

larity of the *margaritae* monkey to *C. olivaceus* and the presence of the unknown blood parasite in all the samples requires further studies to evaluate the risks of zoonosis, not only for pet owners, but for the entire human population inhabiting the island.

The occurrence of *C. olivaceus* as a pet is evidence of considerable illegal traffic of capuchin monkeys into Margarita Island. This was not mentioned as a threat to *C. a. margaritae* during our interview with the local officer from the Ministry of Environmental Resources, but if feral populations of *C. olivaceus* exist on the island (mentioned by two interviewees), this may be an additional threat to the endemic population of monkeys. The possible occurrence of free ranging *C. olivaceus* may be a recent phenomenon. Several capuchin owners admitted to having released pets into the mountains without knowing the species. Although *Cebus* species are sympatric on the continent (Terborgh, 1981), the amount of deforestation and loss of natural habitat due to farming and human settlement could result in competition between the species on the island.

Surveys of the natural populations of *C.a. margaritae*, and for the possible presence of *C. olivaceus*, are urgently needed, as is an environmental education program to make people aware of the significance of the island's monkey species. The success of similar projects with other endangered species on the island, such as the Margarita parrot (yellow-shouldered parrot, *Amazona barbadensis*), has shown that the people are sensitive towards wildlife in their area and are willing to modify their habits to favor the conservation of species and habitats.

We still do not know whether the Margarita capuchins were isolated prior to the arrival of human settlers or whether they were introduced. The two populations on the island are disjunct; occurring between two widely separated mountain ranges. The increase in human settlements, especially near to the park, small-scale farming and burgeoning tourism and recreation, coupled with the generally poor economy of the island, have resulted in widespread habitat fragmentation, the consequences of which have yet to be assessed (Ottocento *et al.*, 1989; Marquez and Sanz, 1992). There is an urgent need for effective protection and management of the Cerro El Copey and Matasiete reserves. Genetic studies will hopefully give us an idea as to the origin of these monkeys and their unexplained isolation from their closest subspecies, and will allow for the design of a management plan. It is possible that *C. a. margaritae* is suffering from some degree of inbreeding depression, or even that it may be recovering from a population bottleneck (founder effect). The assessment of the genetic status of this endemic and little known monkey is extremely important to answer such questions and for an effective management plan to be put into place.

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PRIMATE RECORDS FROM THE POTARO PLATEAU, WESTERN GUYANA, INCLUDING THE FIRST FOR *CEBUS ALBIFRONS* EAST OF THE RIO BRANCO, BRAZIL

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Introduction

Guyana is one of the few Neotropical countries where substantial tracts of forest remain (Groombridge, 1992, Bowles *et al.*, 1998). Even with recent work (Phillips-Conroy and Sussman, 1995; Sussman and Phillips-Conroy, 1995; Lehman, 1999; Lehman *et al.*, 1995), much of the country remains unsurveyed for primates.

Here we report on the primate fauna of the Potaro Plateau, Guyana, a 1,165 km² outlier of the Pakaraima Mountains, and the eastern-most extension of the Guayana Highlands (see Fig.1), with a basal altitude of some 500 m and higher peaks (2042 m, Mt. Ayanganna; 1594 m, Mt. Kopinang; 1470 m, Mt. Wokamung and others). Like much of the

Guyana Highlands, the Plateau consists of pink Proterozoic Roraima Formation sandstone (1600-1800 m.y.b.p.), capped with younger volcanic dolerites (Haffer, 1974). Soils are old and nutrient-poor (Maguire, 1970; Haffer, 1974). A portion of the Plateau constitutes the Kaieteur National Park (this is currently being expanded from 11.65 km² to 580.16 km²; see The World Bank, 1998) (see Fig. 2).

The vegetation of the National Park has been described by Henkel (1994) and by Kelloff and Funk (1998). The vegetation of some other parts of the Plateau has been described by Maguire *et al.* (1948). The floristic communities vary from white sand scrub to flooded riparian forest, basimontane forest, montane forest, upper montane forest, high tepui forest and high tepui scrub (Huber *et al.*, 1995). Though the region has received attention from botanists, zoological data is sparse for the Plateau.

