

SHORT ARTICLES

WESTERN EXTENSION OF THE RANGE OF BEARDED SAKIS: A POSSIBLE NEW TAXON OF *CHIROPOTES* SYMPATRIC WITH *CACAJAO* IN THE PICO DA NEBLINA NATIONAL PARK, BRAZIL

Jean Philippe Boubli

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

During a long-term field study of the black-headed uacari monkey, *Cacajao melanocephalus melanocephalus*, I obtained strong evidence of bearded sakis (*Chiropotes* sp.) occurring in the study area in the Pico da Neblina National Park, Amazonas (Boubli, 1997, 1999). I first became aware of the possibility of bearded sakis there in 1991 when I noticed Yanomamis (the people that inhabit the park)

from Maturacá (a large Yanomami settlement and Salesian Mission inside Pico da Neblina National Park, Fig. 2) wearing decorative headpieces made from their tails. Inquiring about the origins of the headpieces, I was told that bearded sakis could be found throughout the national park. They were, however, also reported to be rare in most areas of the park, although relatively more abundant to the east of the Rio Marauíá, which marks the eastern limit of Pico da Neblina National Park (Fig. 1). The Yanomamis I interviewed said that although bearded sakis could be seen in monospecific groups, they were more often found in mixed-species aggregations with black-headed uacaris.

