Cheney, R. M. Seyfarth, R. W. Wrangham and T. T. Struhsaker (eds.), pp.44–53. University of Chicago Press, Chicago.

Rosenberger, A. L., Norconk, M. A. and Garber, P. A. 1997. New perspectives on the pitheciines. In: *Adaptive Radiations of Neotropical Primates,* M. A. Norconk, A. L. Rosenberger and P. A. Garber (eds.), pp.329–334. Plenum Press, New York.

Ryan, K. 1995. Preliminary report on the social structure and alloparental care in *Pithecia pithecia* on an island in Guri reservoir. *Am. J. Primatol.* 36: 187.

Schomburgk, R. 1848. *Versuch einer Fauna und Flora von Britisch-Guiana.* Weber, Leipzig.

Schomburgk, R. 1876. *Botanical Reminiscences in British Guiana.* W.C. Cox, Adelaide.

Setz, E. Z. F. and Gaspar, D. D. 1997. Scent-marking behaviour in free-ranging golden-faced saki monkeys, *Pithecia pithecia chrysocephala*: Sex differences and context. *J. Zool., Lond.* 241(3): 603–611.

Sommer, V. and Reichard, U. 2000. Rethinking monogamy: The gibbon case. In: *Primate Males: Causes and Consequences of Variation in Group Composition,* P. M. Kappeler (ed.), pp.159–168. Cambridge University Press, Cambridge.

Sussman, R. W. and Phillips-Conroy, J. 1995. A survey of the distribution and diversity of the primates of Guyana. *Int. J. Primatol.* 16: 761–792.

Ter Steege, H. 1990. *A Monograph of Wallaba, Mora, and Greenheart.* Stichting Tropenbos, Wageningen.

Ter Steege, H. 1993. *Patterns in Tropical Rain Forest in Guyana.* Stichting Tropenbos, Wageningen.

Terborgh, J. and Andresen, E. 1998. The composition of Amazonian forests: patterns at local and regional scales. *J. Trop. Ecol.* 14: 645–664.

Van Roosmalen, M. 1985. *Fruits of the Guianan Flora.* University of Utrecht, Utrecht.

Van Schaik, C. P. and Dunbar, R. I. M. 1990. The evolution of monogamy in large primates: a new hypothesis and some crucial tests. *Behaviour* 115: 241–261.

Wittenberger, J. F. and Tilson, R. L. 1980. The evolution of monogamy: hypotheses and evidence. *Ann. Rev. Ecol. Sys.* 11: 197–232.

DIURNAL ACTIVITY BUDGETS OF BLACK SPIDER MONKEYS, *ATELES CHAMEK,* IN A SOUTHERN AMAZONIAN TROPICAL FOREST

Robert B. Wallace

Introduction

In the last twenty years an increasing number of field studies have demonstrated the potential behavioral flexibility within individual primate species. Until recently few published studies existed for any one primate genus, and thus all populations of a given species were inevitably 'tarred with the same behavioral brush' of just one focal study group. Whilst detailed behavioral studies of some primate genera are still scarce, for example the incredibly wide ranging *Cacajao* in the Neotropics (but see Ayres, 1989), today many primate genera have been studied at a number of long-term field sites. In this paper, I present data on diurnal variations in black spider monkey activity budgets from a previously unstudied focal study group in eastern Bolivia, and compare these results with other long-term *Ateles* study sites.

Study Site

The study was conducted in the Noel Kempff Mercado National Park of 15,300 km² in the north-eastern corner of Departmaento Santa Cruz, Bolivia (see Fig. 1). The Río Iteñez defines the park's eastern and northern edges, and represents the border with the neighboring Brazilian states of Rondônia and Mato Grosso. The region is situated on the Brazilian Shield geological formation, which is characterized by poor kaolinitic clay and podsol soils (PLUS-CORDECRUZ, 1994; Peres, 1997). The region has been characterized by a marked dry season in the austral winter, a mean annual temperature of *c.*26°C, and an annual precipitation of *c.*1,600 mm (Wallace, 1998).

Figure 1. Map showing the location of the Noel Kempff Mercado National Park, Bolivia.

Research was based at Lago Caiman (13°36'S, 60°55'W), a large oxbow lake at the base of the northern tip of the Huanchaca escarpment, and approximately 21 km upstream from an international tourist centre "Flor de Oro". A 400 ha study plot (2 x 2 km) with a grid system of trails spaced every 100 m was set up approximately 3.5 km from camp. Subsequently, trails were cut to include a further *c.*100 ha to cover parts of the focal spider monkey community range not encompassed by the 400-ha grid. The Lago Caiman study plot contained a number of structurally and floristically distinct habitats: tall forest, low vine forest, *sartenejal* or swamp forest, piedmont forest and cerrado forest (Wallace, 1998).