This report is based on two surveys. One was conducted by SL and MM in March 1995 (dry season). The other, conducted by AB, BS, EH and PB, was carried out between June and August 1998 (wet season) and formed part of the work of the Potaro Plateau Expedition (PPE). Data were collected during field observations and through interviews with local residents.

Upon contact with primate groups, habitat type was recorded and location was determined with hand-held GPS units (Garmin 12XL, AB & BS; Magellan NAV 5000D, SL). *Ad libitum* notes on behavior, vocalizations and obvious individual physical characteristics were also collected. Altitudes were taken from 1:50,000 topographic maps (Survey Department of Guyana 1975: Kurukabaru Sheet 49 NE, Kurukabaru Sheet 49 NW and Ayanganna Sheet 42 SE).

Methods

Fieldwork

Survey methods differed. SL and MM conducted repeat surveys (N = 22) of a 5.5 km transect, plus 8 km of once-only surveys of an established trail, along the western edge of the post-falls river canyon and from the edge of the Kaieteur Falls through the National Park and into the surrounding habitat. The PPE recorded primates as they were encountered during fieldwork surveys for other mammal groups (bats, otters, small mammals and birds). Survey sites were Muri-muri and Amamuri Creeks (mouth located at 05°10' N, 59°30' W and 05°07' N, 59°32' W, respectively), Chenapou village (04°59' N, 59°35' W), Tiger Bay village (04°59' N, 59°34' W), Tappa airstrip (04°54' N, 59°45' W), Conrad's mining camp (04°59' N, 59°39' W), Menzie's Landing (04.51° N, 59.41° W) and Mount Kowa (04°51' N, 59°42' W). Locations of all survey sites are given in Figure 2.

Interviews

For the Potaro Plateau Expedition, AB interviewed the inhabitants of the villages of Tiger Bay and Chenapou and the park ranger (Mike Phang), using the methods of Barnett

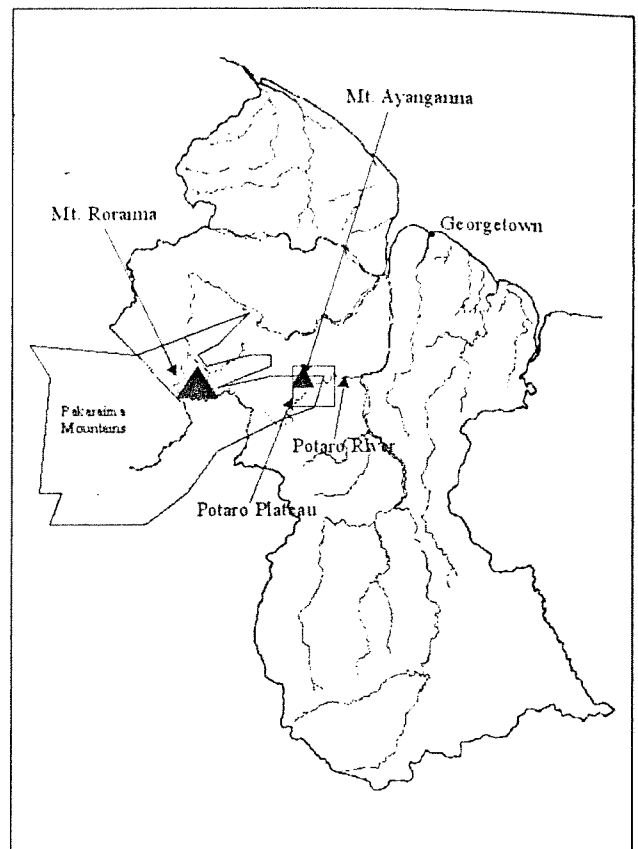


Figure 1. Location of the Potaro Plateau and other places mentioned in the text.

