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A Survey of Primate Populations in Northeastern Venezuelan Guayana

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Abstract: The region of the Guiana Shield is extraordinarily rich in biodiversity. Little is known, however, of the biogeography and conservation status of its diverse primate taxa. The aim of this study was to conduct a rapid survey of primate populations in the northeastern-most part of the state of Bolívar, Venezuela, near the border with Guyana. A previous study had indicated that the white-faced saki (*Pithecia pithecia*), wedge-capped capuchin (*Cebus olivaceus*), and red howler monkey (*Alouatta seniculus*) were present in this area. It had also been suggested that black spider monkeys (*Ateles paniscus*), golden-handed tamarins (*Saguinus midas*), and night monkeys (*Aotus*) may be present in this part of the Venezuelan Guayana. Forty-nine sites of the Río Cuyuní basin were surveyed. Pre-existing forest trails were walked and the Río Cuyuní was also censused by boat. Interviews with local people at all the sites indicated that the only primates inhabiting this region are *A. seniculus*, *C. olivaceus,* and *P. pithecia. S. midas* is not present (or is extremely rare) in the northeastern part of the state of Bolívar. References to night monkeys may well refer to *Potos flavus*. The presence of an isolated population of *Ateles* remains uncertain. Cattle ranching, mining, hunting, logging, and the pet trade are major threats to the primates in this part of Venezuela. Further primate surveys should be conducted in the western Guiana Shield.

Resumen: El macizo de las Guayanas representa una de las regiones de mayor biodiversidad en el Neotrópico. Sin embargo, aún es poco conocido la biogeografía y estado de conservación de sus diversas especies de primates. Por tal motivo, el principal objetivo de esta investigación fue conducir un reconocimiento de poblaciones de primates en la parte más noreste del estado Bolívar (Venezuela), cerca del borde internacional con Guyana. Un estudio previo indicó que monos viudita (*Pithecia pithecia*), monos capuchinos comunes (*Cebus olivaceus*), y araguatos (*Alouatta seniculus*) estaban presentes en esta área. Posteriormente, se sugirió la posible existencia de monos arañas negros (*Ateles paniscus*), titíes manos doradas (*Saguinus midas*) y monos de noche (*Aotus* spp.) en esta parte de la Guayana venezolana. Cuarenta y nueve sitios de la cuenca del Río Cuyuní fueron reconocidos. Se caminaron trillas pre-existentes en el bosque además de navegar el Río Cuyuní con fines de censar dichas poblaciones de primates. Además, se realizaron entrevistas con habitantes de cada sitio. Los resultados indican que las especies de primates identificadas para esta región son *A. seniculus*, *C. olivaceus,* y *P. pithecia. S. midas* no parece estar presente en la parte más noreste del estado Bolívar, y si existe debe ser extremadamente raro. Por otra parte, las referencias de la existencia de *Aotus* spp. pueden reflejar confusión con otros mamíferos nocturnos como el cuchi-cuchi (*Potos flavus*). La presencia de alguna población aislada de *Ateles* permanece incierto. Finalmente, la ganadería extensiva, minería, cacería, tala, y comercio de monos como mascotas representan las mayores amenazas de los monos de esta parte de Venezuela. Más reconocimientos de poblaciones de primates deben ser realizados en el oeste del escudo guayanés.

Key Words: *Alouatta seniculus*, *Pithecia pithecia*, *Cebus olivaceus*, distribution, conservation, Guianas

Introduction

Neotropical forests are areas of high biodiversity (Mittermeier *et al*. 2002) but are threatened due to human activities such as logging, hunting, and deforestation (Chapman and Peres 2001). There, primates represent a major group of vertebrates that play a fundamental role in forest regeneration (Heymann 1993). In the Guianas, the biogeography and conservation status of the primates are still poorly known, although the eastern part of this region has been better documented in recent years (Sussman and Phillips-Conroy 1995; Lehman 2000; Boinski 2002). The main goal of this research was to survey primate populations in the northeastern-most

part of the state of Bolívar, Venezuelan Guayana, in the western Guiana Shield (Fig. 1).

