionada a menor distância percorrida pelo grupo. Diminuindo a distância diária percorrida na época de baixa disponibilidade de alimentos, o grupo reduz seu gasto energético permanecendo maior tempo por mancha, ocorrendo assim, uma diminuição na eficiência da obtenção de alimentos.

Quanto ao emprego da teoria da otimização de forrageamento na pesquisa primatológica, constatou-se não ser esta eficiente quanto busca-se a compreensão dos processos seletivos voltados à alimentação. Tratando-se de modelos relacionados a custos na obtenção de alimentos demonstrou-se contudo, sua aplicabilidade e viabilidade.

Para obter um exemplar dessa dissertação, escreve para: Cuvillier Verlag, Nonenstieg 8, 37075 Göttingen, Alemanha, Tel.: 0551-54724-0, Fax: 0551-54724-21. Preço: DM54,00.

Referência

Heiduck, S. 1997. Nahrungsstrategien Schwarzköpfiger Springaffen *(Callicebus personatus melanochir).* Dissertação de Doutorado, Mathematisch-Naturwissenschaftlichen Fakultäten, Georg-August-Universität, Göttingen. 117pp.

Emperor Tamarins in Europe

As Coordinator of the EEP, Eric Bairrão Ruivo of the Lisbon Zoological Garden, and his assistants, Carmo Margarido Correia, Patrícia Vilarinho and Orlando Silva, published the 4th edition of the European Studbook for *Saguinus imperator* in June 1998. The studbook is current up to 31 December 1997. It includes an activity report and the minutes of the 4th Species Committee Meeting, held in Alphen, Holland, in 1997. The EEP Committee is comprised of the following people: Pierre Moisson, Mulhouse; Teresa Abelló, Barcelona; Warner Jens, Apeldoorn; Joanna Mikkola, Helsinki, David Armitage, Banham; John B. Stronge, Belfast; Graham Catlow, Edinburgh; Rudiger Dmoch, Frankfurt; and Robert Zingg, Zürich. The meeting was attended by 21 people, including four of the committee members, and Bryan Carroll, Bristol Zoo, the Chair for Callitrichidae for the EEP Primate Taxonomic Advisory Group (TAG).

On 31 December 1997, a total of 126 (61.53.12) *Saguinus imperator subgrisescens* was held in 35 zoos and breeding facilities in Europe. Just one female *S. i. imperator* remains in the Frankfurt Zoo. Sixteen hybrids (9.7) are still present in four institutions, but they will eventually be concentrated in just one, Peaugres Zoo, France, which currently already has 9 (6.3). Reproductive success for *S. i. subgrisescens* showed a slight improvement over 1996, but there is still a lack of breeding females, a number of which died in 1997.

The studbook also includes two research reports. The first is on the hybrid population at Peaugres, by Cécile Dubois, and the second on manual asymmetry in reaching for foods, a study carried out in the Lisbon Zoo by Catarina Hermano da Silva. The remainder of the studbook is taken up with

historical listings for both subspecies and their hybrids; births, deaths and transfers during 1997; a listing of the living population by location; recommendations for transfers and breeding in 1998; and demographic and genetic analyses, including the distribution of wild born and captive born animals, the development of the population since 1984, and such as fecundity, inbreeding, and founder representation. The addresses of all the participating institutions are given at the end.

Eric Bairrão Ruivo, Coordenador do EEP do Saguim Imperador, Jardim Zoológico de Lisboa, Estrada de Benfica 158-160, 1500 Lisboa, Portugal.

Reference

Ruivo, E. B. 1998. *European Studbook for the Emperor Tamarin* Saguinus imperator *Goeldi, 1907. Number 4. 1997.* Lisbon Zoological Garden, Lisbon.173pp.

INFORMATION ON *CEBUS*

We are writing a book about the behavioral biology of capuchins (*Cebus* spp.), to be published in the year 2000 (!!) by Cambridge University Press, and are now in the process of collecting all the relevant literature about capuchins that we can locate, to be sure that we do not overlook anything. We would be very grateful if you could send to our "corresponding secretary" (Dorothy Fragaszy) one copy of recent (1994 or later) publications and abstracts of contributions presented at recent meetings that deal with capuchins. Dorothy will copy and distribute these to Linda Fedigan and Elisabetta Visalberghi. We are equally interested in publications in languages other than English, as we are trying to present a "global" view of our subject. We will find translators for languages we cannot read ourselves. We do not need publications in Journals which we get ourselves. This list includes *Animal Behaviour*, *Folia Primatologica*, *Journal of Comparative Psychology*, *American Journal of Primatology*, *Primates*, and *International Journal of Primatology*. We ask also from those who have the good fortune to live in countries where capuchins are found, please let us know about folk tales, songs, sayings, or other forms of cultural knowledge or attitudes in which capuchins are represented. Thank you in advance for your help. Please respond to: Prof. Dorothy Fragaszy or Dr. Elisabetta Visalberghi (addresses below).

Informação sobre *Cebus*. Estamos escrevendo um livro sobre a biologia comportamental do gênero *Cebus*, a ser publicado no ano 2000 (!!) pela Cambridge University Press. No momento, estamos realizando uma revisão da literatura relevante sobre macacos pregos e caiararas, na esperança de realizar um levantamento completo da informação disponível. Ficariamos imensamente gratas em receber contribuições de quaisquer publicações ou resumos de congressos (a partir de 1994) que tratam desse gênero. O material deve ser enviado para Dorothy Fragaszy, que enviará cópias para Linda Fedigan e Elisabetta Visalberghi (as outras autoras). Nós estamos interessadas em receber publicações tanto em inglês quanto em outras línguas para garantir uma visão "global" sobre o assunto. Não necessitamos de artigos dos periódicos mencionados a seguir, os quais já temos acesso: *Animal Behaviour*, *Folia Primatologica*, *Journal of Comparative Psychology*, *American Journal of Primatology*, *Primates* e *International Journal of Primatology*. Pedimos também a aqueles que têm a sorte de morar em países onde ocorrem esses macacos, informação sobre folclore, histórias, cantos, ditados ou outras formas de conhecimento cultural sobre, ou que fazem referências a, macacos pregos ou caiararas. Agradecemos antecipadamente a sua ajuda. Favor responder para Prof. Dorothy Fragaszy ou Dr. Elisabetta Visalberghi (endereços a seguir).

Información sobre *Cebus*. Estamos escribiendo un libro sobre biología conductual de monos capuchinos (*Cebus* spp.) que será publicado en el año 2000(!!) por Cambridge University Press. Actualmente estamos en el proceso de colectar toda la literatura relevante posible sobre capuchinos, para asegurarnos de no omitir trabajos importantes. Agradeceríamos si pudieran enviar copia de publicaciones (de 1994 ó posteriores) sobre monos capuchinos y resúmenes de trabajos presentados en reuniones académicas recientes a nuestra "secretaria de correspondencia" (Dorothy Fragazy). Dorothy copiará y distribuirá estos documentos a Linda Fedigan y Elisabetta Visalberghi. Estamos interesadas en recibir tanto publicaciones en Inglés como en cualquier otro idioma, ya que queremos presentar una visión "global" de nuestro sujeto de estudio. Nosotras podremos encontrar traductores para aquellos idiomas que no podamos leer por nosotras mismas. No necesitamos publicaciones en revistas que podemos obtener por nuestra cuenta, esto es de *Animal Behaviour*, *Folia Primatologica*, *Journal of Comparative Psychology*, *American Journal of Primatology*, *Primates* o *International Journal of Primatology*. Asimismo, pedimos a aquellas personas que tienen la fortuna de vivir en países donde los monos capuchinos habitan naturalmente, que por favor nos informen sobre relatos folklóricos, canciones, dichos u otras formas de conocimiento o actitudes culturales en los que los monos capuchinos estén involucrados. Gracias de antemano por su ayuda. Favor de responder a: Prof. Dorothy Fragazy o Dr. Elisabetta Visalberghi (a las direcciones que aparecen abajo).