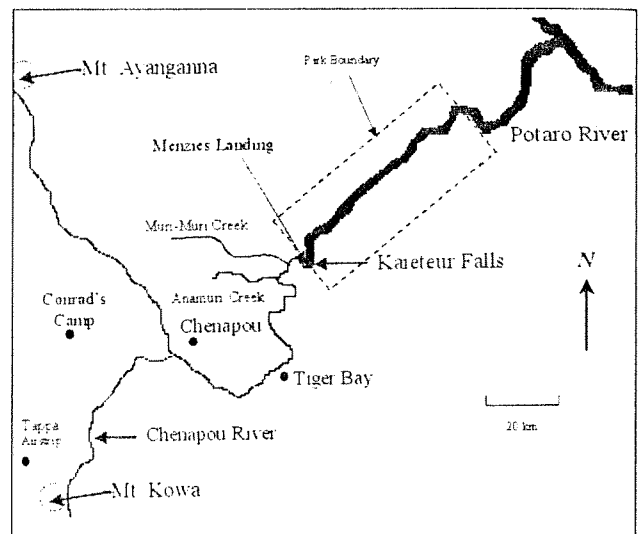


Figure 2. Location of study sites on the Potaro Plateau.

(1996) and Cunha and Barnett (1989). Using the methods of Lehman (1994) and Sussman and Phillips-Conroy (1995), SL and MM conducted interviews near Kaieteur Falls with the previous park ranger (Lawrence Gibbons), three resident miners and three Amerindians from Paramakatoi village who were traveling through the National Park., Great care was taken to avoid leading questions. Interviews consisted of: (i) having people identify local monkey species from laminated colour photocopies of selected illustrations in Eisenberg (1989) and Reid (1998) (PPE), illustrations in Emmons

(1989) and laminated colour print photographs (SL and MM); (ii) asking about primates of the immediate area versus those that occur anywhere in Guyana; (iii) asking for physical descriptions of each species; (iv) asking about the relative abundance of primates in the area (i.e., not found, rare, sometimes seen, abundant, very abundant); and (v) requesting information on hunting techniques (if any).

In addition to interviews, the PPE looked for examples of hunting and of pet keeping during visits at the following locations: Chenapou, Tiger Bay, Tappa Airstrip, Conrad's mining camp and Menzie's Landing.

Results

Fieldwork

Primate locations are given in Figure 2. SL and MM censused a total of four groups of primates during repeat surveys in the park; three groups of wedge-capped capuchins (*Cebus o. olivaceus*) (N = 15) and one male-female pair of red howlers (*Alouatta seniculus*). All encounters were outside the boundaries of the park, with SL observing no primates during his single surveys at Kaieteur Falls National Park. The total sighting rate for primate groups was low, only 0.38 groups/10 km.

The PPE achieved nine primate encounters of five species. *C. o. olivaceus* were observed four times on Mt. Kowa. Group size ranged from four to eight animals. Over a 10-day period, groups consisting of four spider monkeys (*Ateles paniscus*) were seen three times on Mt. Kowa at distances of between 20 and 60m, and assumed to be repeat sightings of the same group. A red howler was seen in waterside vegetation at Muri-muri Creek. Pre-dawn vocalizations from several troops of *A. seniculus* were heard every morning at Chenapou and again in the forests surrounding the airstrip at Tappa. None were heard on Mt. Kowa, though the species is known to inhabit montane forest areas (Husson, 1957; Mittermeier, 1977; Ochoa *et al.*, 1993). Since hunting pressure on Mt. Kowa is low to non-existent, the reason for the unexpected absence of *A. seniculus* there is obscure.