In a previous review, Bodini and Pérez-Hernández (1987) suggested that red howler monkeys (*Alouatta seniculus*), white-faced sakis (*Pithecia pithecia*), and wedge-capped capuchin monkeys (*Cebus olivaceus*) were present in this region. Ten years later, Linares (1998) reported the existence of golden-handed tamarins (*Saguinus midas*) and black spider monkeys (*Ateles paniscus*) there, although the evidence for the occurrence of these two primates remains unclear. That for *S. midas* is restricted to a general map and the name of Bochinche (Bolívar state) as the locality. Similarly, Kinzey *et al.* (1988) reported the possible presence of the night monkey, *Aotus*, in Venezuelan Guayana, but there has been no additional field research to confirm this. Kinzey *et al*. (1988) observed *Alouatta seniculus*, *Cebus olivaceus,* and *Pithecia pithecia* during their surveys in the Lago Guri–El Callao area (Venezuelan Guayana) (Fig. 1B), and local people reported what may be the night monkey *Aotus* and an *Ateles*-like monkey, but not tamarins.

The region I surveyed, located between that visited by Kinzey *et al.* (1988) and the Venezuelan–Guyanese border, represented a gap in our knowledge of the primate populations of the Guianas (Fig. 1). A survey of the Sierra de Imataca was of considerable importance due to increasing cattle ranching, agriculture, logging, and illegal mining that will result in significant forest loss and fragmentation over the coming years. My particular goals were to: a) determine the presence or otherwise of *Saguinus midas*, *Ateles paniscus*, *Aotus* and other primates; b) collect data on group size and the habitats occupied by primate species in the survey area; and c) interview local people to update our knowledge of the geographic distribution of Guayanan primates and document the human activities that may threaten them.

Methods

The reconnaissance sites were located mostly in the forested region of the Río Cuyuní basin. From north to south this area includes Río Grande, Altiplanicie de Nuria (Imataca), Tumeremo, Bochinche (Imataca), Anacoco–San Martín de Turumbán (Río Cuyuní), and El Dorado–La Fé-San Isidro; all in the northeastern part of the state of Bolívar, Venezuela, near the border with Guyana (Table 1, Fig. 1). The survey covered the Venezuelan drainage of the Río Cuyuní, one of the main tributaries of the Essequibo River in Guyana (Ven-