Methods

Following habituation, data was collected on the behavioral ecology of a focal spider monkey community for 11 months between June 1996 and April 1997. The focal spider monkey community was made up of approximately 55 individuals at the beginning of data collection (June 1996). Subadults were visibly smaller than adults and, following McFarland Symington (1988a), were considered subadult until they reached 80–90% the size of adults. All other young animals were considered juveniles except infants that were carried ventrally or laterally by their mothers.

Ateles has a fission-fusion social system and subgroup size and composition change frequently throughout the day (Chapman, 1990; McFarland Symington, 1988b; Van Roosmalen, 1985). To control for this aspect of their behavioural ecology I made individual monkeys the focus of all-day follows. Thus, each month I attempted to follow four adult females (F), four adult males (M), and one sub-adult male (SAM) for a total of nine days during two temporally distinct sessions of up to five days. Attempts were made to randomize the data sampling regime; in the pre-dawn one of five radio-collared males was randomly selected as the initial spider monkey contact and a focal follow animal (FFA) was selected from the animals present at the sleeping site. Whenever possible the age/sex class of the FFA corresponded with a randomly ordered list of the nine day standard monthly sample.

FFAs were followed from dawn to dusk (approx. 0515–0615 to 1745–1845). If an FFA was lost I continued with another individual of the same age/sex class from the same subgroup. If this was not possible I made attempts to rapidly locate another subgroup and continue. These two scenarios were considered 'broken' all-day follows. Occasionally it was not possible to continue, either because the subgroup climbed the inaccessible escarpment and/or it was not possible to rapidly locate a second subgroup. The day was then considered a 'half' or 'quarter' day. If necessary AM 'half' or 'quarter' days were made up at a later stage with an afternoon follow on the same age/sex class. Between January–March 1997 I was unable to collect nine days of data due to illness and other research commitments.

Point scan sampling (Altmann, 1974; Dunbar, 1976) at 15-minute intervals was used to gather data on activity budgets, diet and social behavior. Scans lasted five minutes and data were collected on as many animals as possible. The total number of animals included in any one scan depended on subgroup size and ranged between 1–11 animals per scan. At each scan, data on the following parameters were recorded: climate, location and habitat type, subgroup size, spread, and dominant activity, and the presence of other frugivorous species, as well as the activity of each scanned individual (Wallace, 1998).

Monthly activity budgets were calculated for each of the following age/sex classes: adult and subadult females combined, adult males, subadult males, and non-infant juveniles. In order to provide information on diurnal activity budgets each age/sex class sample was divided into hourly intervals and calculated as follows:

$$\frac{(\text{records for activity } i)}{(\text{records for all activities})} \times 100$$

where i = feeding, resting, travelling or other behaviours. An average activity budget for the spider monkey community was established by averaging the activity budget of the four age/sex classes, weighted by their proportion within the focal community.

Unless otherwise specified the data presented was analysed using non-parametric statistical tests (Siegal and Castellan, 1988). The standard probability level of $p<0.05$ was set, although non-significant trends are also discussed.

Results and Discussion

Age/Sex Class Activity Budget Variations

Overall, at Lago Caiman spider monkeys spend on average 18.9% of daylight hours feeding, 29.7% moving, 45.5% resting, and 5.9% engaged in other activities such as social behavior, vocalization, defecation and urination. Thus, approximately half of the day is spent either resting or engaged in other activities, with the other half divided between feeding and moving. The overall activity budget displayed by the focal spider monkey community at Lago Caiman appears to be fairly typical of previous long-term studies of the genus (see Table 1).

Nevertheless, there were variations in activity budgets between age/sex classes (see Fig. 2). Most strikingly, juveniles spent over double the amount of time in 'other' activities than other age/sex classes. Given that juveniles spent the majority of the day in the same subgroup as their mother, I compared juvenile and adult female time budgets. There were no

Table 1. Comparison of activity budgets for five *Ateles* long-term study populations.

Activity	Bolivia[1]	Peru[2]	Colombia[3]	Brazil[4]	Venezuela[5]
% Feeding Time	18.9	29	22.2	18	50.5
% Moving Time	29.7	26	14.8	36	18.1
% Resting Time	45.5	45	63	45	23.7
% Other Time[a]	5.9	no data	no data	no data	7.7

[1]This study (*Ateles chamek*), [2]McFarland Symington (1988b) (*A. chamek*), [3]Klein & Klein (1977) (*A. belzebuth*), [4]Nunes (1995) (*A. belzebuth*), [5]Castellanos (1995) (*A. belzebuth*). [a]Includes social and physiological function behavioral categories.