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



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

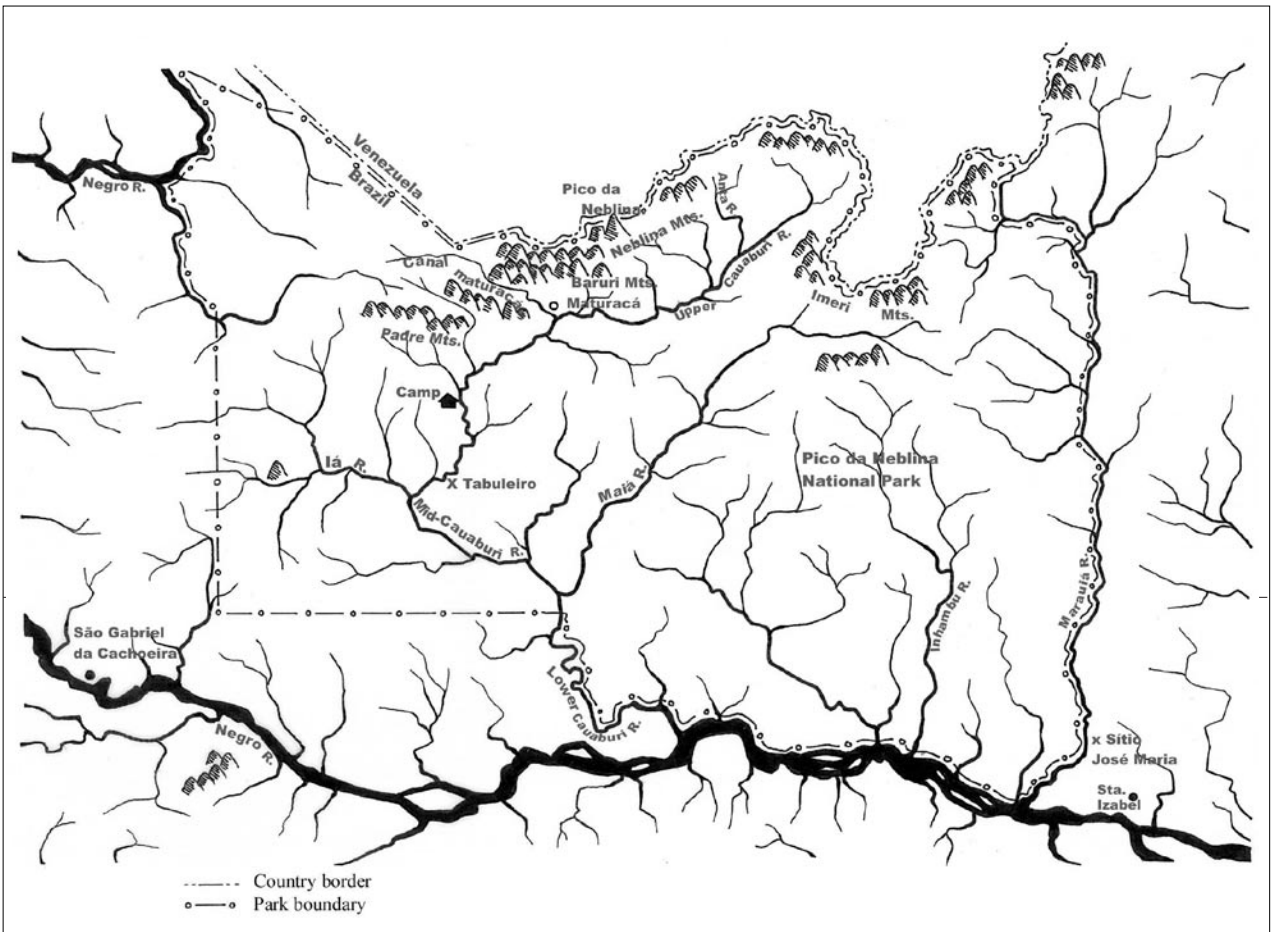


Figure 2. Pico da Neblina National Park, Amazonas, Brazil.

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

The specimen collected was similar to *Chiropotes satanas chiropotes* in that the head, limbs and tail were black, and the back from the neck to the tail gradually changed from a lighter brown in the center back between the shoulders to darker brown on the sides and towards the tail. However, it differed from *C. s. chiropotes* in that the brown coloration of its dorsum was greenish brown (olive) as opposed to light golden brown (Fig. 3). The body measurements were comparable to that of *C. satanas* and *C. albinasus* (head and body = 390 mm; tail = 400 mm; hind foot = 125.8

mm; ear = 28.7 mm; weight = 2400 g) (see Emmons, 1997; Hershkovitz, 1985). I am currently carrying out a detailed morphological and molecular analysis to determine whether this is a new taxon or merely a color variant of *C. s. chiropotes*.

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

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



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

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

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

Acknowledgments

I would like to thank all the Yanomami for their invaluable help during my surveys and fieldwork, the Brazilian Institute for the Environment (IBAMA) staff and the Brazilian Army for logistical support. I am also most grateful to Dr. Alan Dixson of the San Diego Zoological Society, who kindly encouraged me to pursue my recent surveys, and to Clair Stringer Boubli who prepared Figures 1 and 2 and edited this manuscript. Fieldwork in the Pico da Neblina National Park was funded by grants from the Louis Leakey Foundation, National Geographic Society, National Science Foundation, New York Zoological Society and World Wildlife Fund for Nature. Funding for surveying was provided by the Zoological Society of San Diego, USA, and by the Zoological Museum of São Paulo University (MUZUSP). Permission to collect wild primates was obtained from IBAMA (License # 053/2001).

Jean Philippe Boubli, Departamento de Antropologia, Museu Nacional / UFRJ, Quinta da Boa Vista s/n, São Cristóvão, 20940-040 Rio de Janeiro, Rio de Janeiro, Brazil, e-mail: <jpboubli@yahoo.com>, and Center for Reproduction of Endangered Species, Zoological Society of San Diego, PO Box 120551, San Diego, CA 92112-0551, USA.

