Short Communication

Distribution, population size and conservation of the endemic muriquis (*Brachyteles* spp.) of the Brazilian Atlantic Forest

Andre A. Cunha, Carlos Eduardo Viveiros Grelle and Jean Philippe Boubli

Abstract Muriquis are endemic primates of the Brazilian Atlantic Forest, with two recognized species: *Brachyteles hypoxanthus* and *Brachyteles arachnoides*. Although the state of Rio de Janeiro is the type locality for *B. arachnoides* the muriqui population of this region was, until recently, poorly known. We report our surveys for muriquis in seven localities in the state. Our objectives were to estimate the number of muriquis remaining and to identify local threats. We recorded muriquis in Parque Nacional da Serra dos Órgãos, Parque Nacional do Itatiaia and Guapiaçu Private Reserve. Based on our sightings and information from local people we estimate that the remaining muriquis in Rio de Janeiro total c. 160, with 110 *B. arachnoides* and 50 *B. hypoxanthus*. The most severe threat to muriquis in these areas is hunting, followed by small population sizes, habitat fragmentation, forest disturbance and ecotourism. Central Rio de Janeiro state still harbours large tracts of intact forests potentially available to muriquis. Thus, if conservation actions could be targeted to mitigate the main threat of hunting there is potential for the recovery of muriquis in the state of Rio de Janeiro, at least in the short-term.

Keywords Atlantic Forest, *Brachyteles*, Brazil, hunting, muriqui, Neotropical primate, Rio de Janeiro.

With an adult weight of up to 15 kg muriquis (*Brachyteles* spp.), endemic to the Brazilian Atlantic Forest, are the largest New World primates (Aguirre, 1971). There are two species of muriqui, the Endangered southern muriqui *Brachyteles arachnoides* in the states of Paraná, São Paulo and Rio de Janeiro, and the Critically Endangered northern muriqui *Brachyteles hypoxanthus* considered, until now, restricted to the states of Minas Gerais, Bahia and Espírito Santo (IUCN, 2008). Given that muriquis are extinct from much of their original range the original geographical boundary between the two species is unknown, although it could be in the south-west of Rio de Janeiro, bordering the states of Minas Gerais and São Paulo, in the region of Itatiaia National Park (Fig. 1a). There is disagreement as to which species occurs in this Park (Garcia, 2005). Differentiation between the two species is by incomplete facial pigmentation and a vestigial thumb in *B. hypoxanthus*. From an original estimated total population of 400,000 distributed throughout the Atlantic Forest, it is estimated that < 2,200 muriquis now live in fragmented populations in forest remnants (c. 900 *B. hypoxanthus* and c. 1,300 *B. arachnoides*; Melo & Dias, 2005). Greater attention has been devoted to *B. hypoxanthus* because it is more threatened than *B. arachnoides* (Mendes et al., 2005). Earlier assessments of muriqui populations did not include any data from Rio de Janeiro (Mitttermeier et al., 1987; Strier & Fonseca, 1996/1997; Rylands et al., 1998; Strier, 2000) even though this is the type locality of *B. arachnoides* (see Vieira, 1944 for details of the type locality).

Aguirre (1971) estimated that there were 650–840 individual muriquis in Rio de Janeiro, reporting six remaining subpopulations and three further localities where they were already extinct (Fig. 1a). Garcia (2005) reported on 25 visits of her team to six localities previously visited by Aguirre, confirming the existence of 55 muriquis in three localities in Rio de Janeiro during 1999–2003. To update Garcia's surveys and to assess the occurrence and conservation status of *B. arachnoides* we made 24 visits, of at least 5 days each, to seven localities between August 2005 and September 2006 (Fig. 1b, Table 1). Choice of survey localities was based on Aguirre (1971) and Garcia (2005) and recent sightings by researchers, protected area staff, hikers and climbers. Because of logistical difficulties effort varied between sites (Table 1). Local people assisted in the surveys and local guides were employed where available. All surveys were conducted on foot, using pre-existing trails or transects opened by us. Whenever muriquis were encountered the minimum number of individuals sighted and their age and sex composition were recorded if possible.

