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PRIMATE SPECIES AT THE TIPUTINI BIODIVERSITY STATION, ECUADOR

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Introduction

Many previously untouched regions of the Amazon are now faced with imminent disturbance from oil exploration. Forest cover in Ecuador has been decreasing at a rate of approximately 1.8% per year over the last decade (Wunder, 2000). While this figure might not seem startling, it does not take into account the recent push for oil speculation into unexplored regions of the Amazon. Thus, for all those who work in relatively unspoiled tropical forests, it is mandatory to have as much detailed information as possible about each region's primate fauna, since it may be slated to become another fragmented ecosystem in the greater matrix of rainforest loss (Marsh, 2003). This paper confirms the primates occurring in the Tiputini Biodiversity Station (TBS), as there has been some confusion as to the identity of the species in this part of the Yasuní Biosphere Reserve in Amazonian Ecuador.

Methods

Study area

TBS is located in the 1.7 million-ha Yasuní Biosphere Reserve (00°37'05"S, 76°10'15"W, *c.* 250 m above sea level), 300 km ESE of Quito in the province of Orellana (Salvador-Van Eysenrode *et al.*, 1998). The station was established in 1996 by the Universidad de San Francisco, Quito (Fig. 1). It is maintained primarily for students and researchers but is also open for limited ecotourism. The 650-ha lowland rainforest comprising the Biodiversity Station, extending along the north bank of the Río Tiputini, has 30 km of well-marked trails and two established 100-ha plots (J. Blake and B. Loiselle, pers. comm.). Yearly mean temperatures exceed 24°C and the relative humidity is above 80% (weather station data from 1981–1997 at Coca Airport, 00°27'08"S, 76°59'02"W, Dirección de Aviación Civil); yearly rainfall is around 3250 mm (TBS weather station; J. Guerra, pers. comm.). The topography is flat to gently sloped, with characteristics of *várzea* and *terra firma* forest, swamps, and a small oxbow lake. There is a canopy tower, "Torre II," on the far western side of the trail system.

Census methods

A preliminary census was conducted in February and March of 2002 and 2004 for a total of 205 observation hours. Census methods followed those for one observer as per National Research Council (1981) and Peres (1999). Censuses were carried out along 25 km of the trail system at approximately 1 km per hour to listen to and observe primate species. The trails bisect the site as well as following natural contours that lead through all habitat types in the area, including ridgelines, *várzea*, *terra firma*, and swamp. Positional data were taken with a Geographic Positioning

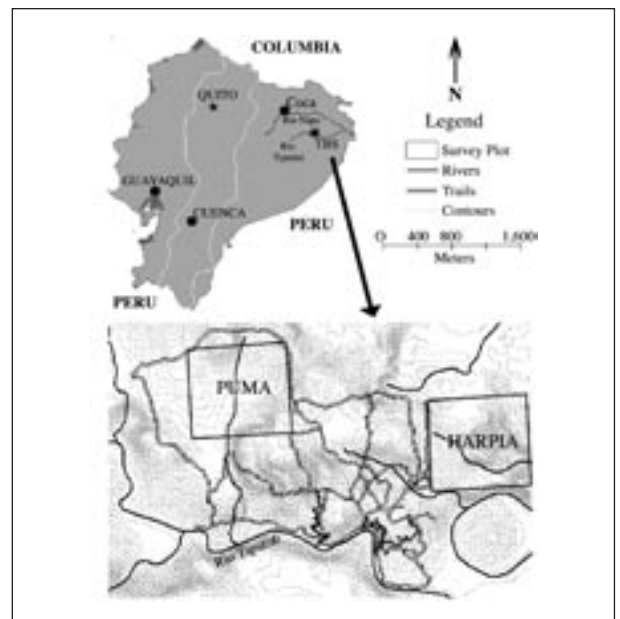


Figure 1. Map of Ecuador showing the location of the Tiputini Biological Station (TBS) and details of the TBS trail system with two 100-ha study plots (Puma and Harpia). Trail system map by B. Loiselle and J. Blake; redrawn by Winters Redstar.