Elisabetta Visalberghi, Istituto di Psicologia, Consiglio Nazionale delle Ricerche, Via Aldrovandi 16 B, 00197 Roma, Italy, Tel>: +39 (6) 3221252 or 3221437, Fax: +39 (6) 3217090, e-mail: <elisa@www.pml.it>, **Dorothy Fragaszy**, Department of Psychology, University of Georgia, Athens, Georgia 30602-3013, USA, Tel.: 1-706-542-3036, Fax: 1-706-542-3275, e-mail:<doree@arches.uga.edu>, and **Linda Fedigan**, Department of Anthropology, 13-15 Tory Building, University of Alberta, Edmonton, Alberta T6G 2H4, Canada, Tel.:(403) 492 5899, Fax: (403) 492 5273, e-mail: <linda.fedigan@ualberta.ca>.

Field Course in Primate Behavior and Ecology

This December, undergraduate and graduate students have the opportunity to participate in a primate behavior and ecology field course in Nicaragua, December 27, 1998 - January 18, 1999. The course will be run by Dr. Paul A. Garber, Professor of Anthropology, University of Illinois, Urbana-Champaign. Dr. Garber has studied nonhuman primates in Peru, Brazil, Panama, Costa Rica, and Nicaragua, and along with the Molina Family is co-founder of the La Suerte Biological Research Station in Costa Rica. More detailed and complete information about the educational and research opportunities offered at both the La Suerte (Costa Rica) and the Ometepe (Nicaragua) Biological Field Stations can be obtained by viewing our web site at <http:// www.studyabroad.com/lasuerte>.

Dr. Garber and a team of graduate teaching assistants will offer an 'advanced' primatology course on the behavior and ecology of capuchin monkeys and howler monkeys at Ometepe. By advanced, we mean that the course will be directed to the particular needs of advanced undergraduates (juniors and seniors) and graduate students who are interested in a career in biological anthropology, primatology, tropical ecology, rain forest conservation, and field biology. Each day professors and graduate teaching assistants will work intensively with students, give lectures, and provide background information to help them develop a conceptual framework for understanding the remarkable diversity and complexity of tropical rain forest ecosystems. Lectures, group projects, and exposure to real examples of animal-plant interactions and primate behavior and socio-ecology are designed to help students develop their own original research projects. Our goals in the course are: 1. To challenge students intellectually and provide themes with the problem-solving skills and the academic background needed to address key issues in tropical ecology, primate behavior, and rain forest conservation, and 2. To instill in all students a passion for inquiry, exploration, and a personal appreciation for our natural world. An intermediate course in Primate Behavior and Conservation will be taught by Dr. Patricia McDaniel at our site, La Suerte Biological Research Station, in Costa Rica during the same dates.

Isla de Ometepe. The site that we have selected for our first ecological-educational-research station is Isla de Ometepe. Ometepe is an island of 276 km² lying in Lake Nicaragua. It is the largest island in the world situated in a fresh water lake. Two majestic forested volcanoes dominate the island. One called Madera raises 1,400 m above the lake, the other, Concepción, is even taller and reaches a height of nearly 1,700 m.. Ometepe is situated in southeastern Nicaragua and has a population of 30,000 people. The majority of the people who live on the island are of Indian ancestry. The word Ometepe is a Nashuatl word that means "land of two volcanoes" (Nashuatl is a language spoken by the ancient Aztecs and their descendants). Crater lakes, beautiful streams with cascading water, cloud forests, and lowland rain forests are found on the island, along with some 80+ species of birds, mantled howling monkeys (*Alouatta palliata*), white-faced capuchin monkeys (*Cebus capucinus*), deer, other tropical forest mammals, reptiles, and amphibians. Our field camp is located on a bay overlooking Lake Nicaragua.

For more information please visit our web site. We encourage faculty and students to join us in our mission of education, research, and conservation.

Paul A. Garber, Professor, Department of Anthropology, University of Illinois, 109 Davenport Hall, 607 S. Mathews Avenue, Urbana, Illinois 61801, USA, Tel. (desk): 217 333-0075, Tel. (Dept): 217 333-3616, Fax: 217 244-3490, e-mail: <p-garber@uiuc.edu>.

The Whitley Award for Animal Conservation

The Whitley Animal Protection Trust, the Iris Darnton Foundation and the Royal Geographic Society (with the Institute of British Geographers) have joined forces to establish an annual award scheme worth up to £22,000 for leaders of projects that make a pragmatic, substantial and lasting contribution to the conservation of animals in their habitat. The winner of the Whitley Award receives £15,000; an additional £7,000 is offered to short-listed candidates and is awarded at the discretion of the Iris Darnton Foundation. In 1998, Claudio Sillero-Zubiri received the Whitley Award for his work with Ethiopian wolves, and our sincere congratulations to PSG member Sharon Matola, who most deservedly received the Iris Darnton Foundation Award for her work at the Belize Zoo, for the creation of The Tropical Education Center there, and her environmental education programs throughout the country. From *Species* (30): 11-12, June 1998.

New Science-Oriented List to Replace Primate-Talk

The Wisconsin Regional Primate Research Center will soon be introducing a new list serve called Primate-Science which will replace Primate-Talk. The WRPRC Internet Services Advisory Committee elected to discontinue Primate-Talk, which was closed down on 27 August 1998. The WRPRC reserves the right to the name "Primate-Talk", however, since it is so closely allied with our institution. All of the other WRPRC Internet based services - Primate Info Net, the Audiovisual Service, Primate-Jobs, Askprimate, the World Directory of Primatology and the International Directory of Primatology - will be continued in support of the international primatological community. We wish to thank all present and past subscribers to Primate-Talk for their participation. We hope that the new list will effectively serve the needs of the research community.

Larry Jacobsen, WRPRC Internet Services Advisory Committee, Wisconsin Regional Primate Research Center, University of Wisconsin-Madison, 1220 Capitol Court, Madison, WI 53715-1299, USA.

MSc in Wild Animal Health

Applications are invited from the European Community or overseas graduates in veterinary or relevant sciences for a twelve month taught MSc course in wild animal health, beginning October 1999. The course includes practical and theoretical instruction in the husbandry and nutrition of wild animals, taxonomy, population biology, conservation genetics, utilization of wildlife, welfare and ethical aspects, epidemiology, immunology, infectious and non-infectious diseases, disease investigation, therapeutics, imaging and preventative medicine, together with an individual research project. Training will be given by staff at The Royal Veterinary College (University of London) and the Institute of Zoology (Zoological Society of London), as well as invited speakers from other veterinary and zoological centers. Full particulars and an application form are available from the Head of Registry or Dr. M. T. Fox, The Royal Veterinary College, Royal College Street, London NW1 0TU, UK, Tel: +44 171 468 5000, Fax; +44 171 388 2342.

