



How to Eat Spiny Food? Predation by Bird of Prey on Thin-Spined Porcupine, *Chaetomys subspinosus* (Olfers, 1818)

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Abstract

Chaetomys subspinosus is an arboreal, cryptic, medium-sized porcupine. This species has the body densely covered by spines thinner and softer than those of other genera of Neotropical porcupines. Its known natural predators are big cats and harpy eagle, while other mammalian carnivores and large birds of prey in general are cited as potential predators. Here I report a new event of predation by bird of prey on *Chaetomys subspinosus* in the northern Espírito Santo state, southeastern Atlantic Forest. The predator removed the stomach and intestine of the prey, as well as the spines of its head and the ventral portion of the body. Although it was not possible to identify the predator precisely, it was a medium to large-sized bird of prey, probably a hawk or a hawk-eagle (Family Accipitridae). The presented data contributes information to the natural history of *Chaetomys subspinosus*, representing one of the first records of predation on this porcupine species by a bird of prey.

Keywords: Accipitridae; Atlantic Forest; Chaetomyinae; Erethizontidae; Predator-Prey Interaction

Introduction

The Thin-spined Porcupine, *Chaetomys subspinosus* (Olfers, 1818), is a rodent species of the monotypic Subfamily Chaetomyinae, Family Erethizontidae [1]. It's a medium-sized porcupine species (~1.3 kg) and has the body densely covered by cylindrical spines [2] thinner and softer than those of other genera of Neotropical porcupines [3]. The spines are shorter and pointed on the head, neck and shoulders. The other parts of the body are covered by longer, blunt, and soft spines [2-4]. *Chaetomys subspinosus* has solitary lifestyle [5] and is an arboreal cryptic species, difficult to observe in nature. It's nocturnally active, spending most of the time resting [5-7], and individuals use daily roosts mostly located on masses of vine and liana tangles in the vegetation [7,8].

The species is folivorous [6], feeding exclusively on the leaves of woody trees and is highly selective in food choice [9]. However, the consumption of flowers and fruits may usually occur opportunistically, mainly during the rainy season [10]. Due to its relatively small size and folivorous diet, this species has the smallest home range already recorded for the Neotropical porcupines [7].

Chaetomys subspinosus is endemic to Brazil, occurring from the northern part of the state of Rio de Janeiro to the southern part of Sergipe, but the northernmost limit of its original range is not known [3]. Recent records of the species are restricted to a narrow section of the coastal Atlantic Forest, between Espírito Santo and south of Sergipe [11]. This porcupine is still poorly studied and only few field studies in

a few localities have been conducted with this rodent species thus far [5-10]. Because of the lack of information, even some basic aspects of this specie's natural history remain poorly know. One of the knowledge gaps is related to information on predator-prey interactions. The known natural predators of *Chaetomys subspinosus* are big cats, both Jaguar [*Panthera onca* (Linnaeus, 1758)] [12] and Puma [*Puma concolor* (Linnaeus, 1771)] [13], and Harpy eagle [*Harpia harpyja* (Linnaeus, 1758)] [14], while other mammalian carnivores and large birds of prey in general are cited only as potential predators of this porcupine [8]. Here I report a new event of predation by bird of prey on *Chaetomys subspinosus* in the northern Espírito Santo state, southeastern Atlantic Forest, and provide information on how the predator dealt with a spiny prey from post-capture to the initiation of feeding.

Material and Methods

The record was obtained in the Vale Natural Reserve

(Reserva Natural Vale - RNV: 22,711 ha; 19°06' S, 39°45' W and 19°18' S, 40°19' W), located in the municipality of Linhares (Figure 1). The RNV, together with the Sooretama Biological Reserve (Reserva Biológica de Sooretama - RBS: 24,250 ha) and other two smaller private protected areas (Recanto das Antas Natural Heritage Private Reserve: 2,212 ha; and the Mutum Preto Natural Heritage Private Reserve: 379 ha), form a single remnant of native vegetation, the Linhares-Sooretama Forest Block (Bloco Florestal Linhares-Sooretama - BLS; ~53 thousand hectares; Figure 1). This area corresponds to about 11% of the remaining area covered by forests in the entire state. This great forest remnant represents one of the last large fragments of "Mata de Tabuleiro" (lowland forest), one of the more threatened vegetation types from Atlantic Forest. And is the richest area in mammalian species known in the biome, demonstrating their biological importance and high priority for conservation [15]. The BLS is surrounded mostly by pastures and crops, especially fruit and coffee cultivations, and *Eucalyptus* plantations.