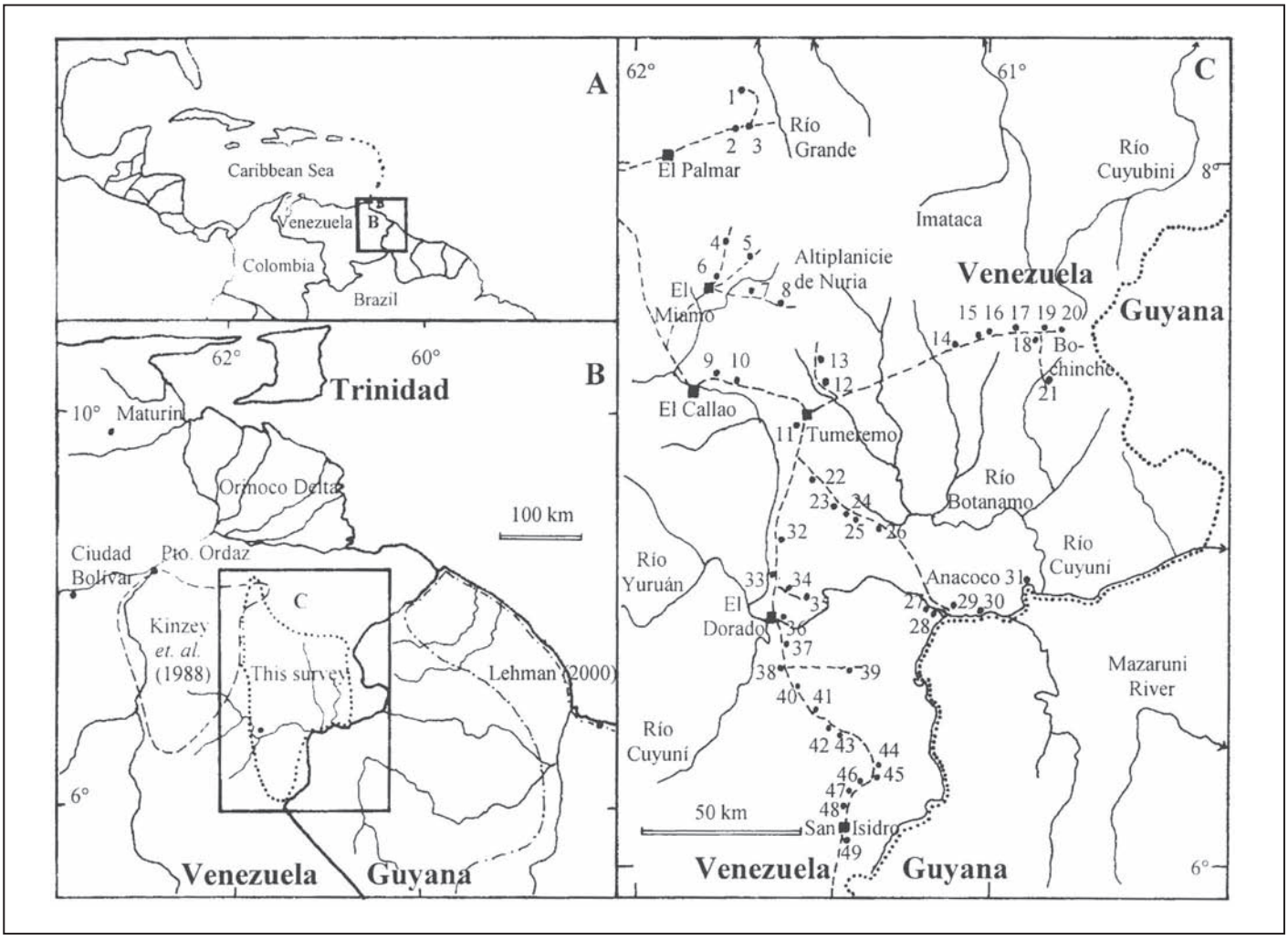

Figure 1. Location of sites surveyed in northeastern Venezuelan Guayana (see Table 1).

Table 1. Sites surveyed in northeastern Venezuelan Guayana.