System (Garmin GPS III) when possible. Independent of the censuses, primate groups were followed for as long as possible to collect data on group size and structure and to determine if other primate species were in association.

Primate Species Confirmed at Tiputini Biodiversity Station

Cebuella pygmaea (pygmy marmoset, leoncito)

Pygmy marmosets were last seen within the station boundaries five or six years ago (J. Guerra, pers. comm.). Now they can be found only at the furthest edges of the station property, along the Río Negro. They have been observed there by TBS station staff (in 2004) although they were not confirmed during this census. Confirmation of this species comes from an area about 40 minutes upstream from the station camp, at a site located on the south side of the Río Tiputini (00°38'58.9"S, 76°12'38.5"W). Two individuals were seen displaying and chewing holes in a tree (*Inga* sp.) that was partly covered by vine tangles and bromeliads. Four other feeding trees were noted within a 30 m² area along the river's edge, about 10 m back from the bank.

Saguinus tripartitus (golden-mantled tamarin, chichico)

Locally abundant, they were seen in treefall gaps, vine tangles, and smaller understorey trees in both *várzea* and *terra firme* areas of the station. They are listed as "Near Threatened" (*casi amenazada*) in the *Libro Rojo de los Mamíferos del Ecuador* (Tirira S., 2001). They are most often observed in the understorey but also forage near the canopy at about 30 m. Sternal and anogenital scent-marking have been observed for males. Group sizes range from two to 10 individuals, but are most often between four to seven. As with other tamarins, they eat insects and share parental care of twins. They have been observed to travel and associate with *Callicebus*, *Saimiri*, and *Cebus*. There is one published account of intergroup variation in ranging patterns from TBS (Kostrub, 2002).

Aotus vociferans (night monkey, mono noche)

Thus far we have confirmed only *A. vociferans* within the TBS area, although there is possibly a second species in the region. There are at least two groups within 0.5 km of the TBS camp area. We observed one group with five members on the edge of the camp clearing. These night monkeys are very pale, blondish animals with less distinct facial markings than is typical of *A. trivirgatus*. In appearance they closely resemble the rendering of this species in *Primates de la Amazonia del Ecuador* (de la Torre, 2000).

Callicebus cupreus (titi monkey, titi)

This titi is characterized by red underparts, brownish agouti back and tail, and a distinct white brow-stripe running the length of the forehead. Group size is two to three individuals, generally a pair with a single offspring. They chorus in the dawn and are seen in similar habitat and forest structure as *Saguinus*, mainly in *terra firme* or the fringes of *várzea*. They have been seen associating with *Saguinus*. Judging from the dawn-calls, there are probably many groups

within the vicinity of the TBS station. One pair has been radio-collared for a detailed ranging study by A. Di Fiore (pers. comm.).

Saimiri sciureus (squirrel monkey, frailecito)

According to Hershkovitz (1984), squirrel monkeys at Tiputini belong to the subspecies *macrodon* Elliot, 1907. They are found both in *várzea* and *terra firme* from about 3 to ~50 m above the ground. Most of the sightings were in the lower strata but they will at times follow spider monkeys right to the top of the canopy. They were seen in groups of 10 to 21, and often in association with *Cebus*, although they also follow and forage with *Lagothrix* and *Ateles*. *Saguinus* seems to loosely associate with *Saimiri*, typically on the fringes of a larger squirrel monkey group.

Cebus albifrons (white-fronted capuchin, mono capuchino)

The color of this species at Tiputini ranges from blondish/light to brownish/dark, always with a lighter underbelly and always with black cap and vertical line (of varying width) in the center of the face. The darker color of some individuals has led to the belief there is a second *Cebus* (*C. apella*) in the region, but this has not been confirmed. When local workers were questioned about the facial and body markings, all sightings corresponded to *C. albifrons*. All capuchins observed by this author and other primate researchers at TBS have been *C. albifrons*. This species is very shy and difficult to see. It is observed most frequently in association with other species, particularly *Saimiri*, but can also be seen traveling with *Lagothrix*, *Saguinus*, and *Callicebus* (when *Callicebus* were in association with *Saguinus*). White-fronted capuchins are most frequently seen in groups of three to six, but there have been sightings of single individuals in association with *Saimiri*.

