Short Articles

The Use of Date Palms (*Phoenix* sp.) as Resting and Sleeping Sites by *Callithrix jacchus* in Northeastern Brazil

Marcelo Oliveira Teles de Menezes

Introduction

As arboreal mammals, primates typically sleep in trees (Anderson, 1998), although there are exceptions such as *Trachypithecus leucocephalus* that use caves (Huang *et al.*, 2003). Primates often sleep in the forks of branches or holes in the trunk (Stevenson and Rylands, 1988), on the surface of leaves (Heymann, 1995; Zhang, 1995; Bitetti *et al.*, 2000) or even in nests they build themselves (Jones *et al.*, 1996).

The structural characteristics of a tree and its surroundings are important when primates choose an arboreal sleeping site. Miranda and Faria (2001) concluded that for *Callithrix penicillata*, the most important aspects are height, the extent of branching, foliage cover, and proximity to food sources. During a study on *Saguinus midas*, Day and Elwood (1999) verified that in 25% of all observations, the tamarins preferred sleeping sites that were closest to their most recent food source. Liu and Zhao (2004) noticed a preference of *Rhinopithecus bieti* for trees with a greater total height and branches growing higher on the trunk, as opposed to trees with a larger crown diameter and branches growing out nearer to the ground. Bitetti *et al.* (2000) noted that the trees chosen by *Cebus apella* were always higher than the canopy and bore a large crown. What is less clear is which factors determine the choice of sleeping sites. Anderson (1998) and Bitetti *et al.* (2000) mentioned several factors that may influence the choice of sleeping sites, such as safety from predators, security from falls, physical comfort, hygiene, avoiding parasites and cohesion of the group.

Little is known about the use of palm trees as sleeping sites by Neotropical primates. Recent studies have reported that *Cebus apella* uses *Jessenia* (Spironello, 2001; Zhang, 1995) and *Syagrus* (Bitetti *et al.*, 2000) to sleep in, while *Jessenia* is also mentioned as providing sleeping sites for *Saguinus mystax* and *S. fuscicollis* (Heymann, 1995). Understanding why palm trees are chosen as sleeping sites may illuminate factors that influence the choice of sleeping trees overall. As monocotyledons, palm trees have distinctive characteristics, such as a lack of branching from the main trunk and a generally even girth along the trunk. According to Zhang (1995), the use of palm trees by primates may be considered a strategy for avoiding predators: the single trunk poses a challenge to wild cats and snakes, and the dense leaves at the crown are a natural alarm system, rustling at any touch and alerting the monkeys if a predator intrudes.

Palms of the genus *Phoenix* are not native to South America, but they are planted worldwide as ornamentals. *Phoenix* palms have pinnate leaves with spines in the petiole, and a dense crown with up to 200 leaves; they may reach a height of over 20 m (Lorenzi and Souza, 1996). Here I report on the use of *Phoenix* palms for resting and as a sleeping site by a group of marmosets, *Callithrix jacchus*, on the campus of the federal university in the city of Fortaleza, Ceará.

Methods

This study took place at the Campus do Pici of the Universidade Federal do Ceará in Fortaleza, Ceará, in northeastern Brazil. Five free-ranging individuals made up the study group: two adults, two juveniles and an infant. The group inhabited a highly fragmented area under intense urban interference, with a number of planted trees and much traffic of vehicles and pedestrians. Observations *ad libitum* were made from 26 July to 24 September, 2004.

Results

On seven occasions I was able to observe the group leaving the same *Phoenix* palm, one by one, between 0524 and 0545 hrs. On two occasions, the group slept in the palm tree for two consecutive nights. On various other occasions, I observed the group climbing, resting or leaving that tree and four other *Phoenix* palms during the day. All five *Phoenix* were in an isolated forest patch of 0.48 ha.

The palm tree most often used for sleeping (Fig. 1) was the immediate neighbor of two *Enterolobium contortisiliquum*

Figure 1. *Phoenix* sp. used as a sleeping site.

