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NEW RECORDS OF *BRACHYTELES ARACHNOIDES* (É. GEOFFROY, 1806) (PRIMATES: ATELIDAE) IN THE SOUTHERN ATLANTIC FOREST, IN PARANÁ STATE, BRAZIL

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Introduction

Primates of the genus *Brachyteles* Spix, 1923, popularly known as muriquis or monos (Auricchio, 1995), are endemic to the Atlantic Forest (Graipel, 2017). This biome is composed in large part of extremely fragmented and reduced areas (Ribeiro et al., 2009), and is considered one of the most threatened biomes in the world (Myers et al., 2000). Two species of muriqui are acknowledged to occur in different forest physiognomies: the northern muriqui, *Brachyteles hypoxanthus* (Kuhl, 1820) in the states Minas Gerais, Espírito Santo, Rio de Janeiro and Bahia, and the southern muriqui, *Brachyteles arachnoides* (É. Geoffroy, 1806) in the states

of Rio de Janeiro, São Paulo and Paraná. The second species is typically found in the phytoecological unit of Dense Rainforest, although there are also records of the species in Seasonal Semi-deciduous Forest and in Mixed Rainforest (Araucaria Forest), as well as in transition zones (Cunha et al., 2009). The muriquis, like other large primates, tend to occupy the higher strata of the forest (Peres, 1994).

According to information on the distribution of muriqui in the state of Paraná, its occurrence extends to the north of the state in the municipality of Castro (Cunha et al., 2009). However, the distribution is restricted and poorly known, with records in 1994 that mention its occurrence in the municipalities of Jaguariaíva and Guaraqueçaba (Martuscelli et al., 1994). Almost a decade later, a more southern population was registered by Koehler and collaborators (2002) in an isolated and unprotected fragment in the municipality of Castro. The third confirmed record for *Brachyteles arachnoides* was in Olho D'Água farm, municipality of Doutor Ulysses (Ingberman et al., 2016). Apart from these few occurrence records, the distribution and southern limit of this species is little known, a concern for its conservation; the species is classified as “critically endangered” in Paraná state (Paraná, 2010) and as “endangered” nationally (ICMBio, 2018) and internationally (IUCN, 2019).

Information related to the distribution and occurrence of populations of the southern muriqui is fundamental for the proposal of conservation measures. Here we contribute new occurrence records of the southern muriqui for Paraná state.

Methods

We registered the occurrence of *Brachyteles arachnoides* during mammalian fauna monitoring in two areas (Fig. 1). The first area is a High Conservation Value area located at Taquarussu Farm, with 1,367 ha of preserved forest (24°47'44.2" S, 48°47'53" W) in the municipality of Adrianópolis, PR, in the Vale do Ribeira region. The second area is a Private Reserve, the Reserva Particular do Patrimônio Natural (RPPN) Vale do Corisco (24°12'16" S, 49°21'26" W), with 396.6 ha, located at the eastern border of the Environmental Protection Area (APA) of the Devonian Scarp, in the municipality of Sengés, PR. Both areas belong to the company Arauco Forest Brasil.

Mammalian fauna were monitored in these areas between January 2015 and December 2019, for a total of 48 months of sampling, with an average of three days per month spent in monitoring. Censuses were based in the analysis of direct (visualization and acoustic signals) and indirect methods (analyses of footprints, marks and carcasses), together with camera traps. Species identification was made according to specialized field guides (Becker and Dalponte, 2013; Reis et al., 2009, 2014).

Monitoring was always performed by at least two observers in non-linear transects in search for traces of the

species. Transects included abandoned roads, natural trails and margins of streams, lakes and rivers. At the end of the study period, we had actively searched for

680 hours (340 hours per area), covering approximately 965 km on foot or on motorized vehicle.

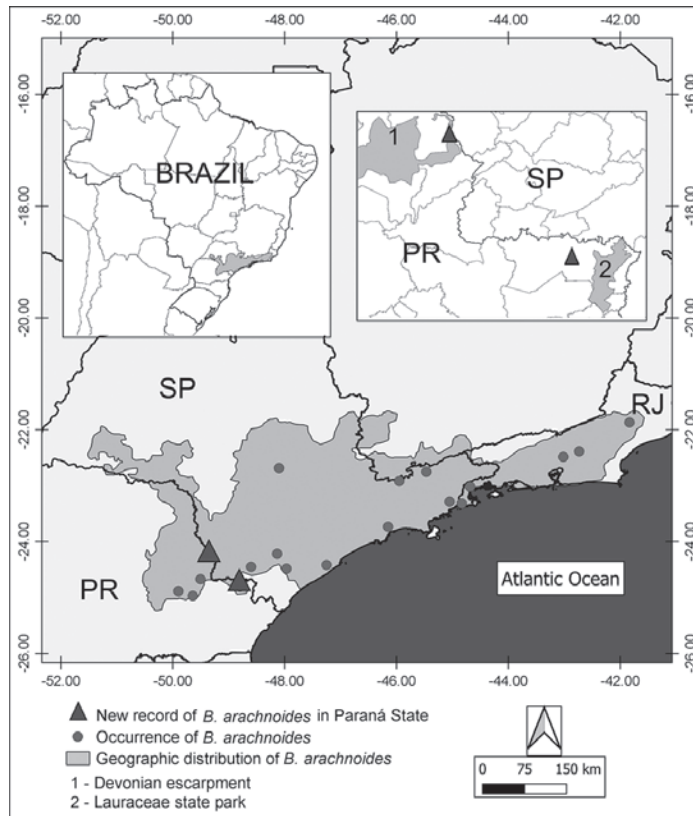


Figure 1. Triangles - location of the records of *B. arachnoides* at Taquarussu Farm, municipality of Adrianópolis, and at the Reserva Particular do Patrimônio Natural Vale do Corisco, municipality of Sengés, PR. Circles represent occurrence records based on information in the literature and historical geographic range of *B. arachnoides* (gray area), adapted from species distribution modeling by Ingberman et al. (2016).