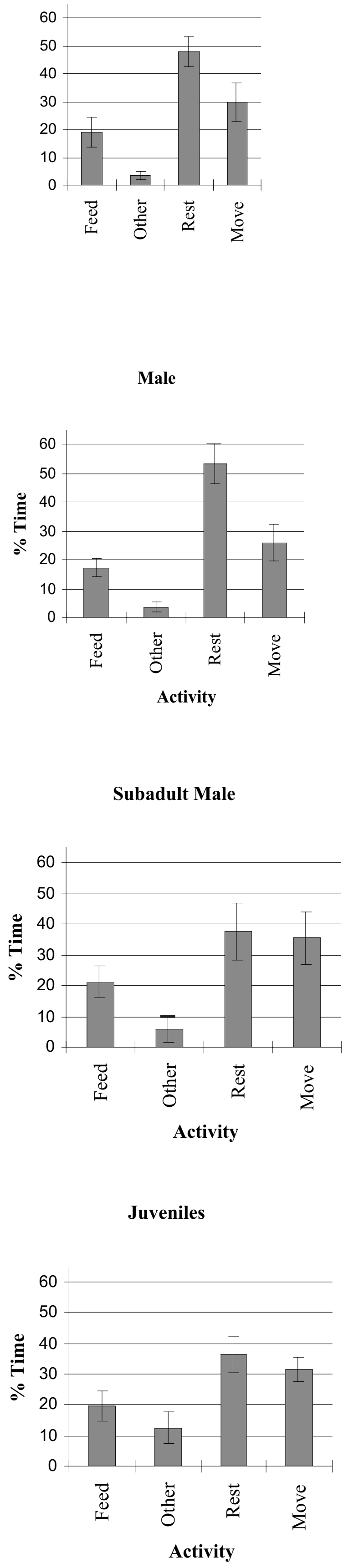

Figure 2. Age/sex class variations in overall activity budgets.

significant differences in monthly activity budget proportions for feeding and moving, but resting and other behaviors were significantly different (Rest - Wilcoxon T = 0, $p<0.005$, N = 11; Other - Wilcoxon T = 0, $p<0.005$, N = 11). The majority of juvenile 'other' time was spent in play behavior (77.8 %), which usually consisted of wrestling and chasing involving up to five individuals. Indeed, juveniles were most frequently observed playing together whilst their mothers slept towards the end of prolonged rest periods.

Subadult males were also frequently observed playing (45.9% of 'other' activities) and this accounts for the relatively high 'other' portion of the activity budget. When monthly activity budget proportions were compared with adult males (see Fig. 1), subadult males spent significantly more time moving and feeding and significantly less time resting (Move - Wilcoxon T = 0, $p<0.005$, N = 11; Feed - Wilcoxon T = 5, $p<0.02$, N = 11; Rest - Wilcoxon T = 0, $p<0.005$, N = 11). These results may reflect the subordinate status of subadult individuals (Eisenberg and Kuehn, 1966). Subadult males may have to spend more time feeding because they are restricted to fringe areas of fruiting resources. Alternatively, these increases may be linked to the energetic costs of growth (Dunbar, 1988). The fact that they spend less time resting than adult males is partly explained by the increases in feeding and 'other' activities, but more so by the increase in proportion of time spent moving. Subadult males and to a lesser extent large juvenile males were frequently observed in male-dominated subgroups which often appeared to be patrolling the focal community home range extensively. This feature of spider monkey behavior has been previously reported (Eisenberg, 1976; McFarland Symington, 1990) and may represent a form of sub-adult male recruitment in a male philopatric primate society.

Males spent significantly more time resting than females (Wilcoxon T = 11, $p<0.005$, N = 11) and significantly less time moving (Wilcoxon T = 7, $p<0.05$, N = 11), whilst females spent more time feeding, although this was only approaching significance (Wilcoxon T = 12, p = 0.07, N = 11). Males and females showed very similar levels of 'other' behaviors and this similarity extended to the overall breakdown of the miscellaneous activities within this category (Wallace, 1998). The additional costs of lactation and pregnancy offer the best explanation as to why females spend more time feeding than adult males; however, an explanation for the differences in resting and moving is more problematical. One possibility is that females are forced to travel at slower rates than adult males because of the additional costs of carrying non-independent infants and juveniles. Even in the case of females with independent juveniles, the need to slow down and wait for these smaller individuals may increase moving time, thereby cutting into resting time.

Diurnal Activity Patterns

Diurnal variations in the spider monkey activity budget are depicted in Figure 3. Spider monkeys show an initial early morning peak in feeding, which then drops off, remaining constant until mid-morning. Feeding behavior then falls considerably until mid- to late afternoon when it increases to a smaller peak. During this second period spider monkeys are presumably attempting to maximize food ingestion prior to the prolonged overnight fasting period (Chapman and Chapman, 1991).