(Leguminosae), one of which was the first tree of the day to be visited, where the marmosets gouged and fed on the exuded gum. In the same fragment I found 14 individuals of *Mangifera indica* (Anacardiaceae), four *Anacardium occidentale* (Anacardiaceae), one *Psidium guajava* (Myrtaceae), a further three *E. contortisiliquum* (Leguminosae), and a total of 20 *Phoenix* date palms. The trunk of the primary sleeping-palm was 45 cm in diameter (DBH); the tree's height was approximately 14 m, and its leaves averaged 4.15 m in length.

The marmosets slept amongst the leaf bases, which were smooth and wider than the petiole; with a width of ~15 cm, they are large enough to accommodate a marmoset without great postural demands—one of the factors mentioned by Anderson (1998) as important in the choice of the sleeping site. The animals accessed the leaf bases in two ways: 1) by jumping from a neighboring tree to a palm leaf, reaching the leaf base by its central rib or rachis (an option only possible when the crown of the neighboring tree was of a similar height to the palm's own crown); and 2) jumping from the crown of a neighboring tree to the trunk of the palm, and climbing up to the crown using their claws. In the latter case, the crown height of the neighboring tree was usually lower than that of the palm. There are spines (Fig. 2) along the lower third of the petiole, close to the leaf base, where the marmosets slept. These spines tended to be longer the further they were from the base of the leaf.

Discussion

The height of the palm trees, together with their lack of branches, protects the marmosets not only from natural predators, but humans as well. Although it is no longer legal in Brazil to transport them or keep them as pets, traffic in these animals for the pet trade was once widespread. Their perch on the leaf bases helps to keep the marmosets secure from raptors; the dense crown of leaves screens them from view, and the many spines would serve as a pointed deterrent. A notable aspect, easily seen in Figure 1, is the complete lack of contact with the surrounding vegetation. Any predator entering could only jump onto the leaves or climb up the trunk. The large leaves may also protect the marmosets from rain, although this was not observed during the period of the study. Heymann (1995) points out that *Jessenia* palms offer protection from the rain for *Saguinus*. It is impossible to see the animals from the ground without the aid of binoculars, unless the marmoset is stretching its neck to look out.

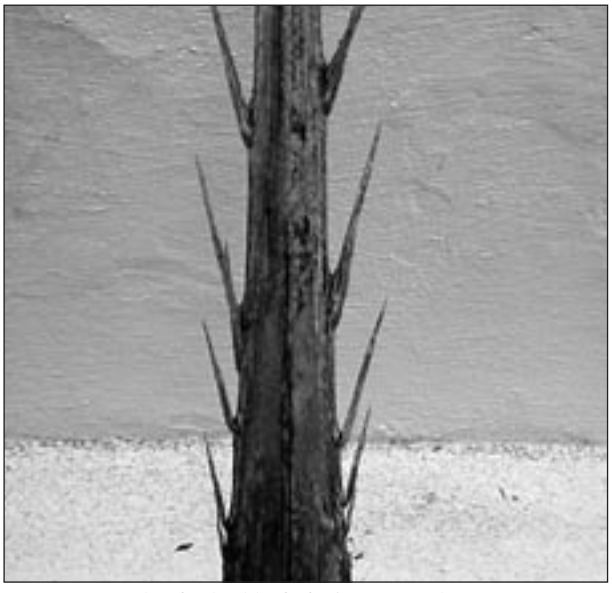

Figure 2. Petiole of a dead leaf of *Phoenix* sp., showing its spines.

Bitetti *et al.* (2000) concluded that their study group of *Cebus apella* did not choose sleeping sites by chance; rather, they preferred high trees with wide crowns, suggesting safety from predators was a deciding concern. That preference was also reflected in the frequent use of those trees. This would appear to contradict the idea that rotation of sleeping sites is to elude predators and parasites (see Stevenson and Rylands, 1981), although the key factor in this case may be the small number of appropriate sites, with the few available being of superior quality.