Primate Societies

XVIIth Congress of the International Primatological Society

The XVIIth Congress of the International Primatological Society was held at the University of Antananarivo, Antananarivo, Madagascar, from 10-14th August, 1998. The General Secretary was Madame Berthe Rakotosamimanana, the Development Committee was chaired by Gisele Randria, and the Scientific Committee by Hantanirina Rasimimanana. It was well attended, with approximately 550 participants, and included numerous interesting symposia, plenary lectures and workshops. A total of 409 abstracts were published in the *Abstracts* book for the Congress. The following plenary lectures were presented: Foundation of sensory motor percussive foraging in aye-aye - Carl Erickson; Food choice and taste perception in non-human primates and humans - Marcel Hladik; and Lemurs as flagship species for conservation in Madagascar - Joanna Durbin. Some symposia of particular relevance for New World primates included: Callitrichine mixed-species troops: Patterns mechanisms and consequences - organized by Eckhard Heymann, Hannah Buchanan-Smith & Scott Hardie; Captive care - organized by Hilary Box; Social influences on feeding in non-human primates - organized by Hilary Box & Dorothy Fragaszy; The effects of forest fragmentation and habitat disturbance on primate populations worldwide - organized by Lisa Gould & Jonah Ratsimbazafy; Exploration and responses to novelty in marmosets and tamarins - organized by Lesley Rogers & Hilary Box; Impact and sustainability on hunting primates - organized by Robert Lee, Elizabeth Bennett & John G. Robinson; Conservation problems and solutions for the coming millennium - organized by Noel Rowe, Benjamin Andrimihaja & Patricia Wright; Behavioral ecology - organized by Jörg Ganzhorn; Social interactions - organized by Peter Kappeler, Urs Thalmann & Chalise Mukesh.

The PSG participated in this Congress in the form of a special conservation symposium - "The World's Most Endangered Primates and the Global Status of Primate Conservation as We Enter The 21st Century" - organized by Russell A. Mittermeier and William R. Konstant. It included the following presentations: Primate conservation: a retrospective and a look into the 21st Century: Survival of the world's most endangered primates - R. A. Mittermeier & W. R. Konstant; The status of endangered primates in Mesoamerica - E. Rodríguez-Luna & L. Cortés Ortiz; Endangered primates of South America - A. B. Rylands; African primate conservation: Western Africa at the end of the century - J. F. Oates; Survey of endangered forest primates in western Ghana - M. Abedi-Lartey; Conservation of Madagascar's lemurs - K. Glander & J. Ganzhorn; Indian primate conservation: Priorities for the 21st Century - A. Kumar; Indonesian primate conservation: Priorities for the 21st Century - J. Supriatna; and Chinese and South-east Asian primate conservation: Priorities for the 21st Century - R. C. Kirkpatrick & Le Xuan Canh. The proceedings of this symposium will be published in *Primate Conservation* (19), 1999.

The PSG and the IPS

The International Primatological Society (IPS) is affiliated to the World Conservation Union (IUCN). For this reason, as well as the fact that many of the IUCN/SSC Primate Specialist Group members also belong to IPS, at a meeting held during the XVIIth IPS Congress, hosted by the University of Antananarivo, Madagascar, 10-14th August 1998, the IPS Council voted to include a representative of PSG on the Council in a non-voting capacity. This measure is intended to increase the joint effectiveness of IPS and PSG in IUCN matters. The PSG Deputy Chairman, Anthony B. Rylands, subsequently attended the Council meeting on August 13, 1998 as PSG representative. At that meeting Anthony Rylands was appointed Meeting Secretary, to participate in the Organizing Committee of the XVIIIth Congress of the International Primatological Society to be held in Adelaide, Australia, 7-12 January 2001.

MARTHA J. GALANTE AWARD - IPS

The Martha J. Galante Award is given each year by the International Primatological Society for the conservation training of professionals of primate habitat countries. Candidates are reviewed by the IPS Conservation Committee, currently chaired by Ernesto Rodríguez-Luna, Universidad Veracruzana, México. This year it was most deservedly presented to Dr. Mukesh Kumar Chalise of the Kathmandu University, Dhulikhel, Nepal. Dr. Chalise is one of very few primatologists in Nepal, and is currently studying *Macaca assamensis* in the Makalu-Barun Conservation Area. For more information on this award, please write to Dr. Ernesto Rodríguez-Luna, Vice President for Conservation, International Primatological Society, c/o Instituto de Neuroetología, Universidad Veracruzana, Xalapa, Veracruz 91000, México, Tel: 52-28-12-57-48, Fax: 52-28-17-65-39 or 52-28-12-57-46, e-mail: <saraguat@speedy.coacade. uv.mx>.

OFFICERS OF THE IPS

Two important changes were made concerning the Officers of the Council of the International Primatological Society (IPS). A new standing committee for Education was created, and Dr. Sîan Evans, Dumond Conservancy, Miami, Florida, was appointed the first Chair, and first Vice-President for Education. Dr. Hilary O. Box, Reading University, Reading, UK, was appointed Interim Vice President and Chair of the Captive Care Committee, replacing Dr. Cobie Brinkman, Australian National University, Canberra, Australia.

