Also of interest is the recent observation of unexpected food habits among several lemur species of the region. Here we report an individual of *Eulemur fulvus* preying on an orb-web spider (Araneidae). During a walk in the Analamazaotra forest in February 2006, a group of *Eulemur fulvus* was observed. The group members were feeding on the fruits of forest plants, when the attention of one individual was captured by the presence of an orb-web spider (cf. *Caerostris* sp.). After a first curious inspection of the spider, the lemur withdrew. Only moments later, the individual approached again, grabbed the spider with one hand and ate it. Although the cobweb appeared to irritate the lemur, it finally managed to remove it and chewed on the spider with obvious relish.

Since plants usually form the bulk of lemur diet, predation on invertebrates has often gone unnoticed. The two predominantly folivorous lemur families (Indridae, Lepilemuridae) do not appear to feed on animal prey at all. Most lemur species known to regularly prey on invertebrates belong to the Cheirogaleidae (Mittermeier *et al*., 2006). This is especially the case for both *Allocebus* and *Microcebus* (e.g. Atsalis, 1999b). In *Cheirogaleus* cf *major* invertebrate prey appears to constitute only a minor part of all food items (Ganzhorn, 1988, Wright and Martin, 1995). If invertebrates are taken, Cheirogaleidae (and Daubentonidae – see Sterling, 2003) mostly prey on insects. Spiders are an unusual diet (but see Fietz, 2003), and only *Mirza* is known to more often feed on arachnids (Pagès, 1980; Andrianarivo, 1981; Kappeler, 2003).

Lemuridae, although much more occasionally than Cheirogaleidae, are also known to include invertebrates in their diet. *Lemur catta*, *Eulemur coronatus*, *E. macaco* and *E. sanfordi* have all been reported to prey on invertebrates (Mittermeier *et al*., 2006). *E. sanfordi* seems to be the only species that has been reported to also feed on spiders (Freed, 1996). *Eulemur* species are largely frugivorous (Overdorff and Johnson, 2003) and *E. fulvus* even has a highly variable diet of more than a hundred plant species (Rassmussen, 1999). Our observation of *E. fulvus* preying on a spider may be a further indication of invertebrate prey more often included in lemurid diet than previously thought.

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Activity Budget, Ranging, and Group Size in Silky Sifakas (*Propithecus candidus*)

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Measures of ranging, activity budget, group size, and life history are crucial for both conservation management and hypothesis testing in behavioral ecology. Group size and ranging information are only currently available from two of the four species of rainforest sifaka (Sussman, 2000). Published rainforest sifaka activity budgets are presently available only from *Propithecus edwardsi* (Hemingway, 1999), although the activity budget of *Propithecus d. diadema* (and *Indri*

indri) can be found in Powzyk's (1998) PhD Dissertation. As the first of three objectives of this report, silky sifaka (*Propithecus candidus*) ranging, group size, and life history data are presented and compared to that of other sifakas. Silky sifakas have been elevated to species rank recently (Mayor *et al*., 2004), and are one of the Top 25 most endangered primates (Mittermeier *et al*., 2005; Fig. 1). As the second goal, the first silky sifaka daily activity budget is presented. Finally, lemur females may feed more than males and perhaps be less vigilant (Overdorff, 1998; Wright, 1999; but for a contrary evidence see: Gould *et al*., 1997; Hussmann and Kappeler, 1998; Hemingway, 1999). Thus I test the prediction that these general activity budgets will demonstrate more feeding and less movement for females than males.

Fig. 1: *Propithecus candidus* male (photy by Eric Patel).

Methods

All data for this report, except 'social structure', 'mean group size', and 'range in group size' were collected on the group of 8 silky sifakas at Camp 2 (775 m; 49° 45.7' S / 14° 26.0' E) of Marojejy National Park (Fig. 2) from August 3 2001 - November 18 2001 and July 24, 2002 to June 12, 2003. The group consisted of 1 fully adult male, 2 young or subadult males, 2 adult females, 1 juvenile male, and 2 female infants. The extremely steep cliffs of the Marojejy mountains and the official prohibition against the creation of any sort of trail system precluded the intensive study of more than 1 group.