Site #	Name	Coordinates
1	Maderera Río Grande	8º12´02″N; 61º43´17″W
2	El Mafao	8º06´52″N; 61º42´07″W
3	Campamento Río Grande	8º06´34″N; 61º41´33″W
4	Carrizal	7º42´46″N; 61º45´20″W
5	Fundo El Tumamo	7º44´19″N; 61º41´57″W
6	Las Casetas	7º40´03″N; 61º46´47″W
7	Cerro Merecure–Las Marías	7º37´25″N; 61º42´32″W
8	Cerro de Nuria	7º36´13″N; 61º37´15″W
9	Los Araguatos	7º22´15″N; 61º47´31″W
10	El Botalón	7º22´36″N; 61º44´56″W
11	Aeropuerto de Tumeremo	7º15´19″N; 61º31´23″W
12	La Carata	7º22´46″N; 61º29´48″W
13	Fundo El Guarán	7º26´29″N; 61º29´28″W
14	Mi Esperanza	7º28´26″N; 61º06´17″W
15	Matupo I	7º29´50″N; 61º01´29″W
16	Matupo II	7º30´08″N; 61º00´28″W
17	Bochinchito	7º30´51″N; 60º55´33″W
18	Guacancio del Prestamo I	7º30´16″N; 60º52´49″W
19	Guacancio del Prestamo II	7º30´51″N; 60º52´47″W
20	Bochinche (La Aldea, GN)	7º30´45″N; 60º48´15″W
21	Aserradero Hnos. Hernández	7º23´04″N; 60º51´00″W
22	Fundo El Corozo	7º06´10″N; 61º31´21″W
23	La Vuelta del Diablo	7º01´43″N; 61º27´01″W
24	San José de Anacoco	6º59´24″N; 61º24´19″W
25	Fundo San José de Anacoco	6º58´18″N; 61º22´24″W
26	Yaguarín	6º55´38″N; 61º17´03″W
27	Anacoco I	6º43´10″N; 61º06´55″W
28	Anacoco II	6º44´10″N; 61º07´46″W
29	San Martín de Turumbán	6º42´51″N; 61º05´45″W
30	Mark´s Place (Venezuela-Guyana)	6º44´05″N; 61º02´15″W
31	T. J´s Place (Venezuela-Guyana)	6º47´05″N; 60º55´03″W
32	Sua Sua	6º56´46″N; 61º37´01″W
33	Fundo Rancho Sicanán	6º50´01″N; 61º36´31″W
34	San Rafael	6º46´42″N; 61º34´01″W
35	Mina La Camorra	6º45´54″N; 61º32´46″W
36	El Encanto Cuyuní	6º42´56″N; 61º36´29″W
37	San José	6º37´50″N; 61º35´23″W
38	Santa Teresita I	6º32´58″N; 61º34´28″W
39	Mina La Fé	6º34´17″N; 61º27´29″W
40	Santa Teresita II	6º30´05″N; 61º33´09″W
41	Fundo Taguapire	6º26´42″N; 61º30´30″W
42	San Flaviano	6º24´25″N; 61º27´44″W
43	Km. 48	6º23´40″N; 61º26´27″W
44	San Miguel de Betania	6º17´30″N; 61º19´01″W
45	La Montañita	6º12´11″N; 61º27´24″W
46	El Granzón	6º12´36″N; 61º22´00″W
47	Los Manacos	6º12´27″N; 61º22´33″W
48	Estación Piscícola Kamoc	6º11´07″N; 61º24´31″W
49	San Isidro	6º08´36″N; 61º25¨40″W

ezuela, Instituto de Ingeniería 1992). The vegetation there is mostly tropical evergreen humid forest with continuous canopies at heights of 20–40 m (Velasco and Aguilera 1987; Huber and Alarcón 1988). The climate is sub-humid/macrothermic and humid-perhumid/macrothermic, both >24ºC (Velasco and Aguilera 1987). The region is in the Guiana Shield of Precambrian-age bedrock, with igneous and metamorphic rocks outcrops and limited, minor alluvial cover near the main drainage (Salazar and Briceño 1987). Altitudes range from 120 m a.s.l. in Anacoco and San Martín de Turumbán to 500 m a.s.l. in Altiplanicie de Nuria (Imataca) (Fig. 1).

The forests have been impacted by cattle ranching, agricultural expansion, so-called "selective" logging, and gold-mining. The major sawmills there have logged between 1% and 20% of the commercial trees in their concessions (Bevilacqua *et al*. 2002). Given "current management [these] practices result in inadequate revenue capture and potentially high environmental costs" (Bevilacqua *et al*. 2002, pp.50–51). Illegal mining is also causing severe forest degradation besides health problems for the local communities (Bevilacqua *et al*. 2002). These abandoned mining "pods" are core locations for the propagation of malaria (Jorge Moreno pers. comm. 2003; Urbani pers. obs. 2003).

The survey was carried out from 30 June to 21 July 2003. A total of 49 sites were visited. Interviews were conducted at each site, and I walked pre-existing trails in secondary and primary forests, besides carrying out river censuses on the Río Cuyuni (Table 1, Fig. 1C). No transects were cut and only pre-existing trails were used (each walked just once) with the due permission of the owners or land managers. This field survey method (and the type of information recorded, see below) has been used in other rapid primate surveys in lowland South America (e.g., Heymann *et al*. 2002). Surveys covered approximately 790 km of roads, 55 km along the Río Cuyuní, and 22 km on pre-existing forest trails. When primates were seen, I recorded data on the behavioral activity, group size, height in the canopy, and sex/age composition of the group. Because of the large area to be covered in this rapid survey and the little time available, a more systematic census technique was impractical. Playback calls were used as an aid in locating tamarin populations, particularly in the Bochinche area where Linares (1998) reported them.

