









First records and range extension of Bristle-spined Porcupine, *Chaetomys subspinosus* (Olfers, 1818) (Rodentia, Erethizontidae), in Minas Gerais state, Brazil

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Abstract

We report from three localities four new records of the threatened Brazilian Atlantic Forest endemic *Chaetomys subspinosus* (Olfers, 1818). These are the first records of this porcupine species from the state of Minas Gerais, and these new data extend the distribution of this species by approximately 220 km to the southwest. As *C. subspinosus* was observed in areas of transitional vegetation, this species may be found in a much broader spectrum of habitat types than previously thought. We recommend further surveys focusing on documenting this species.

Keywords

Atlantic Forest, biogeography, Bristle-spined Rat, distribution, endangered, endemic, Mammalia

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Introduction

Chaetomys subspinosus (Olfers, 1818), Bristle-spined Porcupine, is an arboreal and nocturnal rodent. This solitary porcupine has a folivorous diet, and a mean weight of 1,600 g (Eisenberg and Redford 1999; Giné et al. 2010; Voss et al. 2013). This species is endemic to the Brazilian Atlantic Forest, occurring in the Bahia biogeographical

subregion (Oliver and Santos 1991; Ribeiro et al. 2009), where it is found primarily in the eastern extremes of the biome, from southern Sergipe to eastern and southern Bahia and southern Espírito Santo states (Giné and Faria 2018). *Chaetomys subspinosus* was recorded recently in the eastern portion of the Caparaó National Park in the state of Espírito Santo at border with Minas Gerais state (Kaizer et al. 2021), which represents the westernmost locality recorded to date. From the state of Minas Gerais, there is only indirect evidence of the occurrence of *C. subspinosus*, based on interviews with local residents (Oliver and Santos 1991; Giné and Faria 2018). Giné and Faria (2018) provided the most recent review of the geographic distribution of *C. subspinosus* (117 georeferenced localities of occurrences), including field data, published records, and specimens in scientific collections, in addition to the modeling of the potential distribution of the species.

Chaetomys subspinosus is found in primary and secondary forests, as well as coastal restingas (Moojen 1952; Oliver and Santos 1991; Chiarello et al. 1997; Oliveira et al. 2012), with some records from shaded cocoa plantations (Oliver and Santos 1991). The species has a clear preference for patches of native vegetation with complex vertical structure (Giné 2009). *Chaetomys subspinosus* is listed as Vulnerable by the IUCN (Catzefflis et al. 2017) and the Brazilian Ministry of the Environment (ICMBio 2018) due to population declines caused by deforestation and hunting pressure (Castilho et al. 2013).

The paucity of field records of *C. subspinosus* has been attributed to this species' cryptic behavior, which has led, in turn, to a large part of its geographic distribution being defined on the basis of indirect evidence, primarily interviews with local residents (Oliver and Santos 1991; Giné and Faria 2018). This emphasizes the need for more systematic surveys, based on direct observations, in particular in Sergipe, northeastern Minas Gerais, and northwestern Espírito Santo (Giné and Faria 2016), for better definition of the distribution limits of the species. Here we present from three new localities four new records of *C. subspinosus* in the Brazilian state of Minas Gerais, based on direct observations of individuals or body parts in the field. Two of the records are outside the known distribution of the species.

Methods

We conducted diurnal and nocturnal line-transect surveys (Buckland et al. 2001) of mammals between 2002 and 2004 in eight different fragments of forest located in the valleys of the Mucuri and Jequitinhonha rivers in Minas Gerais. Transects were walked along pre-existing trails and dirt roads, located both within and at the edge of the forest (for details, see Melo et al. 2018). We also surveyed areas in the municipality of Bandeira, in Minas Gerais, between 2017 and 2019.

To define the known distribution of *C. subspinosus*, we considered the existing records reviewed by Giné

and Faria (2018) and the recent record from the Caparaó National Park (Kaizer et al. 2021).

Results

Chaetomys subspinosus (Olfers, 1818)

Figures 1, 2

New records. BRAZIL – Minas Gerais • Jordânia, Fazenda Serra Azul; -15.8000, -040.5166; 860 m a.s.l.; 19.III.2003; Fabiano Melo, Daniel Ferraz, Fernando Lima (obs.); dense montane rainforest • same locality; 8.VII.2004; Adriano Chiarello, Fernando Lima (obs.); 1 adult • Bandeira; -15.8847, -040.5347; 545 m a.s.l.; 18.VIII.2017; Helberth Sansão (obs.); 1 adult • Monte Formoso; -16.9702, -041.2841; 760 m a.s.l.; 11.V.2019; João Lima (obs.); 1 adult.