'Social structure', 'mean group size', and 'range in group size' were calculated from encounters with the following silky sifaka groups: 1) Camp 2 of Marojejy, 2) Between Camp 2 and Camp 3 of Marojejy, 3) Camp 3 of Marojejy,

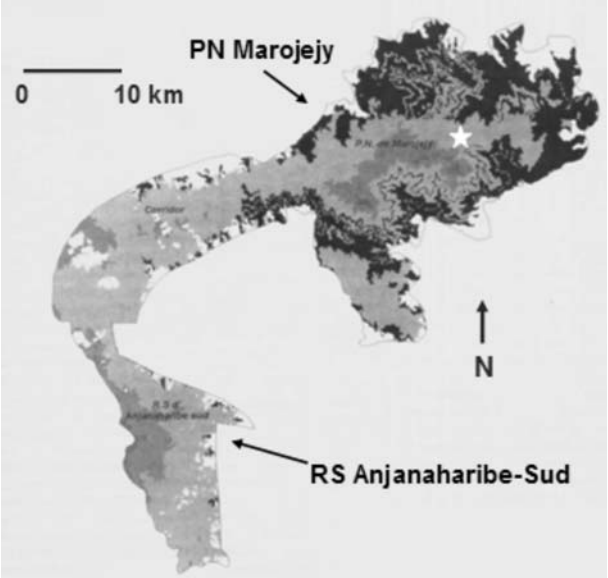

Fig. 2: Map of Marojejy National Park and Anjanaharibe-Sud Special Reserve Location of Marojejy Camp 2 and 3 (marked by star); from Garreau and Manantsara (2003).

4) Site 1a of Anjanaharibe-Sud (see Schmid and Smolker 1998). Further details about Camp 2 and Camp 3 of Marojejy can be found in Goodman (2000). 'Home range size' and 'elevation' were calculated using a Garmin eTrex Vista GPS in the more open regions along the periphery of the home range, such as river beds. 'Daily path length' was calculated from 85 dawn to dusk follows using a Sportline pedometer calibrated to the local terrain. 'Daily travel duration' was calculated using a Timex Ironman stopwatch during 85 dawn to dusk follows. During stationary rest and feeding periods, the stopwatch was paused. 'Activity budget' presented here was calculated from 128 continuous random 30 minute focal animal samples using an ethogram of 64 behaviors. For this analysis, only uninterrupted focals of adult males and females were included. Continuous focal animal sampling was used because, although much more labor intensive than more commonly used instantaneous behavior samples, it provides a more accurate measure of the duration of behaviors (Altmann, 1974). After the completion of behavioral data collection, behaviors were re-coded into 6 mutually exclusive categories for the activity budget: Forage, Move, Sleep, Rest, Social, and Other (scent-marking, vocalizations, directed gaze, urination/defecation).

Mating season was considered the months of November, December, and January based upon personal observation of mountings, long-term data from *P. edwards*i (Pochron *et al*., 2005), and the birth of infants in late June or early July.

Results

Six different groups were encountered in both Marojejy and Anjanaharibe-Sud. These groups ranged in size from 2 to 9 individuals with a mean group size of 4.7. The social structure was 'variable' with three groups polygynandrous and three groups pair-living. The main study group at Camp 2 of Marojejy National Park had a home range size (100 % MCP) of 44 hectares. Elevation ranged from 775 m at Camp 2 up to 1300 m. On several occasions, the group ascended 525 m in vertical eleva-

tion from the lowest to the highest elevation in a single day. Daily path length averaged 712 ± 502 m while mean daily travel duration was a little under 1 hour at 57.5 ± 25.9 min. Table 1 compares ranging and group size across different *Propithecus* taxa. Three infants were born during the study. Litter size was always one. Mean inter-birth interval was 1.67 years which deviates from the expectation of 2 years that is typical of rainforest sifakas. In this study, the oldest adult female gave birth to a healthy infant in consecutive years.

Table 1: Comparisons of sifaka ranging and group size.

	Home Range (ha)	Day Range (m)	Group Size	Reference
P. verreauxi	3-8.5	110-550	2-13	Richard (1978); Jolly *et al.* (1982); Richard *et al.* (1993)
P. tattersalli	8-12	460-1077	3-10	Meyers (1995)
P. edwardsi	50	320-2080	3-9	Wright (1995, pers. comm.)
P. diadema	33-42	1629	3-8	Powzyk (1997)
P. candidus	44[1]	712±502[1]	2-9[1,2,3,4]	[1]This Manuscript; [2]Patel (2003); [3]Duckworth *et al.* (1995); [4]Sterling and Mc Fadden (2000)

The activity budget is displayed in Figure 3. The number of focal samples was approximately evenly distributed across the birth, gestation, lactation, and mating seasons ($X^2_3 = 4.69$; $p > 0.19$). The sex differences in the percentage of time spent moving, resting, and in social behavior were significant. Males moved and engaged in more social behavior than females. Female rested more than males. Although significant, the effect size index (Cohen's d) was low for all three of these categories. No significant sex differences were found for the activity categories 'Forage', 'Sleep', and 'Other' (Table 2).