In a review of the genus, Van Roosmalen and Klein, 1988, suggested that *Ateles* are selecting for dietary variability, with subgroups consistently eating more than one fruit type per follow day. In fact, patterns of diurnal dietary diversity were apparent at Lago Caiman; spider monkeys appeared to concentrate on one or two resources for most of the day and then feed for brief periods on a greater variety of resources towards the end of the day, especially on their way to the sleeping site. This observation could be seen as a way of opportunistically maintaining a full stomach right up until retiring for the long night. Alternatively, once daily energy intake has been maximized *Ateles* may select for some dietary diversity in order to provide a more varied nutrient and mineral intake.

In Costa Rica, spider monkeys ingested relatively more leaves immediately prior to periods of prolonged rest. This diurnal pattern of folivory has been attributed both to the difficulty and added time involved in digesting folivorous material, and of the need to maintain sufficient stomach space for more energetically profitable fruit during foraging sessions (Chapman and Chapman, 1991). The tendency for spider monkeys to consume folivorous material later in the afternoon was also noted by Van Roosmalen (1985) in Suriname. At Lago Caiman a similar diurnal pattern emerges (see Fig. 4), with spider monkeys clearly consuming more leaves in the afternoon, although a very early morning peak in leaf eating also occurs. Folivory is usually rare and the pattern may be less clear because of the months where leaf eating was more important. Thus, I examined the diurnal distribution of the start times of all observed leaf feeding sessions (see Fig. 5), and this shows a much more dramatic pattern which concurs with the above hypothesis.

An alternative explanation regarding diurnal patterns of leaf consumption by primates was suggested by Ganzhorn and Wright (1994). Their results only partially supported the hypothesis that temporal variations in folivory might be linked to varying diurnal protein concentrations in leaf material. However, species which are maximizing energy intake (in the form of sugars) should apparently eat leaves late in the day (Ganzhorn and Wright, 1994), as spider monkeys seem to do. Most folivorous material consumed was