Conclusions

The marmosets' preference for sleeping in the *Phoenix* palm fits well with the factors mentioned by Bitetti *et al.* (2000), Miranda and Faria (2001) and Liu and Zhao (2004): the favored tree was higher than the canopy formed by *Mangifera indica* and *Anacardium occidentale*, was close to the food source (*E. contortisiliquum*), and possessed dense foliage and an unbranched trunk. The use of these *Phoenix* palms in this urban setting would seem to support the hypothesis of predator avoidance, besides evidently being comfortable (Anderson, 1998).

Acknowledgments: To Victor Pereira Torres, for support in carrying out this work; to Wilson Roberto Spironello, James R. Anderson and Eckhard W. Heymann for help with the literature; to George Machado Tabatinga Filho for help in measuring tree heights; to Paulo Cascon for reviewing this article, and Márcia Regina Pereira de Oliveira for assistance with translation.

Marcelo Oliveira Teles de Menezes, Departamento de Biologia, Universidade Federal do Ceará (UFC), Campus do Pici, Centro de Ciências, Bloco 906, Pici, Fortaleza 60451-970, Ceará, Brazil. E-mail: <mteles@gmail.com>.

References

Anderson, J. R. 1998. Sleep, sleeping sites and sleep-related activities: Awakening to their significance. *Am. J. Primatol.* 46: 63–75.

Bitetti, M. S., Vidal, E. M. L., Baldovino, M. C. and Benesovsky, V. 2000. Sleeping site preferences in tufted capuchin monkeys (*Cebus apella nigritus*). *Am. J. Primatol.* 50: 257–274.

Day, R. T. and Elwood, R. W. 1999. Sleeping site selection by the golden-handed tamarin *Saguinus midas midas*: The

role of predation risk, proximity to feeding sites, and territorial defence. *Ethology* 105(12): 1035–1051.
Heymann, E. W. 1995. Sleeping habits of tamarins, *Saguinus mystax* and *Saguinus fuscicollis* (Mammalia, Primates, Callitrichidae), in northeastern Peru. *J. Zool., Lond.* 237: 211–226.
Huang, C., Wei, F., Li, W., Li, Y. and Sun, R. 2003. Sleeping cave selection, activity pattern and time budget of white-headed langurs. *Int. J. Primatol.* 24(4): 813–824.
Jones, C., Jones, C. A., Jones Jr., J. K. and Wilson, D. E. 1996. *Pan troglodytes. Mammalian Species* 529: 1–9.
Liu, Z. H. and Zhao, Q. K. 2004. Sleeping sites of *Rhinopithecus bieti* at Mt. Fuhe, Yunnan. *Primates* 45(4): 241–248.
Lorenzi, H. and Souza, H. M. 1996. *Palmeiras no Brasil: Nativas e Exóticas*. Nova Odessa, São Paulo.
Miranda, G. H. B. and Faria, D. S. 2001. Ecological aspects of black-pincelled marmoset (*Callithrix penicillata*) in the *cerradão* and dense *cerrado* of the Brazilian central plateau. *Brazil. J. Biol.* 61(3): 397–404.
Spironello, W. R. 2001. The brown capuchin monkey (*Cebus apella*): Ecology and home range requirements in central Amazonia. In: *Lessons from Amazonia: The Ecology and Conservation of a Fragmented Forest*, R. O. Bierregaard Jr., C. Gascon, T. E. Lovejoy and R. Mesquita (eds.), pp.271–283. Yale University Press, New Haven, Connecticut.
Stevenson, M. F. and Rylands, A. B. 1988. The genus *Callithrix*. In: *Ecology and Behavior of Neotropical Primates*, Vol. 2, R. A. Mittermeier, A. B. Rylands, A. F. Coimbra-Filho and G. A. B. da Fonseca (eds.), pp.131–222. World Wildlife Fund – US, Washington, DC.
Zhang, S. Y. 1995. Sleeping habits of brown capuchin monkeys (*Cebus apella*) in French Guiana. *Am. J. Primatol.* 36: 327–335.