The officers (1996-2000) are currently as follows: ***President* - Prof. Toshishada Nishida**, Department of Anthropology, Graduate School of Science, Kyoto University, Sakyo-ku, Kyoto-shi 606, Japan, Tel: 81-75-753-4084, Fax: 81-75-751-6149, e-mail: <nishida@jinrui.zool.kyoto-u.ac.jp>; ***Secretary General* - Dr. Dorothy Fragaszy**, Department of Psychology, University of Georgia, Athens, Georgia 30602, USA, Tel: 1-706-542-3036, Fax: 1-706-542-3275, e-mail: <doree@archer.uga.edu>; ***Vice President for Membership* - Dr. Richard W. Byrne**, Department of Psychology, University of St. Andrews, St. Andrews, Fife KY16 9JU, Scotland, Tel: 44 334-62051, Fax: 44-334-63042, e-mail: <rwb@st.andrews.ac.uk>; ***Vice President for Captive Care* - Dr. Hilary O. Box**, Department of Psychology, University of Reading, Reading RG6 2AL, UK, Tel: 44 1734 318523 x 6668, Fax: 44 1734 316604, e-mail: <h.box@reading.ac.uk>; ***Vice President for Conservation* - Dr. Ernesto Rodríguez-Luna**, Instituto de Neuroetología, Universidad Veracruzana, Veracruz 91000, México, Tel: 52-28-12-57-48, Fax: 52-28-17-65-39 or 52-28-12-57-46, e-mail: <saraguat@speedy.coacade.uv.mx>; ***Vice President for Education* - Dr. Siân Evans,** Dumond Conservancy, 14805 S. W. 216 Street, Miami, Florida 33170, USA, Tel: +1 305 238 9981, Fax: +1 305 235 4253, e-mail: <sevans@umiami.miami.edu>; ***Treasurer* - Dr. William Roudebush**, Department of Obstetrics and Gynecology, Medical University of South Carolina, Charleston, South Carolina 29425-2233, USA, Tel: 1-803-792-8348, Fax: 1-803-792-0533, e-mail: <roudebwe@lp.musc.edu>. **Appointed officers**: *Regional Secretary for the Americas* - Prof. Milton Thiago de Mello, Brasília; *Regional Secretary for Europe* - Dr. Regine Vercauteren-Drubbel, Université Libre de Bruxelles; *Regional Secretary for Asia* - Dr. Osamu Takenaka, Kyoto University; *Regional Secretary for Africa* - Dr. Fatina Mturi, University of Dar-es-Salaam; *Meeting Secretary* - Dr. Anthony B. Rylands, Conservation International do Brasil. **IPS Affiliate Representatives (voting)**: *Primate Society of Great Britain* - Dr. Hannah Buchanan-Smith, Stirling University; *American Society of Primatologists* - Dr. John Capitanio, University of California, Davis; *Gesellschaft für Primatologie* - Dr. Elke Zimmermann, Tierarztliche Hochschule Hannover; *Primate Society of Japan* - Dr. Yuzura Hamada / Dr. Yukimaru Sugiyama, Kyoto University. **IPS Affiliate Representatives (non-voting)**: *Associazione Primatologica Italiana* - Dr. Giuseppe Ardito, Istituto di Antropologia, Firenze; *Australasian Primate Society* - Mr. John Lemon, Western Plains Zoo; *Association Primatologique de Madagascar* - Madame Berthe Rakatosamimana, University of Antananarivo; *Societé Francophone de Primatologie* - Dr. Nicolas Herrenschmidt, Centre de Primatologie - ULP; *Asociación Méxicana de Primatología* - Dr. Jorge Martinez, Universidad Autonoma de México; *IUCN/SSC Primate Specialist Group* - Dr. Anthony B. Rylands, Conservation International do Brasil.

XVIIITH CONGRESS OF THE IPS - AUSTRALIA

The next Congress of the International Primatological Society (IPS) will be hosted by the Australasian Primate Society, President Mr. John Lemon, Western Plains Zoo, Dubbo, NSW, and held in Adelaide, Australia, 7-12 January 2001. Mr. Graeme Crook is Chairman of the Organizing Committee. For more information, and to be put onto the Congress Organizer's mailing list, write to: Conventions Worldwide, PO Box 44, Rundle Mall, SA 5000, Australia, Tel: +61 8 8363 0068, Fax: +61 8 8363 0354, e-mail: <satconv@camtech.net.au>, sending your postal address, telephone, fax and e-mail address.

GESELLSCHAFT FÜR PRIMATOLOGIE

Every fourth year there are elections for the council of the Gesellschaft für Primatologie (GfP). At the 5th conference in Berlin, Germany (October 1997) the society members elected a new council which took office in January 1998. The new council members are: ***President:* Prof. Dr. Elke Zimmermann**, Institut für Zoologie,

Tierärztliche Hochschule, Hannover, Postfach 711180, 30545 Hannover, Tel: +49 511 953 8740, Fax: +49 511 953 8586, e-mail: ezimmer@zoologie.tiho-hannover.de; ***Secretary General*** (memberships, vice-president): **Dr. Signe Preuschoft**, Living Links Center, Emory University, Yerkes Regional Primate Research Center, 954 N. Gatewood Road, Atlanta GA 30322, USA, Tel: +1 404 727 3695 or 727 7898, Fax: +1 404 727 3270, e-mail: signe@rmy.emory.edu; ***Treasurer***: **Dr. Angela Meder**, Augustenstrasse 122, 70197 Stuttgart, Tel: +49 711 612963, Fax: +49 711 6159919, e-mail: angela.meder@t-online.de; ***Council Member*** (society newsletter, Christian-Vogel-Fonds): **Dr. Andreas Koenig**, Abt. Verhaltensforschung & Ökologie, Deutsches Primatenzentrum, Kellnerweg 4, 37077 Göttingen, Tel: +49 551 3851 129, Fax: +49 551 3851 228, e-mail: akoenig@www.dpz.gwdg.de; ***Council Member*** (implementation and maintenance of a home-page): **Dr. Kurt Hammerschmidt**, Abt. Neurobiologie, Deutsches Primatenzentrum, Kellnerweg 4, 37077 Göttingen, Tel: +49 551 3851 253, Fax: +49 551 3851 228, e-mail: khammer@www.dpz.gwdg.de.

At its first meeting in January 1998 the new council decided to set up a board of specialists for particular fields of interest of the society. These people will advise the council in their particular fields of expertise and maintain contact with particular organizations. These experts are: *Conservation Biology*: Prof. Dr. Jörg U. Ganzhorn, Zoologisches Institut, Universität Hamburg, Martin-Luther-King-Platz 3, 20146 Hamburg, Tel: +49 40 4123 4224, Fax: +49 40 4123 5980, e-mail: ganzhorn@zoologie.uni-hamburg.de; *Zoo Biology*: Mr. Achim Johann, Tierpark Rheine, Salinenstrasse 150, 48432 Rheine, Tel: +49 5971 55666, Fax: +49 5971 55564; *Animal Welfare and Animal Protection Laws*: Prof. Dr. Franz-Josef Kaup, Abt. Tiermedizin und Primatenhaltung, Deutsches Primatenzentrum, Kellnerweg 4, 37077 Göttingen, Tel: +49 551 3851 241, Fax: +49 551 3851 277, e-mail: fkaup@gwdg.de; *Union Deutscher Biologischer Gesellschaften (UDBio)*: Dr. Jutta Kuester, Allgem. Zoologie & Neurobiologie, Ruhr-Universität Bochum, ND 7/31, 44780 Bochum, Tel: +49 234 700 4327, Fax: +49 234 7094 185, e-mail: kuester@neurobiologie.ruhr-uni-bochum.de; *European Federation for Primatology (EFP)*: Dr. Paul Winkler, Tropenzentrum, Georg-August-Universität, Am Vogelsang 6, 37075 Göttingen, Tel: +49 551 39 9543, Fax: +49 551 39 4556, e-mail: pwinkle@gwdg.de.

We gratefully acknowledge the work of the retired council of the GfP and look forward to working for a better understanding of the biology, evolution and conservation of primates.

Dr. Andreas Koenig, Deutsches Primatenzentrum, Abt. Verhaltensforschung & Ökologie, Kellnerweg 4, D-37077 Göttingen, FRG, Tel: + 49 551 3851 129, Fax: +49 551 3851 228, e-mail: akoenig@www.dpz.gwdg.de.