We saw muriquis in three of the seven sites visited (Serra dos Órgãos National Park, Itatiaia National Park and Guapiaçu Private Reserve). In our three visits to Itatiaia National Park we could not initially determine which species of muriqui we were observing as sighted individuals

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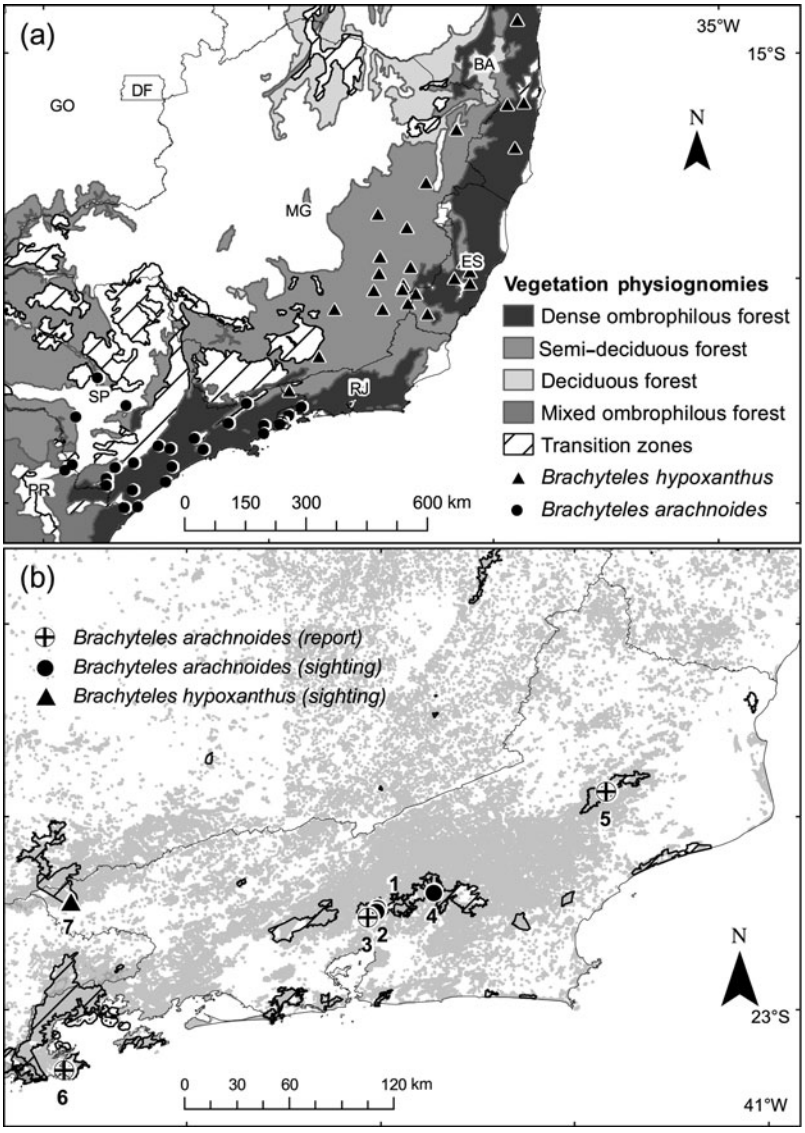

FIG. 1 The occurrences of muriquis *Brachyteles hypoxanthus* and *Brachyteles arachnoides* in the Brazilian Atlantic Forest. (a) Localities of museum specimens (from Grelle, 2000) and vegetation types (from Brasil, 1993). Two letter abbreviations are state names (BA, Bahia; DF, Distrito Federal; ES, Espirito Santo; GO, Goiás; MG, Minas Gerais; PR, Paraná; SP, São Paulo; RJ, Rio de Janeiro). (b) Areas surveyed in this study (see Table 1 for details). Shaded areas are forest remnants in 1995 (data from Fundação SOS Mata Atlântica et al., 1998) and polygons are strictly protected areas or reserves.

were far away and moving fast. However, in one of our visits we watched an amateur video taken in Itatiaia National Park (by Christian Spencer) that showed individual muriquis with mottled faces typical of *B. hypoxanthus,* thus confirming the occurrence of this species in Rio de Janeiro state and extending its known distribution (IUCN, 2008). The distribution pattern of the two muriqui species in the Atlantic Forest vegetation types suggests that *B. hypoxanthus* should be found in Itatiaia because the semi-deciduous forest there is the main forest type within the distribution range of this species (Fig. 1a).

Although we were only able to count 35 *B. arachnoides* in Serra dos Órgãos National Park and Guapiaçu Private Reserve and 16 *B. hypoxanthus* in Itatiaia National Park, we estimate that there are 150 *B. arachnoides* in six groups, and 50 *B. hypoxanthus* in one group (Table 1). These numbers are based on our visual estimations of group sizes when counting of all individuals was not possible and on reliable accounts by local people in places where we did not see muriquis but they are known to be present.