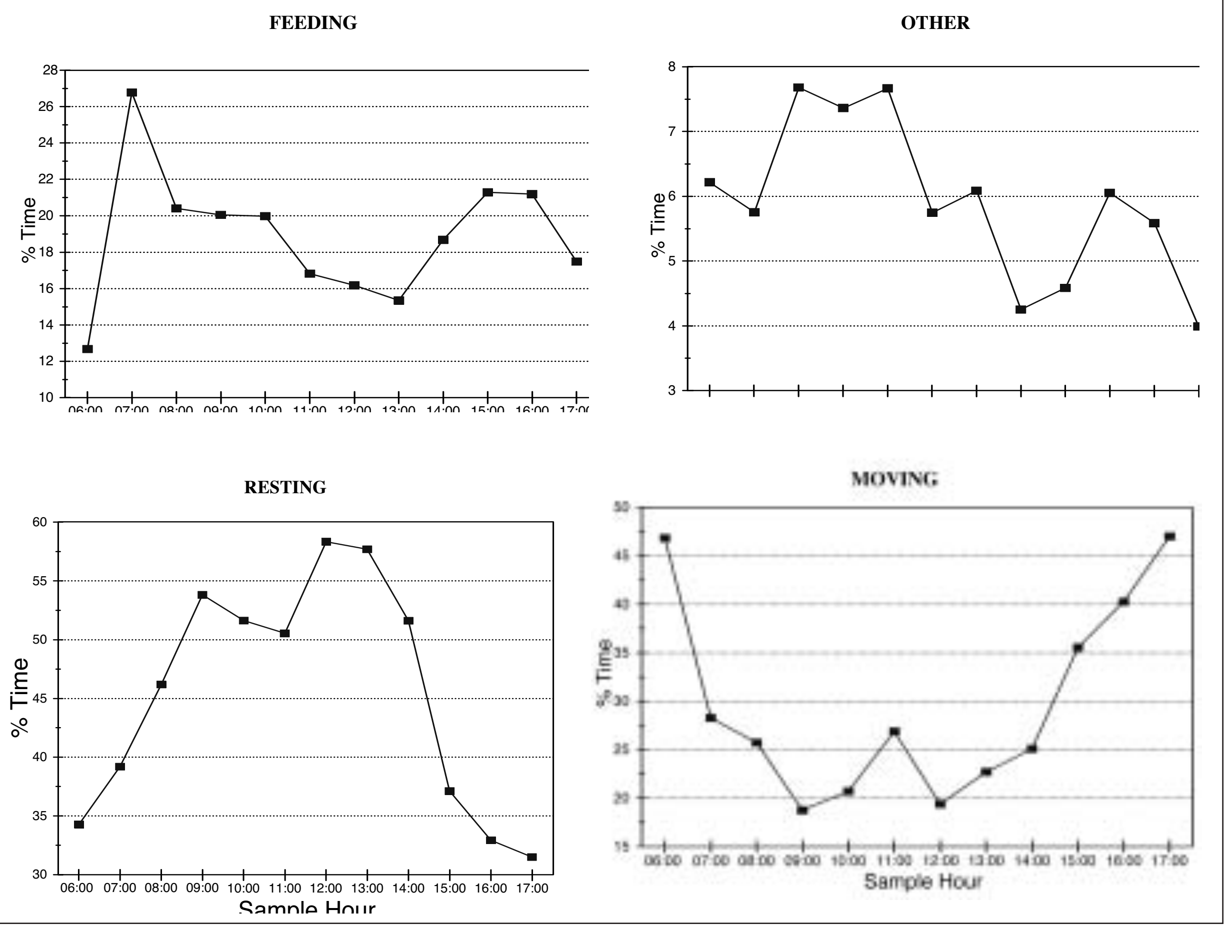

Figure 3. Diurnal variations in spider monkey activity budgets.

the younger leaves of several high canopy liana species, along with young leaves of a few tree species (Wallace, 1998). This pattern of leaf selection is similar to several primate species including *Ateles* (Van Roosmalen, 1985; Chapman, 1987; Castellanos, 1995). Young leaves are known to be easier to digest than those more mature (Hladik, 1978), contain fewer toxins (McKey *et al.*, 1981), higher levels of protein and energy (Milton, 1982), and may also be an important source of minerals and nutrients such as potassium, magnesium, phosphorus and nitrogen (Waterman, 1984).

Time spent moving shows two pronounced peaks, one in the very early morning and another in mid to late afternoon as spider monkeys are traveling from and to sleeping sites respectively. From an energy conserving point of view these two periods represent the coolest times of the day and travel costs would thus be significantly reduced. Otherwise time spent traveling remains fairly constant and the overall pattern of moving is inversely related to the diurnal pattern of resting. Resting time increases throughout the day showing a first peak in the mid-morning (0900–1000) by which time monkeys may well have filled their stomachs. A second more pronounced resting peak occurs at midday continuing into early afternoon (1200–1400), before dropping off dramatically later in the day. This second peak dominates the activity budget at this time of day and is best explained by the corresponding peak in ambient temperatures which, along with high humidity levels, presumably inhibits thermoregulation, thereby discouraging strenuous activity such as travel. Overall these patterns are fairly typical for diurnal primate species living in tropical conditions (Clutton-Brock, 1977), and extremely similar to those documented for *Ateles paniscus* in Suriname (Van Roosmalen and Klein, 1988).

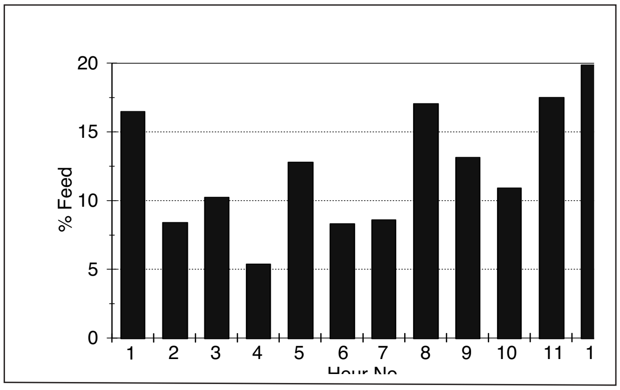

Figure 4. Diurnal variations in degree of folivory in the spider monkey diet.

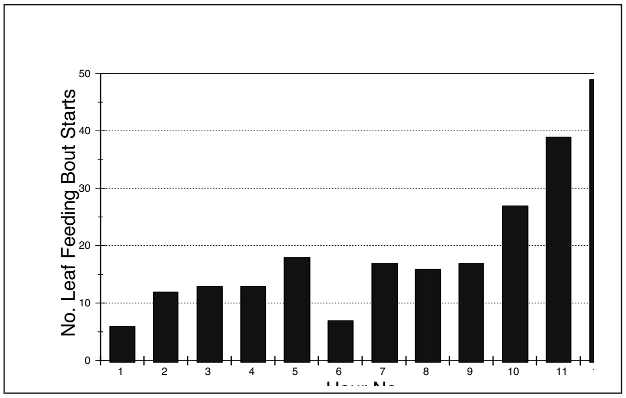

Figure 5. Distribution of start times for folivory patch feeding sessions.

Climatic Effects on Activity Patterns

Extremes in the ambient temperature also affected diurnal activity budgets, for example, during the mid-austral winter cold southerly winds can occasionally lower temperatures to as little as 6°C. In such conditions spider monkeys often remained resting in overnight sleeping sites or high up in large emergents for 3–4 hours after day break, as if waiting for the day to warm up and/or maximizing insolation potential. On one extremely cold and wet morning (28 June 1996) the focal subgroup remained motionless until as late as 13:00 hrs.