American Society of Primatologists Awards 1998

ASP The Conservation Committee of the American Society of Primatologists (ASP), Chair Randall Kyes, University of Washington - Seattle, made the following awards during the Society's 1998 Annual Meeting, held in Southwestern University, Georgetown, Texas, 28 June - 1 July 1998. *American Journal of Primatology* Subscription Awards - **Minna J. Hsu**, National Sun Yat-sen University, Taiwan; and **Komang Gde Suaryana**, Universitas Udayana, Indonesia: Conservation Small Grants - **Rebeca Araya**, New York University, "Genetic structure in two sympatric and behaviorally diverse saki monkeys *Pithecia pithecia* and *Chiropotes satanas*; **Lucy Beresford-Stooke**, UK, "Primate population densities after pitsawing in Budongo Forest, Uganda; **Mukesh K. Chalise**, Nepal, "Environmental protection in Makalu-Barun Conservation Area through conservation education"; **Mugambi Karere**, Kenya, "Pre-translocation ecological study of DeBrazza's monkeys (*Cercopithecus neglectus* Schegel) in western Kenya"; **Christian Mokalu**, Indonesia, "Population survey of the Sulawesi black macaque (*Macaca nigra*) at the Tangkoko-Duasudara Nature Reserve, North Sulawesi, Indonesia"; **Erwin Palacios**, Colombia, "Density of the red howler monkey (*Alouatta seniculus*) in south-eastern Colombia"; **Jill Pruetz**, University of Illinois, "Forest characteristics and spider monkey (*Ateles geoffroyi*) densities in forest fragments at La Suerte Biological Field Station, Costa Rica"; **Juan Carlos Serio Silva**, Mexico, The primates of the peninsular of Yucatan: Current state and strategies for their conservation"; and **Kimberly Williams-Guillen**, New York University, "The behavioral ecology of mantled howling monkeys living in Nicaraguan coffee plantations".

The Awards and Recognition Committee, chaired by Gerry Ruppenthal, University of Washington, Seattle, gave the 1998 Distinguished Primatologist Award to **W. Richard Dukelow**, of Michigan State University, in honor of his outstanding achievements in primate research. Dr. Dukelow was a former President of ASP, and has been a major influence in shaping the direction of the Society and is, besides, a world-renowned leader in the field of primate reproductive biology.

Capuchin monkeys and titi monkeys were the subjects graced by the Poster Presentation Award and Oral Paper Presentation Award at this ASP meeting. **Tina M. Gilbert, David A. Brown** and **Sarah T. Boysen**, Ohio State University, Columbus, were given the award for their poster "Social effects on behavior in capuchins (*Cebus apella*)", and **DeeAnn Reeder, Sally P. Mendoza** and **William A. Mason**, California Regional Primate Research Center and the University of California, Davis, were given the oral paper award for their presentation "Social behavior and sexual motivation across the reproductive cycle in titi monkeys (*Callicebus moloch*): Concealment or commu-

nication of ovulation?".

For further information on these awards: **Dr. Randall Kyes**, Chair, Conservation Committee, University of Washington, Regional Primate Research Center, Health Sciences Center, Box 357330, Seattle, WA 98195, USA, e-mail: <rkyes@u.washington.edu>; **Dr. Gerry Ruppenthal**, Chair, Awards and Recognition Committee, Center on Human Development and Disability, University of Washington, Box 357920, Seattle, WA 98195, USA, e-mail: <gerry@u.washington.edu>. From *ASP Bulletin* 22(3), September 1998.

Recent Publications

The IUCN/SSC Primate Specialist Group Journal - *Primate Conservation*

Number 17 (1996/1997) of the IUCN/SSC Primate Specialist Group Journal - *Primate Conservation* has been published. It is a large issue (165pp.), containing the Proceedings of the Symposium "Primate Conservation: A Retrospective and a Look Into the 21st Century", held during the XVIth Congress of the International Primatological Society and XIXth Conference of the American Society of Primatologists, August 11-16, 1996, Madison, Wisconsin. It includes reviews of primate conservation and the activities of key organizations, reviews of the activities of the four PSG regional networks (Neotropics, Africa, Madagascar and Asia), and case studies for species or species' groups. The contents are as follows: Primate Conservation: A Retrospective and a Look into the 21st Century - Russell A. Mittermeier & William R. Konstant, pp.7-17; The Role of IPS and National Primate Societies in Global Primate Conservation - David J. Chivers, pp.18-23; Conservation Efforts of the American Society of Primatologists - Randall C. Kyes & Susan M. Howell, pp.24-29; Funding for Primate Conservation - Where has it Originated? - William R. Konstant, pp.30-36; The Role of Zoos in Primate Conservation - Anne Baker, pp.37-40; Primate Conservation and the IUCN/SSC Conservation Breeding Specialist Group: Tools, Models, and Processes - Susie Ellis, pp.41-45; Neotropical Primate Conservation - The Species and the IUCN/SSC Primate Specialist Group Network - Anthony B. Rylands, Ernesto Rodríguez-Luna & Liliana Cortés-Ortiz, pp.46-69; The State of Lemur Conservation in Madagascar - Jörg U. Ganzhorn, Olivier Langrand, Patricia C. Wright, Sheila O'Connor, Berthe Rakotosamimanana, Anna T. C. Feistner & Yves Rumpler, pp.70-86; African Primate Conservation - The Species and the IUCN/SSC Primate Specialist Group Network - Thomas Butynski, pp.87-100; Asian Primate Conservation - The Species and the IUCN/SSC Primate Specialist Group Network - Ardith A. Eudey, pp.101-110; Current Status and Future Viability for the Mentawai Primates - Agustin Fuentes, pp.111-116; Endangered Primate Species in Vietnam - Le Xuan Canh, pp.117-126; Proyecto Titi: Developing Alternatives to Forest Destruction - Anne Savage, L. H. Soto & L. H. Giraldo, pp.127-130; The Endangered Muriquis in Brazil's Atlantic Forest - Karen B. Strier & Gustavo A. B. da Fonseca, pp.131-137; Extinction Faces Ghana's Red Colobus Monkey and Other Locally Endemic Subspecies - J. F. Oates, T. T. Struhsaker & G. H. Whitesides, pp.138-144; The Mountain Gorilla - Conserving an Endangered Primate in Conditions of Extreme Political Instability - H. D. Steklis, C. N. Gerald-Steklis & S. Madry, pp.145-151; Conservation Status and Prospects of the Snub-Nosed Langurs (Colobinae: *Rhinopithecus*) - R. M. Ren, R. C. Kirkpatrick, N. G. Jablonski, W. V. Bleisch & X. C. Le, pp.152-159; Conservation of Japanese Macaques in Yakushima: The Effectiveness of UNESCO's Natural World Heritage Designation - David A. Hill & Tamaki Maruhashi, pp.160-163.

In Brazil, copies of *Primate Conservation* (17) are available for R$30,00 (incl. postage and packing), cheques payable to "Conservation International do Brasil", through Anthony B. Rylands (address below). For other countries they can be obtained at a price of US$30,00, by writing to Russell A. Mittermeier, Conservation International (address below).

Number 18 (1998) of *Primate Conservation* is ready to go to the printers. It includes some important contributions from the Neotropics, with reviews of primate conservation in Guatemala, the Tumbes Reserved Zone in northwest Peru, and the state of Quintana Roo in Mexico, as well as reports on the ecology of *Cebus olivaceus* in Venezuela, *Cacajao calvus ucayalii* in Peru, and *Ateles belzebuth* in Colombia.