According to our field observations the main threat to muriquis in Rio de Janeiro is hunting, as is the case in São Paulo (Talebi & Soares, 2005). In three of the seven visited sites (Cairuçu Environmental Protection Area, Desengano State Park, and Serra dos Órgãos National Park) we found recent signs of illegal hunting activities such as hunting

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TABLE 1 Surveyed sites in Rio de Janeiro state, with their latitude, longitude and altitude, and number of survey days at each site, number of muriquis sighted and number estimated (based on our visual estimation of group sizes and/or reliable local reports). Locality numbers are as in Fig. 1b.

Locality/area	Latitude	Longitude	Altitude (m)	Effort (days)	No. seen	Total no. estimated
1. Serra dos Órgãos National Park/Rio Paquequer	22°27′	43°01′	1,600	53	26	26
2. Serra dos Órgãos National Park/Rio Soberbo	22°29′	43°01′	850	6	4	43
3. Serra dos Órgãos National Park/Santo Aleixo	22°31′	43°04′	485	9	0	13
4. Guapiaçu Private Reserve/Rio Guapiaçu	22°23′	42°44′	620	8	5	15
5. Desengano State Park/Morumbeca	21°52′	41°50′	750	5	0	12
6. Cairuçu Environmental Protected Área/Pico do Cairuçu	23°19′	44°38′	240	10	0	>1
7. Itatiaia National Park/Três Picos	22°26′	44°36′	1,210	25	16*	50*
Total				116	51	160

**Brachyteles hypoxanthus*; other sites are *Brachyteles arachnoides*

camps, traps and guns. During our surveys we learned that hunting in rural areas of Rio de Janeiro is an old tradition and a popular recreational activity. Difficulties of access to the protected areas because of the steepness of the forested landscape make patrolling by reserve authorities difficult.

The remaining muriqui populations in Rio de Janeiro are all small. Two of these populations (Cairuçu Environmental Protection Area and Desengano State Park) are most probably isolated. Genetic studies of muriquis in such small isolated populations are required to assess the risk of inbreeding depression.

Habitat loss is another threat to muriquis in Rio de Janeiro (Bergallo et al., 2000). In 1500 the Atlantic forest covered c. 97% of the state but it now covers < 21% (Fundação SOS Mata Atlantica et al., 1998). Although most of the sites where muriquis are now found are protected areas where deforestation is not occurring, forest fires are frequent. An old resident of Itatiaia National Park told us about a forest fire in 1960 that decimated a group of 80–100 muriquis.

Although ecotourism can promote conservation in some locations, visitation can sometimes have a negative impact (Issacs, 2000). In Serra dos Órgãos National Park muriquis appear to have avoided a valley of pristine forest located around a busy mountain trail since the 1980s, when tourism became more popular there (Cunha, 2003).

Strategies focusing on in situ actions seem more appropriate than ex situ initiatives for the conservation of large and social complex primates such as muriquis. These, the largest Neotropical primates, are flagship, keystone and landscape species (sensu Sanderson et al., 2002) for the Brazilian Atlantic forest, and a strategic and effective tool for regional conservation programmes (Cunha & Grelle, 2008). The central mountain region (Serra do Mar and Serra dos Órgãos) of Rio de Janeiro state harbours relatively intact, connected tracts of forest, has a mosaic of protected areas and is an important habitat for muriquis and other large vertebrates. If conservation actions can be targeted to mitigate threats such as hunting, there is potential for the recovery of the muriquis of Rio de Janeiro state.

Protected area managers are working together to design and implement a unifying conservation strategy in the region. We are now collaborating with Park managers, who are trying to facilitate connections between existing protected areas and the long-term viability of muriquis and other large vertebrates in this region of the Brazilian Atlantic Forest.

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Biographical sketches

Andre A. Cunha's research focuses on mammal abundance and habitat use applied to management and conservation in practice. He is also interested in the evolution and effectiveness of protected area systems for biodiversity conservation in Brazil. Carlos Eduardo Viveiros Grelle has interests in the ecology and conservation biology of Neotropical mammals, particularly in large-scale studies of the distribution of species and in the effects of habitat reduction and fragmentation on the persistence of populations. Jean P. Boubli is interested in the evolutionary ecology, conservation and biogeography of Neotropical primates. He is currently studying the phylogeography of Amazonian primates and the ecology of the two threatened muriqui species of the Brazilian Atlantic forest.

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