As has been demonstrated for other diurnal arboreal primate species (Raemakers, 1980; Barrett, 1995), rainfall also affected spider monkey behavior. Although during light drizzly rain the spider monkeys continue apparently unaffected (unless also particularly cold at the time), more typical heavy tropical downpours result in the monkeys taking shelter and resting motionless until the rain stops. In summary, the focal follow animal's subgroup was dominated by resting individuals in 76% of those scan samples that occurred during rainfall.

Two other behaviors were directly associated with rain, firstly, a 'bathing' form of autogrooming was often witnessed during and immediately following rainfall, especially if the rainfall was the first for several days. This behavior has been previously reported for free-ranging spider monkeys (Eisenberg and Kuehn, 1966) and is particularly notable given the relatively low grooming frequencies displayed by spider monkeys at Lago Caiman (1% of the overall activity budget), and in general (Symington, 1988a; van Roosmalen and Klein, 1988).

The second behavior was rare but extremely dramatic; several pilo-erecting adult and subadult males would repeatedly charge around particularly open and connected emergent and upper canopy trees. This movement included running but was dominated by brachiating and, along with inter-community disputes, was the fastest that spider monkeys were ever seen traveling during the study. On the few occasions this behavior was witnessed it appeared to correlate with the coming of rains, which often also brought heavy winds. The fact that only males were observed in this activity suggests the possibility that this behavior serves as an intra-community male display. Intriguingly, an extremely similar behavioral response to the arrival of rains has been described for adult male chimpanzees (*Pan troglodytes*) at Gombe (Goodall, 1986) and termed a 'rain dance'. Spider monkeys and chimpanzees have been frequently compared in the past due to the fission-fusion nature of their social systems (McFarland Symington, 1990, Chapman *et al.*, 1995).

Acknowledgements

This research was funded by the Wildlife Conservation Society (WCS) through a grant from the Bolivian Sustainable Forestry Project (BOLFOR), which is jointly financed through USAID and the Bolivian Government. I would like to thank the Bolivian National Secretariat for Protected Areas for permission to work in Noel Kempff Mercado National Park and the National Directorate for the Protection of Biodiversity for help in acquiring necessary research permits. Field work was also facilitated through logistical support from the Fundación Amigos de la Naturaleza (F.A.N.). Many thanks to the following individuals who helped during field work: Lilian Painter, William Karesh, Damian Rumiz, Chris Stromquist, Angel Saldania, Nicolas Tagua, Walter Perez, Bonifacio Mostacedo. A special debt of gratitude to Jose Chuvina, my research assistant.

Robert B. Wallace, Wildlife Conservation Society, 185th Street and Southern Boulevard, Bronx, New York 10460, USA. *Address for correspondence:* Wildlife Conservation Society – Madidi, 3-35181, San Miguel, La Paz, Bolivia, e-mail: <wcsmadidi@mail.zuper.net>.

References

Altmann, J. 1974. Observational study of behaviour: Sampling methods. *Behaviour* 48: 1–41.

Ayres, J. M. 1989. Comparative feeding ecology of the uakari and bearded saki, *Cacajao* and *Chiropotes*. *J. Hum. Evol.* 18: 697–716.

Barrett, L. 1995. Foraging strategies, ranging behaviour and territoriality among grey-cheeked mangabeys in Kibale forest, Western Uganda. Doctoral Thesis, University College London, London.

Castellanos, H. G. 1995. Feeding behaviour of *Ateles belzebuth* E. Geoffroy, 1806 (Cebidae: Atelinae) in Tawadu Forest southern Venezuela. Doctoral Thesis, University of Exeter, UK.

Chapman, C. 1987. Flexibility in diets of three species of Costa Rican primates. *Folia Primatol.* 49: 90–105.

Chapman, C. 1990. Association patterns of spider monkeys: the influence of ecology and sex on social organization. *Behav. Ecol. Sociobiol.* 26: 409–414.

Chapman, C. and Chapman L. J. 1991. The foraging itinerary of spider monkeys: When to eat leaves? *Folia Primatol.* 56: 162–166.

Chapman, C. A., Wrangham, R. W. and Chapman, L. J. 1995. Ecological constraints on group size: An analysis of spider monkey and chimpanzee subgroups. *Behav. Ecol. Sociobiol.* 36: 59–70.

Clutton-Brock, T. H. 1977. Some aspects of intraspecific variation in feeding and ranging behaviour in primates. In: *Primate Ecology: Studies of Feeding and Ranging Behaviour in Lemurs, Monkeys, and Apes*, T. H. Clutton-Brock (ed.), pp.539–556. Academic Press, London.