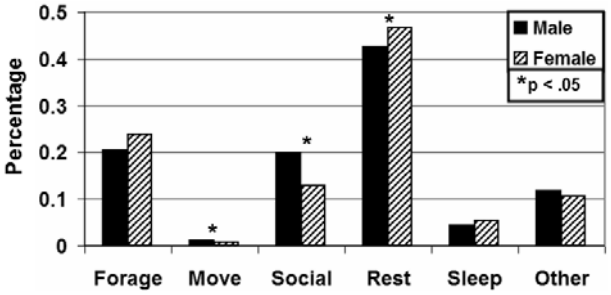

Fig. 3: Silky sifaka activity budget by sex.

Table 2: Sex differences in Silky sifaka activity bout durations; Z and p values are based on Mann-Whitney-U-tests (* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$).

	Z	Sex Difference	Effect Size Index (d)
Forage	Z = 0.22	None	N/A
Move	Z = 2.67**	**Male > Female**	0.05
Social	Z = 6.97***	**Male > Female**	**0.12**
Rest	Z = 2.35*	**Female > Male**	0.10
Sleep	Z = 1.421	None	N/A
Other	Z = 1.230	None	N/A

Discussion

Taken as a whole, these results suggest that silky sifaka ranging, group size, and life history resemble that of other rain forest sifakas (Table 1). However, *P. edwardsi* may have a somewhat larger home range and *P. diadema* a larger day range. As the only major difference, the extreme elevational range of *P. candidus* may exceed all other sifakas. As in *P. edwardsi*, silky sifaka social structure is variable and females may sometimes give birth to 1 infant in consecutive years, although the typical inter-birth interval is 2 years (Wright, pers. comm.; Pochron and Wright, 2003). However, these and other interpretations below must be tempered by the fact that most of the results of this report are limited to a single group of silky sifakas.

This report presented the first silky sifaka activity budget. As is typical of folivores, adult silky sifakas spend most of their day resting (44.4 %) and foraging (21.9%), while also devoting a substantial amount of time to social behavior (16.8 %). Of the six major activity categories, movement consumed the least amount of time (0.9 %). By comparison, *Propithecus d. diadema* may spend more time feeding (37.9 %) and resting (49.4 %), but less time engaged in social behavior (2.4 %). These differences may be species differences or may be due to methodological differences, such as the number of categories and the sampling procedure.

Consistent with prior sifaka research (reviewed in Hemingway, 1999), this activity budget revealed no significant sex difference in foraging duration. However there was a nonsignificant trend for females to forage longer than males which has been found in *Indri indri* (Pollock, 1977).

Silky sifaka adult males did devote slightly, but significantly, more time to movement and social behavior, but less time to resting than females. I often observed long bouts of male-only play on the ground which may well account for the sex difference in social behavior. This may not be true of other rainforest sifakas. For example, female Milne-Edwards' sifakas are known to be full participants in terrestrial play bouts (Wright, pers. comm.). These slight sex differences could reflect the importance of energy conservation to female lemur biology (Wright, 1999), could reflect male vigilance (Overdorff, 1998), or could be nonfunctional. While some work suggests that female lemurs may suffer uniquely high reproductive or metabolic costs (reviewed in Pochron *et al.*, 2003), others question the extent to which female lemurs bear high metabolic costs and possess compensatory behavioral adaptations (Pereira *et al.*, 1999; Hemingway, 1999).

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Cytogenetic and molecular characteristics of a new species of sportive lemur from Northern Madagascar

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Key words: *Lepilemur*, Cytogenetics, mtDNA, Taxonomy, New species

A cytogenetic and molecular study of the sportive lemurs (*Lepilemur*) in northern Madagascar provides evidence that sportive lemurs from the Ampasindava peninsula constitute a separate species, *Lepilemur* sp. nov. The karyotype (2N = 24) differs from the two parapatric species *L. dorsalis* and *L. sahamalazensis* (2N = 26).