Figure 2. Photographs of the *Brachyteles arachnoides* female in the RPPN Corisco Valley. A = female resting; B and C = female moving through the forest canopy; D = the prehensile tail.

Results

Here we present two new records of *Brachyteles arachnoides* for the state of Paraná. The first record was in the Vale do Ribeira, in the Taquarussu Farm, municipality of Adrianópolis, in December 28, 2016, when a group of miquis was registered by their vocalizations. Due to difficulties in accessing points closer to the group, the individuals were not observed visually. The second record was on November 22, 2019, in the RPPN Vale do Corisco, municipality of Sengés, Paraná. On this day, a lone female was photographed and filmed in the forest canopy (Fig. 2).

Discussion

Miquis distribution in Paraná state is poorly known and previously described populations are restricted to small isolated forest fragments (Ingberman et al., 2016). Both the lack of knowledge and the isolation of populations are threats to the persistence of the species in the medium and long term. In addition, hunting and forest fires are imminent threats to the preservation of miquis in the state.

Miquis are relatively cautious and quiet, and they spend half of the diurnal hours at rest, so they may often go unnoticed. When active they can move quickly through the forest due to morphological adaptations such as the prehensile tail, long arms and hooked hands (Rosenberger and Strier, 1989). In addition, vocalization episodes of southern miquis are less frequent than in the northern miquis (Talebi, 2005). In the two places that we registered the miquis, the species can be considered to be rare, because despite all of our sampling efforts, the species was registered only once at each site.

Miquis usually move around in groups that vary in composition according to the season and food availability in their natural habitat (Talebi and Lee, 2010). Sex-biased dispersal has been described for *Brachyteles arachnoides*, in which adolescent females typically disperse from their natal group (Printes and Strier, 1999). The female registered alone in the RPPN Vale do Corisco may have been foraging alone or perhaps emigrating.

Only three previous records are available for the miquis in the state of Paraná. The record by Martuscelli et al. (1994), in Jaguariaíva municipality (at the border with Sengés), in the Environmental Protection Area (APA) of Guaraqueçaba remains unverified due to the lack of material proof (Ingberman et al., 2016). Koehler et al. (2002) reported the occurrence of the species in Fazenda João Paulo II, in the municipality of Castro, Paraná, in a small patch of mixed forest along the rivers Ribeira and Açungui (Koehler et al., 2002). Another population was registered in the Olho D'Água Farm, municipality of Doutor Ulysses (Ingberman et al., 2016).

Our records add new information about the distribution of *Brachyteles arachnoides*, principally for the state of Paraná. In particular, we would like to highlight the importance of remaining forest areas along the Devonian Scarp. Although many of these areas are fragmented and/or reduced, they can still support populations of various species. We recommend surveys to evaluate the size of the population of *B. arachnoides* in the area. This information could be used to propose measures for the conservation and protection of the miquis, especially in the Paraná State, where information on the species is scarce.

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**PITHECIA MITTERMEIERI (MARSH, 2014)
GEOGRAPHIC DISTRIBUTION: NEW RECORDS
EXTEND THE RANGE EAST OF THE JURUENA
RIVER**

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Introduction

The range of Mittermeier's saki monkey (*Pithecia mittermeieri*) (Primates: Platyrrhini) was originally proposed to extend throughout the region east of the Madeira River up to the Juruena River as well as along the entire Guaporé River (Marsh, 2014). It had been suggested by Miranda-Ribeiro (1914), Hershkovitz (1987) and Sampaio et al. (2012) that the taxon that corresponds to the modern *P. mittermeieri* also exists east of the Juruena River. However, this distribution was not followed by Marsh (2014), who instead restricted its distribution to the region west of this river. The name *Pithecia mittermeieri* is deployed here, despite questions about the validity of the *Pithecia* taxonomy of Marsh (2014) raised by Serrano-Vilavicencio et al. (2019). Genetic studies are needed to resolve the relationship between *P. mittermeieri* and *P. irrorata*.

Recently, new populations of *Pithecia mittermeieri* have been recorded in the Upper Paraguai River Basin (De Lazari et al., 2014; Gusmão and Santos-Filho, 2015; Orsini et al., 2017). Some of these records (24 and 26, Fig. 1) not only extend the range of *P. mittermeieri* 300 km south-eastward, but they are also the easternmost points for the genus as a whole in Mato Grosso state, Brazil. They also represent new population records in the ecotonal region between the Amazon, Pantanal, and Cerrado. Such new sites suggested that *P. mittermeieri* species distribution was greater than that formerly recognized, and here we report additional records that extend the species' geographical distribution still farther eastward.

Methods and observations

Our survey was conducted at Fazenda Camargo Correa in the municipality of Diamantino, state of Mato Grosso, in a 307,880 ha block of continuous terra firma forest. Cerrado enclaves (RadamBrasil, 1978) are also present. The area is located on the Chapada dos Parecis (Fig. 1, point 28). The climate of the region is AW with 1,900mm mean annual rainfall, and 23°C mean annual temperature (Alvares et al., 2014).

Primate surveys were conducted using line-transect methodology adapted from Peres (1999), where three trails were