On 1 August 1998, a group of four *Cebus albifrons* was seen by AB, BS, EH and PB at a distance of 30 m, some 7 m up in flooded forest bordering Amamuri Creek, a left bank tributary of the Potaro River. The light was good and the animals were clearly visible with both binoculars and the naked eye. The animals displayed all the field characters of the species (see Hershkovitz, 1949; Eisenberg, 1989; Kinzey, 1997): body colour was much browner than the *C. o. olivaceus* seen on Mt. Kowa; there was no black line down the middle of the forehead; the facial fur was white; the forearms were not gray and the shoulders were white. Two of the four observers also reported that the animals had whitetipped tails. This is the first record of *C. albifrons* for Guyana and appears to be the first time this species has been recorded east of the Rio Branco, Brazil. A single *Pithecia p. pithecia* was observed with the *C. albifrons*.

Interviews

A combined total of 18 interviews were conducted, with information from 34 people (12 interviews with 27 people by AB, SL conducted 6 interviews with 7 people). The residents of Chenapou confirmed and identified all the species encountered by the PPE. The interviewees specifically denied that *Saguinus midas*, *Aotus trivirgatus*, *Cebus apella*, *Chiropotes satanas* and *Saimiri sciureus* occurred on the Plateau. Most informants knew of *Saimiri*, but considered it to be a coastal species. *Aotus* was said to occur in the north of the country. Local reports of a 'night monkey' were found to refer to the kinkajou (*Potus flavus*) (see Roussillon, 1988, for a similar occurrence in French Guiana). In the opinion of local people, overall rank order of abundance for the region's primates was: *Alouatta*, *Cebus* spp., *Ateles*, *Pithecia*. *Ateles* was considered to be locally abundant in remoter areas.

SL and MM's informants reported that *Saimiri*, *Cebus apella*, *C. olivaceus* and *Alouatta* were to be found in or near the park. *Ateles* was considered very rare in the Kaieteur region, the result of intensive hunting by miners. According to two inhabitants of Paramakatoi village, *Ateles* did still occur 2-3 days walk SE of the falls (i.e. the Mt. Kowa region). The existence of *Chiropotes* was denied by all informants. There was disagreement on the presence of *Pithecia* in the Kaieteur region, some interviewees affirmed its presence and some denied it. No data was obtained on the presence of *Aotus*. That these interview results are not entirely consistent with those of the PPE may be attributable to the PPE's near-exclusive interviewing of Indigenous Patamona people for information. Only three of SL and MM's informants were long-term residents in the Plateau, though not of the region in which the interviews were being conducted. In addition, the "area around the park" included the lowland forests at the base of the Falls and beyond, and thus is not necessarily relevant to the Plateau, of which the National Park is a small subset.

In interviews for the PPE, AB found that no-one reported hunting monkeys regularly. Paca (*Agouti paca*), peccaries (*Tayassu pecari* and *T. tajacu*) and tapir (*Tapirus terrestris*) reportedly formed the hunters' mainstay. Monkeys were hunted only rarely. The most common reasons given were i) that they looked too human, either when alive (seven interviewees), or when skinned (five interviewees) or ii) that the difficulty of hunting them outweighed the cartridge costs compared to the ease of hunting the abundant paca (four interviewees).

No primates were observed being kept as pets in either Chenapou, Tiger Bay or Menzie's Landing, though keeping wild animals as pets appeared common in these villages. Unlike the situation in eastern Bolívar (Kinzey *et al.*, 1988), *C. olivaceus* was not reported to attack crops and, as a result, was not punitively hunted.

Table 1. Primate species recorded in areas close or adjacent to the Potaro Plateau.

Species	Mt. Roraima (Tate 1932, 1939)	Canaima National Park (Ochoa <i>et al.</i> , 1993)	S-E Bolivar (Norconk <i>et al.</i> , 1996)
<i>Aotus trivirgatus</i>		+	
<i>Saimiri sciureus</i>		+	
<i>Cebus apella</i>		+	+
<i>Cebus olivaceus</i>	+	+	
<i>Pithecia pithecia</i>		+	+
<i>Chiropotes satanas</i>		+	
<i>Alouatta seniculus</i>	+	+	+
<i>Ateles belzebuth</i>		1	

1 - not seen, but considered very probable.