Interviews were conducted in 49 sites—towns and small *caseríos* (villages) located with a global positional system portable unit (Garmin GPS III) (Fig. 1C, Table 1)—to obtain information on the primate species present at each, their use by local communities (hunting, pets, use of body parts), and on perceptions of the behavior and ecology of the species. I avoided leading questions in order to avoid bias in the responses of the informants. In the initial questions I asked about the primates of the area, and their behavioral and physical descriptions, and only subsequently showed laminated color photocopies of primates in order to clarify their identity. I also included primates that have never been reported for this part of the Venezuelan Guayana (e.g., *Callicebus lugens* and *Saimiri sciureus*) to test the interviewees' knowledge. The informants were adult residents, including Amerindian *capitanes* (community leaders of the ethnic groups *Kariña* and *Pemón*), Amerindian and *criollo* (Venezuelan Creoles) local hunters, *campesinos* (*criollo* farmers), miners, loggers,

local traders, Venezuelan national guards, Venezuelan and Guyanese Army soldiers, and Guyanese Carib Amerindians and Creoles.

Results

Only five primate groups were seen during the survey (Table 2). Four of these were *A. seniculus* and one *P. pithecia*. I heard red howler monkeys calls at six sites (Fig. 1C: numbers 1, 7, 21, 35, 39, and 47). The calls were heard mostly in the morning between 05:51 and 06:26, and later in the afternoon between 15:12 and 17:53.

Ninety-seven people were interviewed at the 49 sites (Fig. 1C: 1–49; Table 1). All informants indicated that the only primate taxa in the region were *P. pithecia*, *C. olivaceus* and *A. seniculus.*

The following common names were obtained from the interviews:

a) *Alouatta seniculus*. In Venezuelan Guayana: *araguato*, *arautá* (in *Pemón*, an Amerindian language). In Guyana: baboon, howler monkey.

b) *Cebus olivaceus*. In Venezuelan Guayana: *mono*, *mono corriente*, *mono normal*, *mono maicero*, *mono carita blanca*, *mono capuchino*, *mono fifí*, *mono titi*, *macaco*, *titi*; *yaracáru* and *aracarú* (in *Kariña*, a Carib Amerindian language), *iwarüka* (in *Pemón*). In Guyana: monkey, *dou jou,* and *hep* (in Carib language).

c) *Pithecia pithecia*. In Venezuelan Guayana: *mono viudo*, *viudo*, *mona viuda*, *viuda*, *viudito*, *viejito*, *arikí* (in *Kariña*), *chic* (in *Pemón*). In Guyana: white-faced monkey, *warga* (in *Akawayu*, a Carib Amerindian language).

Discussion

There was universal agreement among the informants as to the relative abundance of the three species: red howlers (*Alouatta seniculus*) > wedge-capped capuchin monkeys (*Cebus olivaceus olivaceus*) > white-faced sakis (*Pithecia pithecia pithecia*). The single saki sighting I achieved was of a multi-male and multi-female group of eight in an extremely degraded forest. There was an abandoned mining camp and evidence of a recent fire near the road. I was also told of *P. pithecia* living in a degraded forest on the outskirts of Tumeremo (*c*.10,000 inhabitants). The red howlers were seen in evergreen primary forests as well as in highly disturbed forests. These taxa were reported as the only primates present on the Guyana side of the Río Cuyuní. The informants indicated that white-faced sakis live in groups of two to nine individuals, while red howlers and wedge-capped capuchins form larger groups. I was also told that *C. olivaceus* and *P. pithecia* exploit *guama* trees (*Inga* spp., Leguminosae), and that wedge-capped capuchins tend to feed in slash-and-burn plantations.