The records from Fazenda Serra Azul are based on two different types of evidence. In the first record, about 50 spines of *C. subspinosus* (Fig. 2A) were found during a field expedition that was part of the project “Biodiversity and Conservation of the Valleys of the Jequitinhonha and Mucuri rivers” (PROBIO/Conservation International). It was not possible to determine what had caused the quills to detach, given that no other remains were found at the site, but it is likely that the animal was captured by a predator. In the second record, an adult *C. subspinosus* was sighted at approximately 17:00 h resting in the crown of a tree in a tract of dense montane rainforest (Fig. 2B). The third record was obtained at around 10:00 h, when an adult was observed moving in the crown of a tree at a height of approximately 10 m, near the edge of a fragment of forest. This individual was observed for a few minutes before it went out of sight into an area of denser vegetation (Fig. 2C). The fourth record was obtained at approximately 11:00 h, where an individual was encountered while clearing vegetation for the installation of a transmission line (Fig. 2D). The animal was first sighted crossing a clearing and it then climbed a tree. After being observed for a few minutes, the animal moved into the denser vegetation and out of the line of sight of the observers.

Identification. Spines found alone and live animals were identified by the following combination of diagnostic characteristics: tricolored spines with pale yellow bases, dark brown middles, and pale brown tips; a tapering, long, prehensile and thinly-haired tail, becoming almost naked toward the tip; “head and shoulders evenly and densely covered with short (c. 15 mm), kinky spines that stand up and are sharp at tips”; “spines extending onto dorsal pelage to rump and on legs and base of the tail, and in contrast to spines on head, these are non-defensive, longer (c. 50 mm) spines lacking hard, sharp points” (Barthelmess 2016: 391).

Discussion

The new records presented here are the first documentation of *Chaetomys subspinosus* from the Brazilian