Discussion

The abundance ranking from local interviews broadly agrees with the data of Norconk *et al.* (1996) who also reported that *P. pithecia* is everywhere rare in Guyana, and with the data in Kinzey *et al.* (1988) from neighbouring eastern Bolívar state, Venezuela.

The primate records are of great interest as the distribution of several species still requires clarification (Sussman and Phillips-Conroy 1995; Phillips-Conroy and Sussman 1995). These authors reported the distribution of *Saimiri* to be patchy. The reported absence on the Plateau of *Chiropotes satanas* and *Saguinus midas* is in agreement with Sussman and Phillips-Conroy's belief that neither of these species occur west of the Essequibo River nor north or west of the Rupununi River (Sussman and Phillips-Conroy 1995).

Ateles paniscus is very sensitive to hunting (Robinson and Ramirez, 1986), and both its presence and the group members' reactions to human observers supported local opinion that Mt. Kowa is very rarely visited by hunters. Muckenhirn *et al.* (1975) considered that *Ateles* did not occur north of the Potaro River. Our records at Mt. Kowa neither confirm nor deny this, since Kowa lies on the southern bank of that river. It does, however, show that the species is still present in this remote region.

The north-west extent of the distribution of *C. apella* is uncertain according to Sussman and Phillips-Conroy (1995) and Phillips-Conroy and Sussman (1995). Its apparent absence from the Potaro Plateau is in line with the belief of Lehman (1999) that the species does not occur further north than the riparian forests along the Rupununi River; and with that of Muckenhirn *et al.* (1975) who believed the species to be absent from the north-west of the country.

The taxonomy of the genus *Cebus*, particularly of *C. albifrons*, is in need of revision (Rylands *et al.*, 1995). As noted by Phillips-Conroy and Sussman (1995), further confusion to the situation is brought about by the presence of hybrids (e.g. Moonen 1987). However, the possibility that the animals seen at Amamuri Creek represent a visually distinct subspecies of *C. olivaceus* is unlikely given the possibilities (see Hershkovitz, 1949).

The record of *C. albifrons* is significant as it appears to be the first time it has been recorded in Guyana (see Sussman and Phillips-Conroy, 1995; Norconk *et al.*, 1996; Lehman, 1999), and the first time it has been recorded east of the Rio Branco in Brazil (see maps in Emmons, 1997; Kinzey, 1997). This is a range extension of some 200 km. The species was not recorded in adjacent parts of Venezuela by Bodini and Pérez-Hernández (1987); their apparent record for Mount Roraima on Map 6 (p.241) was refuted by their statements in the text (see also Norconk *et al.*, 1996). Primate species of adjacent parts of Venezuela have been reported by Tate (1932, 1939), Norconk *et al.* (1996) and Ochoa *et al.* (1993) (see Table 1) and do not indicate the presence of *C. albifrons*. However, it appears that no primate surveys have been conducted in the critical region between the eastern bank of the Rio Branco and the Guyanese border with Brazil (John F. Eisenberg, pers. comm.; A. L. Gardner, pers. comm.; Anthony Rylands, pers. comm.; Richard Thorington, pers. comm.; and see Hershkovitz, 1977, p.901). It is therefore uncertain if this record represents the documentation of a true long-established historical range of the species, or a very recent range extension (possibly as a result of the very severe forest fires in the region in early 1998, see Hammond and ter Steege, 1998; Schulze, 1998). Further fieldwork is needed to resolve this, but it should be noted that the presence of the isolated *C. albifrons* subspecies on Trinidad (*C. a. trinitatis*) argues for the species historically having a much wider range than currently thought.

Importantly, the field characteristics of the animals seen at Amamuri Creek are not consistent with those described for any of the visually distinct subspecies of *C. olivaceus* (see Hershkovitz, 1949).