Pithecia (saki monkey, parahuaque, mono volador)

The identity of the saki monkey occurring in the TBS is in question. Its pelage does not correspond to the published descriptions and photographs of *P. aequatorialis* Hershkovitz, 1987, otherwise indicated for the region. It may be a color variant or a distinct taxon (M. Norconk, T. Deffler, pers. comm.; L. Marsh, in prep.). *P. aequatorialis* as such has not been conclusively confirmed anywhere within Yasuni National Park. An inconclusive photograph was taken by a field assistant during a mammal survey in 1995 (Reid and Engstrom, 1996). During this survey they identified the more commonly seen saki as *P. aequatorialis*. For observers unfamiliar with *Pithecia* in Ecuador, it is possible to misidentify the species based on fleeting observations. Often there are groups of three to four individuals, of whom two are females, either two adults or an adult and subadult traveling together. Since these animals are not particularly habituated, the females will stay together in flight and the male can be easily missed. In these instances the females, because of their markings and pelage characteristics, can be mistaken as a male and female *P. monachus*. In *P. monachus* the male and female are nearly identical in coloration and the females of the *Pithecia* at TBS look very much like them.

The *Pithecia* at TBS, however, are sexually dichromatic. Males are blackish and brindled with a classic saki shape; their hands and feet are white to light grey with short hair, and the hair just under the chin and on the upper chest is noticeably orange to rusty. The facial disk appears pale but does not have the distinct band of dense white fur around the face as described by Hershkovitz (1979, 1987), Emmons and Feer (1997), and Rowe (1996). The facial hair is short, clearly separate from the hair on the head, more grayish than whitish, with two distinct white eyebrows over each eye that vary in brightness among males. The hair in general appears coarse and shorter than the females'. White lines come down vertically on either side of the muzzle, which also vary in intensity between individual males.

Females are much "fluffier," with more of a grey, brindled pelage than the males. Hands and feet are also white, and the orange/rust color under the chin is also present. Hair around the face and on top of the head is much longer than in males, giving the females "bangs." The face is less of a short-haired disk than the males', with two bald spots immediately above the eyes with faint white eyebrows above that. Predominant white stripes follow the edges of the muzzle and complete the circle of the jaw under the chin.

This saki does not closely resemble *P. monachus* or *P. aequatorialis* (c.f. Hershkovitz, 1979, 1987; Rowe, 1996; Eisenberg and Redford, 1999; Burton, 1995; Napier and Napier, 1967, 1985; Kavanagh, 1983; Kinzey, 1997; Emmons and Feer, 1997; Wolfheim, 1983; Soini, 1986; Rylands *et al.*, 1995), and analyses of photographs, tissue samples, and genetic data for its correct classification are ongoing (L. Marsh and A. Di Fiore, in prep.). A male was recently radio-collared at TBS by A. Di Fiore for a ranging study (pers. comm.), and material was preserved for analysis by L. Marsh and A. Di Fiore.

Group sizes range from two to five individuals, typically two to three, with one male and one or two females and offspring; two or more saki groups will sometimes join up to form loose associations of 10 individuals. They have been seen eating fruits and insects, and travel in the mid- to upper canopy, mainly in *terra firma* forests, although one group included *várzea* in its territory. They have a purr-bark-whine that is used as an alarm or warning call when humans are near. There are six or seven groups within the TBS trail system. They associate with *Lagothrix* and *Ateles*, but are typically "swept up" in the action as these larger primates come through. They have been observed to join larger groups of *Lagothrix* or *Ateles* and feed with them.

Alouatta seniculus (red howler monkey, aullador rojo)

Howler monkeys are common at the station and tend to keep to themselves rather than associating with other species. However, they may also be "caught up", like the sakis, when other primates, particularly *Lagothrix* and *Ateles*,

move through their area, and they can be seen in the same trees with them. They have smaller home ranges than the other large primates at TBS. Group size is from three to nine individuals, typically ranging from five to seven. They are very quiet when not howling, and sit for long periods at the tops of the canopy trees. They use mainly the upper canopy and emergents, but also some mid-level canopy trees.