Dunbar, R. I. M. 1976. Some aspects of research design and their implications in the observational study of behaviour. *Behaviour* 58: 78–98.

Dunbar, R. I. M. 1988. *Primate Social Systems.* Croom Helm, London and Sydney.

Eisenberg, J. F. and Kuehn, R. E. 1966. The behaviour of *Ateles geoffroyi* and related species. *Smithson. Misc. Coll.* 151: 1–63.

Eisenberg, J. F. 1976. Communication mechanisms and social integration in the black spider monkey (*Ateles fusciceps robustus*), and related species. *Smithson. Contrib. Zool.* (213): 1–108.

Ganzhorn, J. U. and Wright, P. C. 1994. Temporal patterns in primate leaf eating: The possible role of leaf chemistry. *Folia Primatol.* 63: 203–208.

Goodall, J. 1986. *The Chimpanzees of Gombe - Patterns of Behaviour*. Belknap Harvard Press, London.

Hladik, A. 1978. Phenology of leaf production in rain forest of Gabon: Distribution and composition of food for folivores. In: *The Ecology of Arboreal Folivores*, G. G. Montgomery (ed.), pp.51–71. Smithsonian Institution Press, Washington, DC.

Klein, L. L. and Klein, D. J. 1977. Feeding behaviour of the Columbian spider monkey. In: *Primate Ecology*, T. H. Clutton-Brock (ed.), pp.153–180. Academic Press, New York.

McFarland Symington, M. 1988a. Demography, ranging patterns, and activity budgets of black spider monkeys (*Ateles paniscus chamek*) in the Manu National Park, Peru. *Am. J. Primatol.* 15: 45–67.

McFarland Symington, M. 1988b. Food competition and foraging party size in the black spider monkey (*Ateles paniscus chamek*). *Behaviour* 105: 117–134.

McFarland Symington, M. 1990. Fission-fusion social organization in *Ateles* and *Pan*. *Int. J. Primatol.* 11: 47–61.

McKey, D. B., Garland, J. S., Waterman, P. G. and Choo, G. M. 1981. Food selection by black colobus monkeys (*Colobus satanus*) in relation to plant chemistry. *Biol. J. Linn. Soc.* 16: 115–146.

Milton, K. 1982. Dietary quality and demographic regulation in a howler monkey population. In: *The Ecology of a Tropical Forest: Seasonal Rhythms and Long-term Changes*, E. G. Leigh, A. S. Rand and D. M. Windsor (eds.), pp.273–289. Smithsonian Institution Press, Washington, DC.

Nunes, A. 1995. Foraging and ranging patterns in white-bellied spider monkeys. *Folia Primatol.* 65: 85–99.

Peres, C. A. 1997. Effects of habitat quality and hunting pressure on arboreal folivore densities in Neotropical forests: A case study of howler monkeys (*Alouatta* spp.). *Folia Primatol.* 68: 199–222.

PLUS-CORDECRUZ. 1994. *Plan de Uso de Suelos Total del Departamento de Santa Cruz.* Cordecruz, Santa Cruz, Bolivia.

Raemakers, J. J. 1980. Causes of variation between months in the distance travelled daily by gibbons. *Folia Primatol.* 34: 46–60.

Van Roosmalen, M. G. M. 1985. Habitat preferences, diet, feeding strategy, and social organization of the black spider monkey (*Ateles p. paniscus* Linnaeus 1758) in Surinam. *Acta Amazonica* 15 (supl.): 1–238.

Van Roosmalen, M. G. M and Klein, L. L. 1988. The spider monkeys, genus *Ateles*. In: *Ecology and Behavior of Neotropical Primates, Vol. 2.,* R. A. Mittermeier, A. B. Rylands, A. F. Coimbra-Filho and G. A. B. Fonseca (eds.), pp.455–537. WWF, Washington, DC.

Siegel, S. and Castellan, N. J., Jr. 1988. *Nonparametric Statistics for the Behavioral Sciences*. McGraw-Hill International Edition.

Wallace, R. B. 1998. The behavioural ecology of black spider monkeys in north-eastern Bolivia. Doctoral Thesis, University of Liverpool, Liverpool, UK.

Waterman, P. G. 1984. Food acquisition and processing as a function of plant chemistry. In: *Food Acquisition and Processing in Primates,* D. J. Chivers, B. E. Wood and A. Bilsborough, (eds.), pp.177–211, Plenum Press, London.