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SURVEY OF *ALOUATTA PALLIATA* AT THE BILSA BIOLOGICAL RESERVE, NORTH-WEST ECUADOR

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Introduction

Howler monkeys (*Alouatta*) are among the larger New World primates. They are found living in a wide range of forest habitats over most of South and Central America from Mexico to Argentina, with a total distribution of 483,000 km² (Marsh and Mittermeier, 1987). The mantled howler monkey *Alouatta palliata*, can be found from southern Mexico, through Central America, western Colombia and Ecuador to the northwest of Peru (Eisenberg, 1989). Throughout this geographical range, *A. palliata* occupies several different forest types: dense primary forest in many places, but also coastal mangrove forest in Panama, dry, deciduous forest in Costa Rica, secondary forest in Mexico and mountain forest in Guatemala (Wolfheim, 1983). Strong variations in density have been observed between these different habitats (Peres, 1997; Chapman and Balcomb, 1998). Thus, an important issue for *A. palliata* conservation is a better understanding of the links between habitat characteristics and population densities. In this paper, we report the results of a population survey of *A. palliata* at the Bilsa Biological Station of Ecuador. To our knowledge, this species has not previously been studied in Ecuador; nothing is known about their local ecology or abundance.

Methods

Alouatta palliata

Adult males of *A. palliata* weigh around 7.3 kg and females around 5.8 kg (Martin, 1990). The basic color of both sexes is black, sometimes brown, with a gold, white or brown fringe along the flanks (the mantle). The colour and shape of the mantle varies greatly within the species. *A. palliata aequatorialis*, the subspecies we have been working on, is listed as "Lower Risk" by Crockett (1998). The same status is given for *A. palliata palliata*. However, the subspecies *A. palliata mexicana* is listed as "Vulnerable" by Crockett (1998) as well as in the 1996 IUCN Red List of Threatened Animals.

Study Site

The Bilsa Biological Station (00°20.8' N, 79°42.7' W) (Fig. 1) is situated in the foothills of the Mache-Chindui Mountains in the Province of Esmeraldas, at an altitude of 300-750m, in the western coastal region of Ecuador. The reserve covers 3000 hectares of some of the last remaining tropical pre-montane wet and humid coastal forest in Ecuador. A small fraction of the area is composed of very recent secondary forest, now submitted to reforestation. Altitude variations and moisture from the Pacific Ocean create microclimates that encourage local species endemism (Brame, 1995). Robin Foster (in Parker III and Carr, 1992) describes the area as pristine. The surrounding area has only been disturbed by colonisation and logging in the last 30 years. The temperature is fairly stable year round at Bilsa, and the climate is described as uniform temperate wet (Parker III and Carr, 1992). Average rainfall is often more than 3 m of rain per year. In the wet season, from January to June, the temperature range is usually between 24°C and 25°C. In the dry season, from July to December, the range is between 21°C and 22°C. During the time of our study (4th August to 10th September), the average temperature was 21.6°C. The maximum temperature recorded during that time was 27.5°C and the minimum

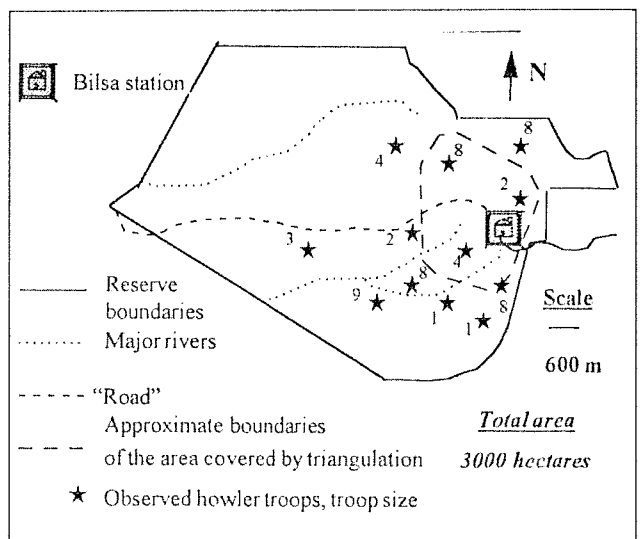


Figure 1. Map of the Bilsa Biological Reserve, from Carlos Aulestia.