References

- Ayres, J. M. 1986. The white uakaris and the Amazonian forests. Ph.D. Dissertation, Cambridge University, Cambridge, UK.
- Ayres, J. M. 1989. Comparative feeding ecology of the uacari and bearded saki, *Cacajao* and *Chiropotes*. *J. Hum. Evol.* 18: 697–716.
- Boubli, J. P. 1997. Ecology of the black uakari monkey, *Cacajao melanocephalus melanocephalus*, in Pico da Neblina National Park, Brazil. Ph.D. Dissertation, University of California, Berkeley.
- Boubli, J. P. 1999. Feeding ecology of black-headed uacaris (*Cacajao melanocephalus melanocephalus*) in Pico da Neblina National Park, Brazil. *Int. J. Primatol.* 20: 719–749.
- Emmons, L. H. 1998. *Neotropical Rainforest Mammals: A Field Guide*. University of Chicago Press, Chicago.
- Groves, C. P. 2001. *Primate Taxonomy*. Smithsonian Institution Press, Washington, DC.
- Hershkovitz, P. 1985. A preliminary taxonomic review of the South American bearded saki monkeys, genus *Chiropotes* (Cebidae, Platyrrhini), with the description of a new subspecies. *Fieldiana, Zool. (n.s.)* 27: 1–46.
- Hershkovitz, P. 1987. Uacaris, New World monkeys of the genus *Cacajao*: A preliminary taxonomic review with a description of a new subspecies. *Am. J. Primatol.* 12: 1–53.
- Kinzey, W. G. and Norconk, M. A. 1993. Physical and chemical properties of fruit and seeds eaten by *Pithecia* and *Chiropotes* in Surinam and Venezuela. *Int. J. Primatol.* 14: 207–227.
- Rylands, A. B., Schneider, H., Langguth, A., Mittermeier, R. A., Groves, C. P. and Rodríguez-Luna, E. 2000. An

assessment of the diversity of New World primates. *Neotrop. Primates* 8(2): 61–93.

Schneider, M. P. C., Schneider, H., Sampaio, M. I. C., Carvalho-Filho, N. M., Encarnación, F., Montoya, E., and Salzano, F. M. 1995. Biochemical diversity and genetic distances in the Pitheciinae subfamily (Primates, Platyrrhini). *Primates* 36: 129–134.

SURVEY OF THREE PRIMATE SPECIES IN FOREST FRAGMENTS AT LA SUERTE BIOLOGICAL FIELD STATION, COSTA RICA

Jill D. Pruettz
Heather C. Leason

Introduction

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

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

Methods

Study site

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

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

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

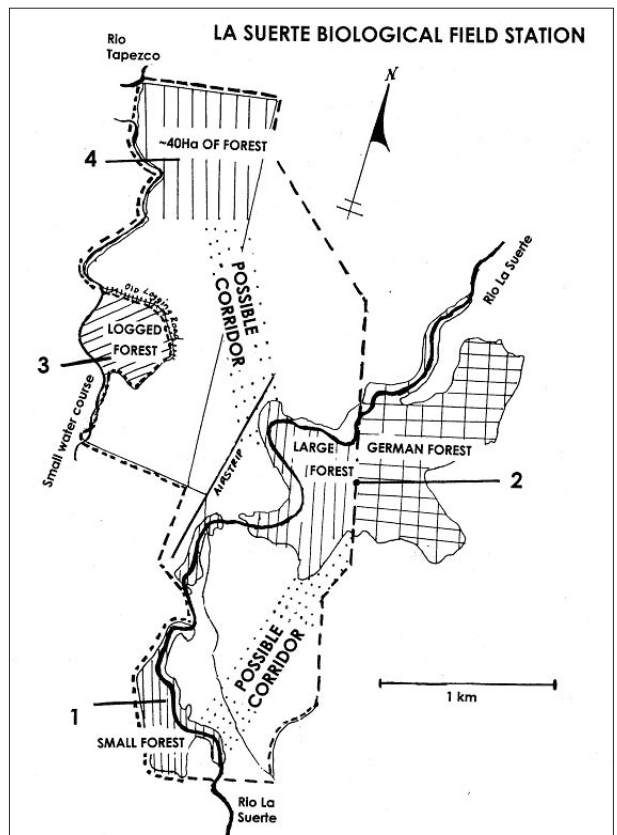


Figure 1. Map of La Suerte Biological Field Station, Limon Province, Costa Rica. 1 – Small Forest, 2 – Large Forest/German Forest, 3 – Logged Forest, 4 – New Forest patch.