Number 19 (1999) is in preparation, and will include, but will not be restricted to, the proceedings of the symposium organized by the Primate Specialist Group, "The World's Most Endangered Primates and the Global Status of Primate Conservation as We Enter The 21st Century", held during the XVIIth Congress of the International Primatological Society, University of Antananarivo, Madagascar, 10-14 August, 1998. Please send contributions to *Primate Conservation* (19), covering such aspects as regional or species or species group reviews, as well as geographic distributions, surveys, and pertinent aspects of systematics, ecology, behavior, management, and zoo conservation activities, to Anthony B. Rylands at the address below.

The editors of *Primate Conservation* are **Russell A. Mittermeier**, Conservation International, 2501 M Street NW, Suite 200, Washington D.C. 20037, USA, and **Anthony B. Rylands**, Conservation International do Brasil, Avenida Antônio Abrahão Caram 820/302, 31275-000 Belo Horizonte, Minas Gerais, Brazil, Tel/Fax: +55 (0)31 441-1795, e-mail: <a.rylands@conservation.org.br>.

PSG Regional Newsletters

Issues of the other PSG regional newsletters have been published recently. *Asian Primates*, edited by Ardith A. Eudey, is a combined issue of Volume 6 (3), December 1996, and 6(4), March 1997, and includes articles on the golden langur, *Trachypithecus geei*, in Assam, India, the Philippine tarsier, *Tarsius syrichta*, the distribution of *Presbytis* in Sumatra, the rediscovery of the black langur, *Trachypithecus francoisi ebenus*, a survey of the Hatinh langur, *Trachypithecus francoisi hatinhensis*, and reports on the progress of the Indo-U.S. Primate Project and the Golden Monkey Research and Conservation Project. The third issue of the *Lemur News* (3), August 1998, 33pp., was published by its new editor, Jörg Ganzhorn, University of Hamburg. It reports on the creation of Madagascar's largest protected area, the Masoala National Park with 2,300 km² of primary and littoral rain forest in north-east Madagascar, and includes articles on the lemurs of the region of the region Bemaraha, a survey for *Daubentonia*, the re-introduction of captive-bred *Varecia variegata* in the Betampona Natural Reserve, the lemur community of the Ambato Massif, predation on the eastern woolly lemur, *Avahi laniger*, the lemurs of the Comoro Archipelago and the Island of Mayotte, and research efforts in the dry zones in the west of Madagascar. Lastly, Volume 2(2), December 1996, of *African Primates*, editor Thomas M. Butynski, includes articles on the Zanzibar red colobus, *Procolobus kirkii*, a census of diurnal primates on Bioko Island, Equatorial Guinea, the status of Hamadryas baboons in Eritrea, a survey of gorillas and chimpanzees in the Dja Reserve, Cameroon, new dwarf galago species in Tanzania, nest-making behaviour of chimpanzees in Guinea and Uganda, and the status of the Sanje mangabey, *Cercocebus galeritus sanjei*, from Tanzania.

To contribute articles and news items, and to obtain copies of these newsletters, please contact: **Ardith A. Eudey**, Editor, *Asian Primates*, 164 Dayton Street, Upland, California 91786, USA. Tel/Fax: (909) 982 9832, e-mail: <eudey@aol.com>, or **Jörg Ganzhorn**, Editor, *Lemur News*, Institute of Zoology, Ecology and Conservation, Martin Luther King Platz 3, 20146 Hamburg, Germany, e-mail: <ganzhorn@zoologie.uni-hamburg.de>, or **Thomas M. Butynski**, Senior Editor, *African Primates*, Zoo Atlanta, Africa Biodiversity Conservation Program, P. O. Box 24434, Nairobi, Kenya, Tel: 254 2 745374, Fax: 254 2 890615, e-mail: <butynski@thorntree.com>, or **Debra Forthman**, Editor, *African Primates*, Zoo Atlanta, 800 Cherokee Avenue S. E., Atlanta, Georgia 30315-1440, USA.

A Special Edition of the *International Journal of Primatology* - Howling Monkeys

Volume 19, number 3, 1998, of the *International Journal of Primatology*, the official journal of the International Primatological Society, Editor - Russell H. Tuttle, The University of Chicago, is dedicated exclusively to the howling monkeys, *Alouatta* - a feast for howler researchers. As explained in the introduction, this special issue was the brainchild of Kenneth E. Glander, Director of the Duke University Primate Center, but the Guest editor was Margaret R. Clarke, Tulane University, New Orleans. It is based on a symposium "Howlers: Past and Present", held during the XIIth Congress of the International Primatological Society, Brasília, 1988. The issue includes the following papers: Population characteristics of howlers: Ecological conditions or group history - Colin A. Chapman & Sophia R. Balcomb, pp.385-403; Growth of mantled howler groups in a regenerating Costa Rican dry forest - Linda M. Fedigan, Lisa M. Rose & Rodrigo Morera Avila, pp.405-432; Agonistic and affiliative relationships of adult female howlers (*Alouatta palliata*) in Costa Rica over a 4-year period - Evan L. Zucker & Margaret R. Clarke, pp.433-449; Infant-nonmother interactions of free-ranging mantled howler monkeys (*Alouatta palliata*) in Costa Rica - Margaret R. Clarke, Kenneth E. Glander & Evan L. Zucker, pp.451-472; Relation of intergroup variation in allogrooming to group social structure and ectoparasite loads in red howlers (*Alouatta seniculus*) - Marcelo R. Sanchez-Villagra, Theresa R. Pope & Viviane Salas, pp.473-491; Parasites of wild howlers (*Alouatta* spp.) - Michael Stuart, Vickie Pendergast, Susan Rumfelt, Suzanne Pierberg, Lisa Greenspan, Kenneth Glander & Margaret Clarke, pp.493-512; Physiological ecology of howlers (*Alouatta*): Energetic and digestive considerations and comparison with the Colobinae - Katharine Milton, pp.513-548; Conservation biology of the genus *Alouatta* - Carolyn M. Crockett, pp.549-578; Effective solutions for howler conservation - Robert H. Horwich, pp.579-598; Arboreal quadrupedism and forelimb articular anatomy of red howlers - Miguel A. Schön Ybarra, pp.599-613; Skeletal pathologies in a population of *Alouatta palliata*: Behavioral, ecological and evolutionary implications - David DeGusta & Katherine Milton, pp.615-650.

Subscription inquiries and orders: Subscription Department, Plenum Publishing Corporation, 233 Spring Street, New York, NY 10013-1578, USA, Fax: 212 807 1047, e-mail: <info@plenum.com>, World Wide Web: <http://www.plenum.com>.