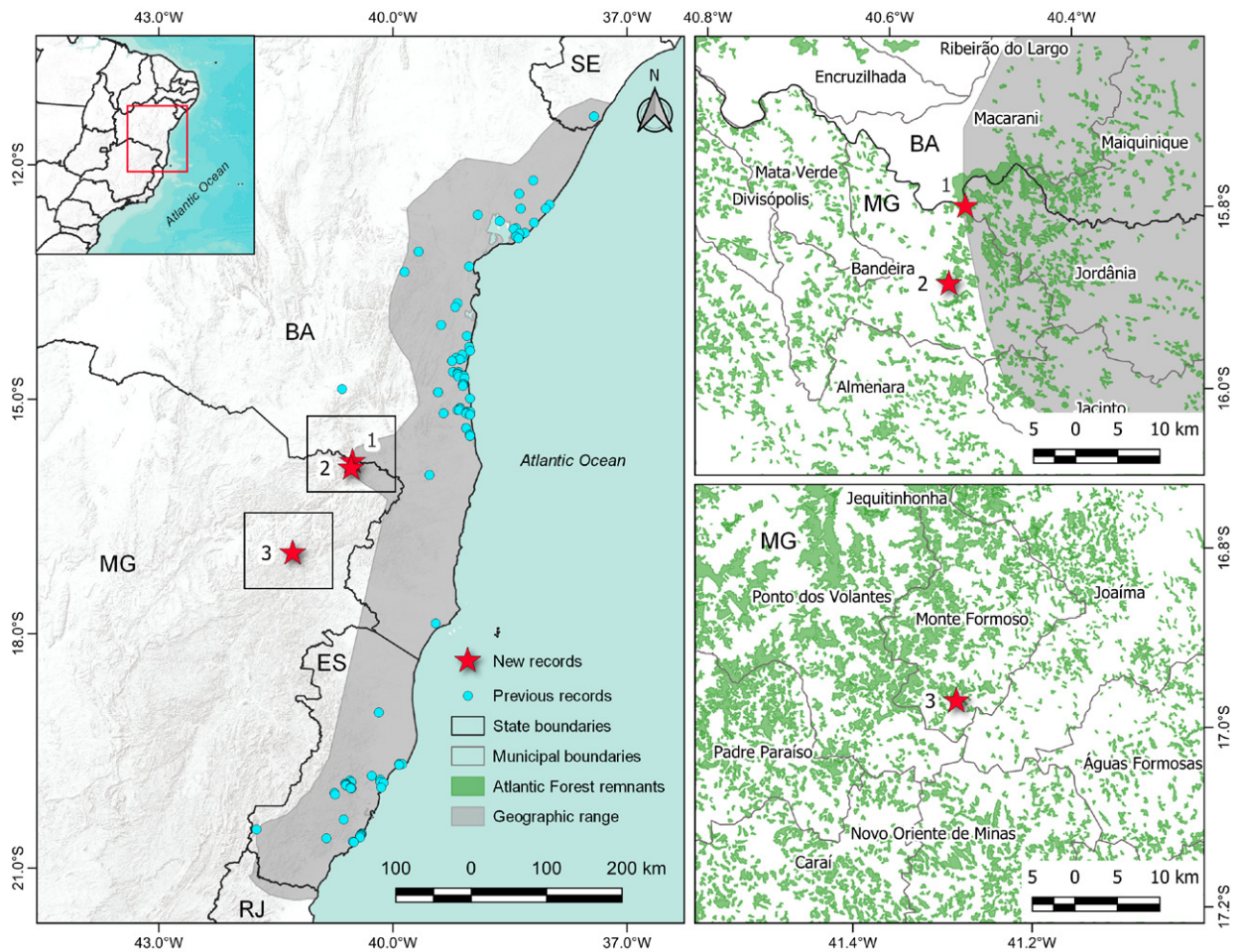


Figure 1. First records of *Chaetomys subspinosus* from the Brazilian state of Minas Gerais (MG), showing the existing localities in the states of Bahia (BA), Sergipe (SE), and Espírito Santo (ES). Geographic range according to Catzefflis et al. (2017), from north Rio de Janeiro (RJ) to south SE. Previous records compiled from Giné and Faria (2018) and Kaizer et al. (2021).

state of Minas Gerais. Previous evidence of the species presence was based solely on interviews with local residents (Oliver and Santos 1991; Giné and Faria 2018). The record from Monte Formoso extends the known distribution of the species by approximately 110 km and is 220 km southwest of the nearest documented localities in the municipalities of Itapebi and Nova Viçosa, both in the state of Bahia (Giné and Faria 2018). The record from Bandeira, while near the projected distribution of the species (Catzefflis et al. 2017), is approximately 110 km west of the nearest confirmed locality in the municipality of Itapebi, Bahia (Oliver and Santos 1991).

In Bandeira, the characteristics of the forest in which *C. subspinosus* was observed, the humid local climate, and the tree species identified at the site, were all consistent with typical dense submontane rainforest (Melo et al. 2018). Giné and Faria (2018) suggested that this species has a marked preference for this type of forest, which would account in part for its occurrence predominantly in the humid coastal forests of eastern Brazil. However, Monte Formoso is located within a transition zone between the dense rainforests of eastern Brazil and the more seasonal, semi-deciduous forest of the interior (Silva and Casteleti 2003), in this case, within the Jequitinhonha basin.

Chaetomys subspinosus populations are extremely sensitive to habitat loss, abruptly becoming rare when the remaining forest cover reaches less than 10%, on a scale of approximately 5,000 km² (Giné and Faria 2018). This means that deforestation rates in the Brazilian Atlantic Forest are close to the limit of the tolerance of this species on a regional scale (Giné and Faria 2018). Currently, environments that are most adequate for *C. subspinosus* cover only 16% of the species’ potential area of occurrence, that is, approximately 16,813 km² (Giné and Faria 2018). While no reliable data are available on the demographic parameters of *C. subspinosus*, its populations are thought to be declining rapidly (Giné and Faria 2018), given that native forest areas within its distribution have been suppressed and fragmented extensively (SOS Mata Atlântica 2020).

Based on these findings, we recommend further surveys focusing specifically on detecting *C. subspinosus* in the largest forest fragments within the region delimited by the new records presented here. We also recommend surveying the largest forest remnants in adjacent areas. Potential areas for surveys in the state of Minas Gerais include Mata Escura Biological Reserve, Alto Cariri State Park, Mata dos Muriquis State Wildlife Refuge, and the western portion of Caparaó National Park.