DISTRIBUCIÓN PARCIAL DEL TITÍ GRIS (*SAGUINUS LEUCOPUS*, CALLITRICHIDAE) EN EL DEPARTAMENTO DE ANTIOQUIA, COLOMBIA

Carlos A. Cuartas-Calle

Introducción

Saguinus leucopus fue descripto en la localidad tipo de Medellín (Bella Villa) departamento de Antioquia por Günter (1877), la especie era muy numerosa en dicho poblado. El crecimiento de la población humana y la construcción de vías y sitios de vivienda fueron acabando con los remanentes de bosque y aislando y desplazando a las poblaciones de tití gris amenazando la permanencia del tití en dicho hábitat. Los últimos grupos de *S. leucopus* fueron observados en la ciudad de Medellín en la década del treinta (1930–1940), a partir de dicha fecha no se volvió a saber de la especie, la cual fue diezmada de su localidad tipo.

Saguinus leucopus es un primate endémico de Colombia, tiene como zona de distribución el Norte del país, entre la parte baja del Río Cauca y el Valle Medio del Río Magdalena (Hernández-Camacho y Cooper, 1975, Hernández-Camacho y Defler, 1983). Según Cuervo *et al.,* (1986) la especie se distribuye desde el Oriente de Caldas, Norte del Tolima, Antioquia (en el Bajo Cauca y Nechí, y la Hoya del Magdalena). Eisenberg (1989) la ubica en el Valle del Río Magdalena, centro y norte de Colombia, en la margen izquierda del Río Magdalena en el departamento de Antioquia, y en los departamentos de Bolívar y Tolima. Emmons y Feer (1998) la distribuyen al Oriente de los Andes en el piedemonte de la Cordillera Central, entre la margen Oriental del Río Cauca (Bajo Cauca) y la margen Occidental en la parte media del Río Magdalena. También se distribuye en zonas poco anegadizas al Sur del departamento de Bolívar y sectores del Norte del Departamento de Caldas en el corregimiento de Norcasia, y el corregimiento de Guarinó en la parte media y alta de la Quebrada la Burra entre los municipios de Dorada y Honda (observación personal); como también en el sector "Arizona" municipio de La Dorada, Departamento de Caldas, y el sector "San Antonio" municipio de Samaná, Departamento de Antioquia (Vargas y Solano, 1996). Esta especie está catalogada por la UICN y US-ESA (1994) CITES como "En Peligro de Extinción", debido a tres variables: Su marcado endemismo, su rango de distribución restringido (uno de los más reducidos entre los primates del mundo), y la severa reducción y destrucción de su hábitat.En el departamento de Antioquia, aún se conservan bosques primarios, primario intervenido y bosques secundarios, con áreas relativamente extensas que albergan poblaciones de esta especie, pero lastimosamente a la fecha no se han creado áreas de reserva para la protección y conservación de *S. leucopus.*

Area de Estudio

Durante el período 1995–1998 se realizaron varios inventarios de mamíferos en la margen Oriental del Río Cauca, en las subregiones del Bajo Cauca, Nordeste, Norte, Magdalena Medio y Oriente del departamento de Antioquia, en áreas con jurisdicción de CORNARE (Corporación Autónoma Regional de los Ríos Negro y Nare) y CORANTIOQUIA (Corporación Autónoma Regional del Centro de Antioquia). Se visitaron 40 veredas pertenecientes a 17 municipios, con alturas entre los 30 y 1600 msnm, y zonas de vida de bosque húmedo tropical (bh-T) hasta bosque pluvial premontano (bp-PM) (Figura 1 y Tabla 1).

Resultados y Discusión

En este estudio preliminar de la distribución de *S. leucopus* en el departamento de Antioquia, se observaron 95 grupos con un total de 719 individuos (Tabla, 1). También se detectó la presencia de otros primates como: *Cebus albifrons, Alouatta seniculus, Ateles* sp. y *Aotus lemurinus.*

Basado en las observaciones de campo, la distribución geográfica de *S. leucopus* al Sur de Antioquia, corresponde a la margen derecha del Río Cauca, en los límites con el departamento de Caldas (Río Samaná, municipios de Nariño, Argelia y Sonsón), y a la margen izquierda del Río Magdalena, en los límites con el departamento de Boyacá (municipios de Puerto Triunfo). Al Norte se distribuye en límites de los departamentos de Bolívar (municipios de El Bagre y Nechí), y Sucre (municipio de Caucasia) en la margen derecha de los Ríos Cauca y Porce (Figura 1). Los grupos de Tití, se observaron en bosques primarios, primarios intervenidos, secundarios y rastrojos altos y en bosques ribereños.

Los bosques primarios observados se caracterizan por la presencia de un estrato emergente disperso formado por grandes árboles que superan los 30 m de altura y cobertura total mayor del 90%. Los bosques primarios intervenidos presentan coberturas mayores del 90% y alturas entre 7 y 30 m. Las lianas y trepadoras tienen densidades medias. Los bosques secundarios con estados sucesionales medio y tardío presentan alturas entre 5 y 20 m y una cobertura total del 70%. Los estratos arbustivos muestran coberturas del 50% y