Following the recommendation of Kinzey *et al*. (1988), I resurveyed an area they visited in 1988, on the upper Río Grande (Fig. 1C: 1–3). At the time of their study, they found white-faced sakis there. Fifteen years later, however I failed to observe any primates. I heard red howlers, and locals said that sakis and wedge-capped capuchins are often seen in the logged forest.

There was no evidence of the presence of *Saguinus midas* in the Bochinche area as reported by Linares (1998) (Fig. 1C, number 20 and adjacent sites). Here, local *Kariñas* and *criollos* identified just three primates, *A. seniculus*, *C. olivaceus,* and *P. pithecia*, with no reference of any animal similar to *S. midas*. Corroboration for the inexistence of *S. midas* in the region comes from Ochoa (2000), who worked on small mammal community structure in the Imataca region. He set up a trapping schedule for didelphids and small rodents that resulted in 10,320 trap nights (arboreal and terrestrial) using bananas as bait. The traps and bait were suitable for tamarins, but trapped none. He also spent 567 hours surveying mammals (diurnal and nocturnal) and his easternmost site was about 10 km west of Bochinche and found no evidence for the occurrence of tamarins. My attempts to locate them using *Saguinus* spp. and *S. midas* playback calls in secondary and primary forest around Bochinche also failed to detect any groups. A Guyanese Amerindian informant clearly indicated that tamarins occurred near the Essequibo River in Guyana, but not in the Río Cuyuní basin. This lends to support to Sussman and Phillips-Conroy's (1995) statement that this species does not occur west of the Essequibo River. Based on my survey, I suggest that *S. midas* is not present in the northeastern part of the state of Bolívar in Venezuela.

The possibility of *Aotus* occurring in the region, as was suggested by Kinzey *et al*. (1988) for the area of Río Grande, might be a reference to another nocturnal mammal. In many of the sites I surveyed the kinkajou (*Potos flavus*) was classified as a monkey. In the Venezuela Guayanan region it is referred to as the *mono güinche* and *ueshé* (in *Kariña*), while on the Guyanese side of the Río Cuyuní it is called night monkey or night traveler. In many cases, it was described as nocturnal, solitary, or living in pairs, *marroncito* (light brown) or *amarillento* (yellowish) and with *cara de perro* (dog-face), clearly indicating the kinkajou. An informant who knew this

Table 2. Description of primate sightings (abbreviations: A = Adult, J = Juvenile, I = Infant, F = Female, M = Male, U = Unknown).

Site #	Species	Behavior	Group size	Age/sex	Height in tree
20	*A. seniculus*	Moving	1	A/M	24 m
27	*A. seniculus*	Resting	5	A/M, A/F, A/U, J/U, I/U	20 m
28	*P. pithecia*	Moving	8	3xA/M, 4xA/F, I/U	18 m
31	*A. seniculus*	Resting	6	2xA/M, A/F, 2xA/U, I/U	20 m
39	*A. seniculus*	Moving	2	2xA/U	22 m

animal from western Venezuela called it *cuchi-cuchi*, which is the common name for *P. flavus* in the country. I also presented photographs of *Aotus* to the informants and they failed to recognize it. Bodini and Pérez-Hernández (1987) and Ford (1994) reported that the range of *Aotus* does not extend to this region. In two interviews, the three-toed sloth (*Bradypus tridactylus*) and the silky anteater (*Cyclopes didactylus*) were also classified as monkeys.