Ateles belzebuth (white-bellied spider monkey, maqisapa)

The white-bellied spider monkey is listed as Vulnerable in the *Libro Rojo de los Mamíferos del Ecuador* (Tirira S., 2001). As is typical in this species, individuals vary considerably in the color of their faces and pelage, even within the same groups (Konstant *et al.*, 1985). Individuals may vary from the type coloration. *Ateles* at TBS have a wide variety of pelage coloration that ranges from brown dorsally with tan to cream undersides or dark brown or black dorsally with dark undersides. The faces also vary. Some follow the type with tan or orange cheek stripes and light muzzles. Others occur with black or very dark brown bodies with faces that may be entirely red. Other individuals have been observed with black or darker dorsum and either dark or light belly coloration with mottled pink muzzles and pink to red "spectacles" around the eyes. This color variation has led to a belief that there is more than one spider monkey species at TBS.

Spider monkey groups occupy the upper canopy, and they have been observed in association with *Lagothrix*, *Saimiri*, and *Cebus*. Group sizes vary from one to 15, with an average of five to seven individuals. Groups or subgroups may consist entirely of females and their offspring, or may be mixed with adult males and females and juveniles of various ages.

Lagothrix lagothricha poeppigii (Poeppig's woolly monkey, chorongo)

Listed as Vulnerable in the *Libro Rojo de los Mamíferos del Ecuador* (Tirira S., 2001), woolly monkeys are the largest primates in the area, traveling in large groups of 10 to 25, although often forming smaller feeding groups which stay within calling range of each other. They are noisy and very demonstrative to humans on the ground. They may also be observed at close range from the canopy tower, and the adult males do not seem to be as agitated with humans in this situation. They typically use the upper-middle to high canopy for feeding and travel. *Ateles*, *Saimiri*, *Cebus*, *Pithecia*, and *Alouatta* have been observed feeding, traveling, or otherwise associated with them, and occasionally more than one species travels and forages with them (e.g., *Ateles* and *Saimiri*). Also found in association with *Lagothrix* are double-toothed kites (*Harpagus bidentatus*), which forage for insects disturbed by the passing monkeys; as many as three kites may follow the monkeys at a time.

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SURVEY OF A GALLERY FOREST PRIMATE COMMUNITY IN THE CERRADO OF THE DISTRITO FEDERAL, CENTRAL BRAZIL

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Introduction

The Cerrado biome occupies 2,064,676 km² of the central plateau of Brazil (Pereira *et al.*, 1997). It is the largest of the Neotropical savannas and the second largest biome in South America after the Amazon forest. The vegetation is largely scleromorphic, with an intergrading mosaic of pure grassland to closed woodlands, gallery forest and dry seasonal forest (Eiten, 1972).

Ten primate species have been recorded from the Cerrado (Eisenberg and Redford, 1999). A recent revision of the taxonomy of *Cebus* by Groves (2001) indicated that the capuchin monkey occurring through the majority of the region is *Cebus libidinosus*, but *C. nigritus* is the species in the southern and eastern fringes, and *C. apella* occurs along the Cerrado – Amazon forest interface in the north. The tufted capuchins (*Cebus*), the black howler (*Alouatta caraya*) and the black-tufted-ear marmoset (*Callithrix penicillata*) are widely distributed throughout the biome (Mares *et al.*, 1989; Queiroz, 1991; Rylands *et al.*, 1993).

Little information has been published on the ecology of these primates in the Cerrado; most reports are lacking detail and present only lists of species and the habitats they occupy. All studies of wild populations in the Cerrado have been restricted to central Brazil. Lacher *et al.* (1984; see also Fonseca and Lacher, 1984) reported on the gum-feeding behavior of *Callithrix penicillata* in gallery forest and *cerradão* (scleromorphic woodland), and Faria (1989a, 1989b; Miranda and Faria, 2001) studied the feeding, ranging and social behavior of *C. penicillata* in gallery forest. The first survey of a primate community in gallery forest was carried out by Queiroz (1991), who studied a community of only three species, with low population densities and biomass.