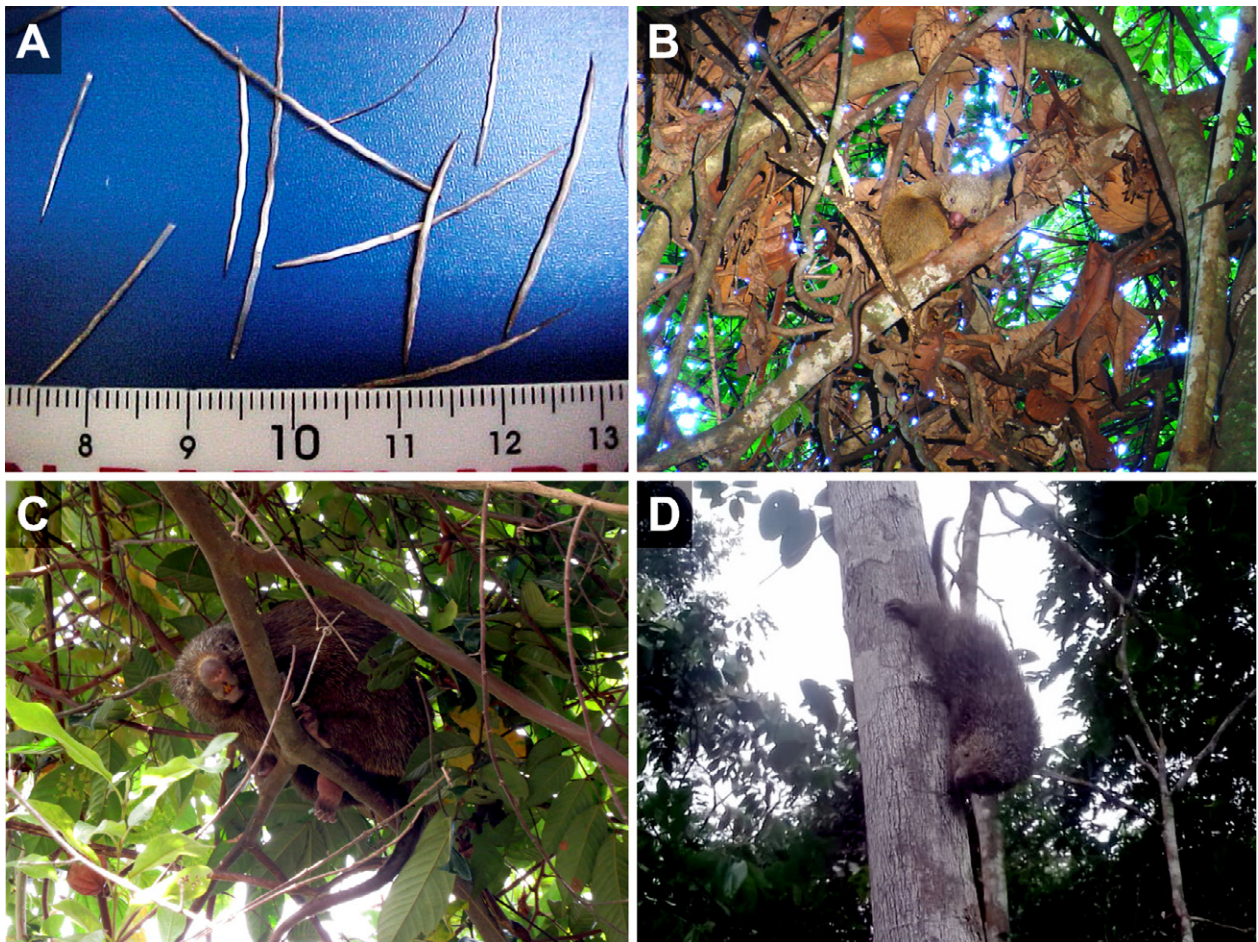


Figure 2. *Chaetomys subspinosus*: (A) quills and (B) an adult on the Fazenda Serra Azul, in the municipality of Bandeira, Minas Gerais (MG); (C) adult observed in the municipality of Bandeira, Minas Gerais; (D) adult recorded in the municipality of Monte Formoso, MG. Photo credits: (A) F. Lima, (B) A.G. Chiarello, (C) H. Sansão, and (D) J.M. Lima.

As *C. subspinosus* was observed in areas of transitional vegetation, the species may occur in a broader spectrum of habitat types than previously thought. It seems likely, however, that the species is not found in the northeastern extreme of the state of Rio de Janeiro, as there was no evidence of this and models predicted unsuitable climatic conditions (Giné and Faria 2018). Finally, studies on connectivity among populations in this fragmented landscape can help to improve conservation strategies that promotes the long-term survival of this endemic and vulnerable species.

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Authors' Contributions

Conceptualization: AC, TV, FU, FM. Formal analysis: AC, FU, FL. Funding acquisition: AC, FM, TV. Investigation: AC, HS, JL, DF, FU, FL, FM. Writing - original draft: DF, FU, AC, FL, FM, TV. Writing - review and editing: FM, FU.

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