Linares (1998) indicated the presence of black spider monkeys (*Ateles paniscus*) in the Río Cuyuní area. He reported a sighting of four individuals in 1967 on the upper Río Cuyuní, and an observation in 1979 of a solitary individual near San Martín de Turumbán (Fig. 1C: number 29), which is very close to Anacoco (Fig. 1C: numbers 27, 28). In Anacoco, I saw wild *P. pithecia* and *A. seniculus* (Fig. 1C: Table 2). All informants in Anacoco and San Martín de Turumbán indicated that *Ateles* did not occur in the area. They included two Guyanese who knew black spider monkeys from the Potaro and Essequibo rivers in Guyana, but said they did not occur in Venezuela. One informant I interviewed on the upper Río Cuyuní clearly identified the three common primates of the area: *P. pithecia*, *A. seniculus,* and *C. olivaceus*, and the spider monkey. He said he had seen a pair in 1996 (Fig. 1C: number 36) and clearly described them as an *Ateles*, emphasizing their particular physical characteristics, a grayish color, and giving the Spanish name, *mono araña*. In El Dorado, I was also informed of a spider monkey-like primate, which was very rare but apparently existed in the Alto Paraguán of the Río Yuruán, a tributary of the upper Río Cuyuní (Fig. 1C). Kinzey *et al*. (1988) reported the possibility of *Ateles* near the Río Supamo, a tributary of the Río Yuruán, between the Río Caroní and the Río Cuyuní. Considering the color description of the Río Cuyuní specimen, its proximity to the Río Supamo basin, and the distribution of *A. paniscus* in Guyana, it is probable that rare, small, isolated populations of spider monkeys inhabit the Venezuelan Río Cuyuní basin, but this demands further investigation. Although reported absent from the Iwokrama Reserve west of the Essequibo River by Lehman (2000), a large population of black spider monkeys was studied in this reserve by Barth Wright (pers. comm. 2005), indicating that northwestern Guyana may be more densely populated with *A. paniscus* than previously believed, and that this species may well have crossed into this part of Venezuela (B.Wright pers. comm. 2005).

The only records of pet monkeys were four wedge-capped capuchins (*C. olivaceus*). Two were found in *criollo* villages (Fig. 1C: numbers 17, 24): an infant and an adult owned since it was young. A juvenile was being kept as a pet in a *Pemón* village, and another was in a *Kariña* village where I obtained the partial skeleton of an immature *C. olivaceus* pet (Fig. 1C: numbers 44, 18). Capuchins are the preferred primate pets in the region, and generally captured when young, after killing the mother. I was also told of a female *P. pithecia* that had been sold for about US$25, and another person informed me that white-faced saki tails are used for making key chains. Based on my interviews, primates were rarely preferred bush meat. Some locals argued that they look too much like humans, and informants alleged that rodents and ungulates, particularly agoutis (*Agouti paca*) and tapirs (*Tapirus terrestris*), were relatively abundant and preferred game animals in the region. Gold miners, on the other hand, reported hunting red howler because of its *carne roja* (red meat), but indicated that they tend to be rare near the mines.

Cattle ranching and habitat fragmentation are widespread in the region, especially in the area of Altiplanicie de Nuria-Tumeremo and the middle Río Botanamo. Forest patches are common, as are recently burned cleanings. Mining and logging are apparently reducing primate populations from the Río Botanamo to the Venezuelan-Guyanese border due to habitat loss and the creation of roads and trails in the Imataca forest, which provide for incursions of human disturbance and hunting. The consequences of such activities need to be studied in order to evaluate their effects on the primate communities and the implications for the conservation of the primates and forests of the Guianas in general.

Primate biogeographic studies are particularly needed in different areas of western Guyana, particularly in the Barama, Down Cuyuni, and Mazaruni river basins. This region is located between the east of the surveyed area in this project (the Venezuelan-Guyanese border in the Río Cuyuní basin) and the Potaro and Essequibo Rivers (Guyana), west of the regions surveyed by Lehman (2000) and Barnett *et al*. (2000). As such it fills a gap in our knowledge of the distribution and conservation status of the primates in the western Guianas. My findings reinforce the observed pattern of a gradual drop in primate diversity from east to west in the Guiana Shield, probably because of the existence of major rivers acting as biogeographic barriers such as the Essequibo (see Sussman and Phillips-Conroy 1995). It was possible to fully document the presence of only three primate species (*A. seniculus*, *C. olivaceus* and *P. pithecia*) in the northeastern part of the Venezuelan Guayana (= western Guianas), contrasting as such with the eight primates reported for eastern Guyana and Suriname (Lehman 2000; Boinski 2002). More surveys in isolated areas of the Guianas should be conducted to fully understand the primate biogeography of this broad region.

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