American Journal of Primatology - A Special Edition on Primate Seed Dispersal

The *American Journal of Primatology*, official journal of the American Society of Primatologists, Editor-in-chief Michael J. Raleigh, University of California - Los Angeles, has produced a special issue on "Primate Seed Dispersal" (Volume 45, number 1, 1998). The Guest Editors were Joanna E. Lambert, University of California - Los Angeles, and Paul A. Garber, University of Illinois - Urbana. It is based on a symposium "Primates as Seed Dispersers and Seed Predators in Tropical Forests", presented at the Joint Congress of the International Primatological

Society and the American Society of Primatologists held in Madison, Wisconsin, in August 1996. It includes the following papers: Primates as seed dispersers: Ecological processes and directions for future research - Paul A. Garber & Joanna E. Lambert, pp.3-8; Evolutionary and ecological implications of primate seed dispersal - Joanna E. Lambert & Paul A. Garber, pp.9-28; Seed dispersal by long-tailed macaques - Peter W. Lucas & Richard T. Corlett, pp.29-44; Lowland gorillas and seed dispersal: The importance of nest sites - M. E. Rogers, B. C. Voysey, K. E. McDonald, R. J. Parnell & C. E. G. Tutin, pp.45-68; Seed handling by three prosimian primates in south-eastern Madagascar: Implications for seed dispersal - Deborah J. Overdorff & Suzanne G. Strait, pp.69-82;Variation in seed handling by two species of forest monkeys in Rwanda - Beth A. Kaplin & Timothy C. Moermond, pp.83-101; Seed dispersal by Neotropical seed predators - Marilyn A. Norconk, Brian W. Grafton & Nancy L. Conklin-Brittain, pp.103-126; Forests without primates: Primate/Plant codependency - Colin A. Chapman & Daphne A. Onderdonk, pp.127- 141.

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

Journal of Medical Primatology

The *Journal of Medical Primatology* is the leading medical and biomedical nonhuman primate related journal, covering such research areas as veterinary care, husbandry, experimental methodology, morphology, physiology, reproductive biology, cardiovascular diseases, neurology, molecular biology, genetics, nutrition, wildlife management, and behaviour and sociology as related to medical conditions and captive primate needs. In addition, subjects on infectious diseases have always played an important role for the journal, but especially since 1989, when the first of the now yearly issues of "nonhuman primate models for AIDS" became the mainstream areas of research covered. Since 1996, the Editor-in-Chief is Prof. Dr. Jorg W. Eichberg, Rijswik, The Netherlands, e-mail: <eichberg@bprc.nl>. The founding co-editors are E. I. Goldsmith and J. Moor-Jankowski. One volume of six issues is published annually, including one special issue. For subscription orders: Munksgaard International Publishers Ltd., 35 Norre Sogade, P. O. Box 2148, DK-1016 Copenhagen K., Denmark, Fax: +45 33 12 93 87, e-mail: <fsub@mail.munksgaard.dk>, or Regional Office for North America, Munksgaard International Publishers Ltd., Commerce Place, 350 Main Street, Malden, MA 02148-0518, USA, Fax: +1 617 388 8274.

Global Biodiversity

Global Biodiversity is a quarterly magazine published by the Canadian Museum of Nature, Ottawa, dedicated to all aspects of biological diversity research and conservation. Besides regular articles, it includes updates and news on such as biodiversity policy, biosafety, meetings, and conservation. Two theme issues have been produced, one on Ecoforestry (1997), and another on Ecoagriculture (1998). For more information, write to *Global Biodiversity*, Canadian Museum of Nature, P.O. Box 3443, Station D, Ottawa, Ontario K1P 6P4, Canada, Tel.: (888) 437-6287, Fax: (613) 566 4673, e-mail:<sswan@mus-nature.ca>. World Wide Web: <http://www.nature.ca/english/gbzine.htm>.

Books

Planning, Proposing, and Presenting Science Effectively: A Guide for Graduate Students and Researchers in the Behavioral Sciences and Biology, by Jack P. Hailman and Karen B. Strier, 182pp. 1997. Cambridge University Press, Cambridge. ISBN 0 521 56023 3 (hardback), 0 521 56875 7 (paperback). A most excellent and useful guide to writing - a must not only for graduate students and researchers but also for editors even. The guidelines apply equally to independent projects for introductory biology, directed study projects, and undergraduate senior theses, as well as to master's theses, doctoral dissertations and research aimed at publication. It: guides the reader through a discussion of the nature of scientific research, how to plan research, and obtain funding; discusses writing a research proposal, whether for a formal proposal for thesis research to be written by a graduate student, or for a research proposal for a funding agency such as the National Science Foundation (using the Dissertation Improvement Grant format as a specific example); deals with writing a research report such as a graduate thesis, or a manuscript for publication in a research journal; gives advice and guidelines for presenting the results of research at research seminars and scientific meetings, and also provides useful tips on preparing abstracts and posters; shows how to write an effective C.V.; gives tips on how to write clearly, common abbreviations (including Latin phrases), and difficult inflections, as well as other issues; and provides a final appendix with a number of useful Word Wide Web addresses for U.S. grant sources. Throughout, the book is illuminated with personal examples from the author's own experiences with research on behavioral ecology, and there is a strong emphasis on problems associated with field studies. All biologists will find this a valuable resource and guide for the early years of their scientific careers. Established faculty will find it an essential instructional tool. Available from: Customer Services Department, Cambridge University Press, FREEPOST (within the UK), The Edinburgh Building, Cambridge CB2 1BR, UK, Tel.: +44 (0)1223 325056, Fax: +44 (0)1223 325891. In the US: Cambridge University Press, 40 West 20th Street, New York, NY

10011-4211, USA. In Australia: Cambridge University Press, 10 Stamford Street, Oakleigh, Melbourne 3166, Australia. For further information on textbooks from CUP, please contact Heather Elliot at <hellicott@cup.cam.ac.uk>.

Minds of Their Own: Thinking and Awareness in Animals, by Lesley J. Rogers, 224pp., November 1997. Allen and Unwin, St. Leonards, NSW, Australia. ISBN 1 8644 8504 3. Price: Paperback AU$17.95 + AU$5.00 p+p outside of Australia. Are animals consciously aware of themselves or other individuals? Do they think about objects not in their immediate presence, and do they have ideas? There is a rapidly growing interest in these questions. On the one hand a number of leading ethologists have written books and papers addressing the topic of thinking in animals, while on the other hand neuroscientists are discussing the evolution of brain structures that may be essential for consciousness. This fascinating book brings these two approaches together. Contents: 1. Not simply machines; 2. Awareness of self and others; 3. Mental images, memory and intelligence; 4. Evolving a brain for consciousness; 5. Evolution of the human brain and mind; 5. Future research on animal minds; 7. Thinking, feeling and animal rights. For more information: Allen and Unwin, PO Box 8500, St. Leonards, NSW 2065, Australia, Tel.: +61 (0)2 9901 4088, Fax: +61 (0)2 9906 2218, e-mail:<academic@allen-unwin.com.au>.

Not Only Roars and Rituals: Communication in Animals, by Lesley J. Rogers and Gisela Kaplan, 240pp., November 1998. Allen and Unwin, St. Leonards, NSW, Australia. ISBN 1 864448 798 4. Price: Paperback AU$19.95 + AU$5.00 p+p outside of Australia. This book explores the scientific evidence for communication in animals, presenting a rich variety of examples, using sight, sound, touch, smell, and even electrical signals. As well as providing a historical background to the field, it deals with modern concepts (such as animals using communication to deceive) and modern controversies, including the evolution of human language and the use of sign language by apes. It tackles the often-avoided concept of intentional communication and explores the future of communication between humans and animals. Lesley Rogers is Professor of Neuroscience and Animal Behavior at the University of New England, and Professor Gisela Kaplan has pursued parallel careers in the social sciences and in animal behavior, focusing especially on communication in birds and primates. Highly recommended. For more information: Allen and Unwin, PO Box 8500, St. Leonards, NSW 2065, Australia, Tel.: +61 (0)2 9901 4088, Fax: +61 (0)2 9906 2218, e-mail:<academic@allen-unwin.com.au>.