On the Occurrence of the Owl Monkey (*Aotus azarai*) in Cerro Leon, Chaco, Paraguay

Juan Manuel Campos, Ivon Benítez
Dennis A. Meritt Jr.

The owl monkey, *Aotus azarai*, has been described from various parts of northern Argentina and Paraguay (see Stallings, 1984, 1985; Fernandez-Duque *et al.*, 2001). One of the earliest reports is found in Kerr (1950), in a description of a pioneering exploration of the Chaco from 1889 to 1891 along the Río Pilcomayo. The most recent review detailing this primate's distribution in northern Argentina and Paraguay is provided by Neris *et al.* (2002). In the northern Paraguayan Chaco, they describe low canopy scrub forest and high canopy forest as suitable *Aotus* habitat. They describe its activities in Paraguay as mainly crepuscular, although sometimes active on cloudy or overcast days.

During fieldwork on the Chacoan peccary, *Catagonus wagneri*, in the Chaco Central in the austral spring of 2003, an opportunity presented itself to investigate two locations in the extreme north and west of the country. One of these was the Defensores del Chaco National Park and its unusual land formation, Cerro Leon. These are the only places one may find rocks of any type in the entire Chaco region. The observation reported here provides an additional location for *Aotus azarai* in Paraguay, verifying that it is capable of survival and reproduction in a xerophytic habitat.

Defensores del Chaco and Cerro Leon are located from 19°45' to 20°45'S, and 59°30' to 61°10'W in the Department of Alto Paraguay and a small portion of Boquerón. Average annual rainfall is from 500 to 800 mm, and temperature ranges from 0–42°C. The park has a xerophytic fauna and flora, locally referred to as *seca*—literally dried up, arid and barren. At the time of our visit the region had been suffering from an extended period of extreme drought.

While visiting Cerro Leon during late October of 2003, we observed an adult pair of *Aotus azarai* with a very young infant in a candelabra tree cactus (*Cereus* sp.), near a foot trail leading to the summit of the highest ridge. The day was cloudless, with bright sun and an ambient temperature of about 40°C. The adults were alert but not obviously alarmed; the infant was clinging to an adult's neck and upper back. It was movement by the adults that clued us to their presence. There were no vocalizations, and we saw no aggressive behavior, such as the typical rapid and jerky movement of the head and upper body. We observed the pair and their offspring closely for more than twenty minutes, after which time—and perhaps in response to our attempts to take photographs—the trio moved rapidly out of the tree cactus, into the adjacent shrubby vegetation and out of sight. Given the steepness of the hillside and the density of the thorny vegetation, it was not possible to follow them.

The environment in which this family group of *Aotus* was found is a stunted, thorny, dry forest region with no large trees or emergent vegetation, except for occasional Palo Borracho trees (*Chorisia insignis*) in the infrequent and somewhat more humid lowland areas. The "soil" at Cerro Leon is largely broken rocks of various sizes, making human movement and climbing noisy and extremely difficult. The large amount of rock present at this site is uncharacteristic of the Chaco—a flat, plain-like habitat that is without stone or rocks of any type. All stone and rock used there for road building or construction is either imported or brought from the eastern and southern part of the country. *Chaqueños* tell the folk story of the Chaco being a great inland sea whose bottom was devoid of rock or stone. Plant growth is precarious; rainfall is limited and subject to rapid runoff, and there is little natural shade. Overall the vegetation rarely exceeds 3 m, with the exception of the occasional tree cactus (*Cereus* sp.) or Palo Borracho tree.

Given these circumstances, we were unable to determine whether or not these owl monkeys were demonstrating