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Meetings

Forest 98 - V Congresso e Exposição Internacional sobre Florestas, 25-28 de novembro de 1998, Centro de Convenções de Curitiba, Paraná, Brasil. Promoção: Sociedade Brasileira para a Valorização do Meio Ambiente - BIOSFERA. Temário preliminar: Silvicultura, manejo, sustentabilidade e conservação da biodiversidade; Industrialização e comercialização de produtos florestais; Ensino, pesquisa e extensão florestal; Políticas, legislação e geopolítica florestal; Arborização urbana, paisagismo e unidades de conservação. Coordenador Geral: Prof. Maurício Balensiefer, Escola de Engenharia Florestal, Universidade Federal do Paraná, Rua Bom Jesus 650, 80035-010 Curitiba, Paraná, Tel: (041) 232 9084 (UPPR), (041) 322-1611 (SEMA), Fax: (041) 232 3636, e-mail: <forest98@pr.gov.br>.

Primate Society of Great Britain (PSGB) Winter Meeting - Current Contributions of Zoos to Primate Conservation and Biology, 2 December, 1998, Zoological Society of London, Regent's Park, London, U.K. Includes the Osman Hill Memorial Lecture to be given by Prof. Christopher Stringer on "The Origin of Our Species". Organized by Dr Miranda Stevenson and Dr Bryan Carroll. Contact: Dr Miranda Stevenson, Marwell Zoological Park,

Colden Common, Winchester, Hants SO21 1JH, England, U.K. Tel: 01962 777407, Fax: 01962 777511, e-mail: <mirandast@email.msn.com>.

Association for the Study of Animal Behaviour - The Genetic Analysis of Behaviour, 3-4 December, 1998, Zoological Society of London, London. Organized by Mike Ritchie and Bambos Kyriacou. For more information: Dr M. G. Ritchie, Environmental & Evolutionary Biology, Bute Medical Building, University of St. Andrews, Fife KY16 9TS, UK, Fax: +44 (0)1334 463600, e-mail: <mgr@st-andrews.ac.uk>, or Dr Bambos Kyriacou, Department of Genetics, Adrian Building, University of Leicester, Leicester LE1 7RH, UK, Fax: +44 (0)1162 523378, e-mail: <cpk@leicester.co.uk>.

XVII Annual Conference of the Australasian Primate Society, 4-6 December, 1998, Perth Zoological Gardens, Labouchere Road, South Perth, Western Australia. Theme: "A Home Away From Home: Creating Species-specific Environments for Captive Primates". Deadline for abstracts: 15 October 1998. For further detals, contact: Dr R. Markham, Perth Zoo, P. O. Box 489, South Perth. WA 6151, or Mr G. Crook, P. O. Box 500, One Tree Hill, SA 5114, Tel: +61 8 82807670, Fax: +61 8 82807078, e-mail: <APS_editor@classic.msn.com>, or crook.graeme@etsa.com.au>.

1999

1st European Zoo Nutrition Meeting, 8-11 January, 1999, Rotterdam, The Netherlands. Organized by the Rotterdam Zoo and the Veterinary Faculty in Utrecht, with the Nutrition Research Group of EAZA. Topics include: Current status of nutrition in Europe (methods, research topics); European nutrition research targets in the future; Feeding ecology; Specific nutrition research on various species; Various nutrition topics. Contact: Joeke Nijboer, Rotterdam Zoo, P. O. Box 532, 3000 Am Rotterdam, The Netherlands, Tel: +31 010 4431441, Fax: +31 010 4431414, e-mail:<j.nijboer@inter.nl.net>.

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

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

II International Wildlife Management Congress "Wildlife, Land and People: Priorities for the 21st Century", 28 June- 2 July 1999, Gödölló, Hungary. Organized by The Wildlife Society with the Hungarian co-sponsor and host, the University for Agricultural Sciences in Gödölló, Hungary. Deadline for proposals of one-half-day workshops, symposium, and special poster session proposals: 30 June 1998. Workshops, symposia, and special poster sessions should focus on topics of wildlife science, management, sustainable development, education and outreach, or laws and policy within the broad theme of the Congress. Each day will begin with a morning plenary session followed by related concurrent sessions, symposia and workshops in the afternoon. Themes for the five-day congress are (1) Sustainable Development and Wildlife Conservation; (2) Landscape Linkages: Ecosystem Science and Management; (3) Issues in Wildlife-Human Conflicts; (4) Education, Outreach, and Human Dimensions in Wildlife Conservation; and (5) Techniques for Monitoring Wildlife Populations. Symposia, and, where appropriate, workshop presentations will be considered for publication in a Congress proceedings; organizers will be required to provide an initial edit and evaluation of submitted papers. The proceedings will be published in English; oral presentations will be in English or possibly Hungarian depending on the availability of translators. More information on preparing proposals for workshops, symposia, and special poster sessions can be found in the March-April 1998 issue of *The Wildlifer*, and on The Wildlife Society website <http://www.wildlife.org/index.html>, or guidelines may be requested from Co-Chair of the Program Committee, W. Daniel Edge at his e-mail address. Deadline for submission of papers and posters: 15 October 1998. Electronic (e-mail or internet form) submissions are preferred. Electronic submissions of contributed papers and posters should be sent to the Program Co-Chair at the e-mail address below. Please, no telephone inquiries related to abstract submission or acceptance. Direct all other inquiries to The Wildlife Society office at Tel: (301) 897-9770, Fax: (301) 530-2471, e-mail: <tws@wildlife.org>. Decisions concerning acceptance of papers and posters will be made by 30 November 1998. The abstract submission form can be found on the TWS webpage <http://www.wildlife.org/abstract.html>. Dr. W. Daniel Edge, Co-Chair, Program Committee, Department of Fisheries and Wildlife, Oregon State University, 104 Nash Hall, Corvallis, Oregon 97331-3803, USA, e-mail - <daniel.edge@orst.edu>, <edged@netten.net>, also <http://www.wildlife.org>.

22nd Annual Meeting of the American Society of Primatologists, 12-16 August, 1999, Fairmont Hotel, New Orleans, Louisiana, USA. Contact information: Program Chair, Dr. Mollie Bloomsmith, TECHLab, Zoo Atlanta, 800 Cherokee Ave., S.E., Atlanta, Georgia 30315, USA, Tel: (404) 624 5990, Fax: (404) 627-7514, e-mail: <mbloomsmith@mindsprin.com>. Local Arrangements Chair: Dr. Margaret Clarke, Department of Anthropol-

ogy, Tulane University, 1021 Audubon Street, New Orleans, LA 70118, Tel: (504) 865-5336, Fax: (504) 865-5338, e-mail: mrclarke@mailhost.tcs.tulane.edu>. ASP website: <http://www.asp.org>.

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

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

Contributions

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

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

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