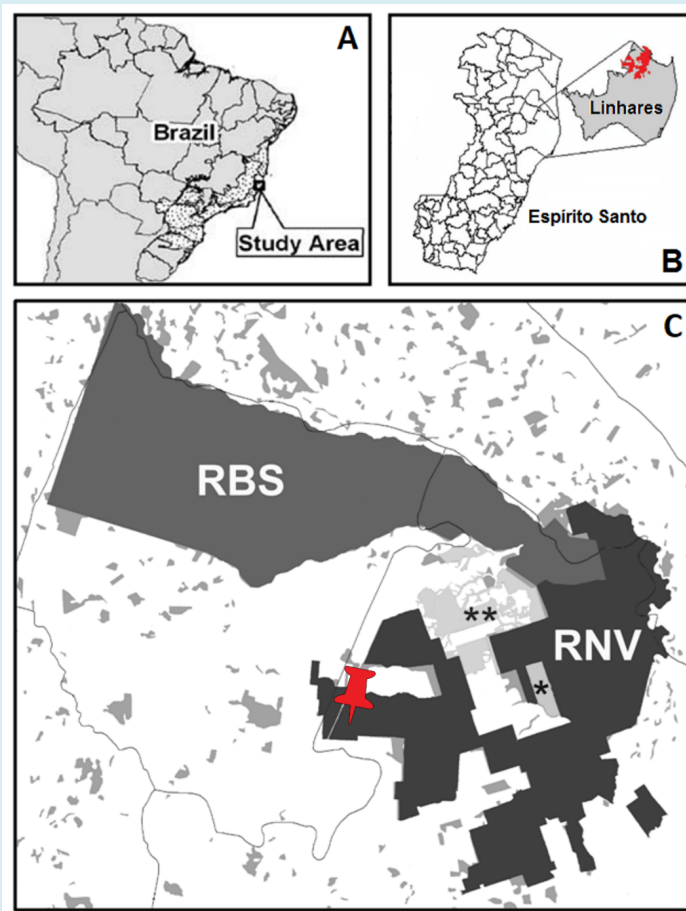


Figure 1: Location of the record of the Thin-spined Porcupine (*Chaetomys subspinosus*) preyed by a bird of prey in Vale Natural Reserve (RNV), in the northern Espírito Santo state, southeastern Brazilian Atlantic Forest (A,B). The Sooretama Biological Reserve (RBS), Mutum Preto Natural Heritage Private Reserve (*), Recanto das Antas Natural Heritage Private Reserve (**) and surrounding Atlantic Forest remnants (light gray polygons) are also shown (C).

The carcass of a recently slaughtered mammal was found on 13 January 2009 at 08:15h on the visiting trail located in the RNV public use area (19°09'15" S, 40°04'12" W; Figure 1). The carcass was being consumed by a bird of prey at the time of the recording.

Results and Discussion

The fresh carcass was identified as being a *Chaetomys subspinosus*. Although *Chaetomys subspinosus* has similarities with the genus *Coendou*, this species differs on its general morphology (mainly the shape of the head, muzzle and ears, and tail features), having spines not stiff as the other Neotropical porcupine species [2,3].

The porcupine recorded at RNV was over a fallen tree trunk and had a cut in the thoracic region through which the predator had removed its stomach and intestines (Figure 2). Curiously, the predator had also removed almost all the

spines of the head and ventral portion of the rodent, including neck, thorax, abdomen, and proximal half of the limbs, except distal half of the limbs (forefeet and hind feet) and tail (Figure 2). The stomach, the intestines, and the spines were lying on the forest floor, next to the carcass (Figure 2), indicating that the prey had not been dragged after the removal of the entrails and spines. By the approach of the observers (two visitors and a local guide), the predator left the carcass and flew away, not been possible to identify the bird species precisely. However, it was possible to see that it was a medium to large-sized bird of prey (Humberto Luiz Cerri Junior, personal communication). Given the time of day, the guide's knowledge of the region's avifauna and the list of bird species present in the RNV [16], it was probably a hawk or a hawk-eagle (Family Accipitridae). Upon returning to the area few minutes later (the local guide and I), the carcass had been removed from the site. Spines and some hairs were collected, which helped confirm the identification of the porcupine species.



Figure 2: Carcass of Thin-spined Porcupine (*Chaetomys subspinosus*) preyed upon by a bird of prey in Vale Natural Reserve on January 2009. (Photos credit: Alice Menezes).

The use of tall trees with high amount of lianas and the avoidance of resting and traveling on the top of tree crowns are considered strategies to reduce the predation risk by limiting the access by terrestrial and aerial predators [8]. These behavioral aspects may provide advantages, helping to explain the scarcity of records (number of studies) and the low predation rate of *Chaetomys subspinosus* in the diet of its known predators (Percent occurrence: Jaguar = 0.7% [12]; Puma = 1.9% [13]; Frequency of occurrence: Harpy eagle = 0.8% in Espírito Santo, and 0.3% in Bahia state [14]). I would like to emphasize that the previous studies providing information on predation of *Chaetomys subspinosus* (except for the record from Bahia) were conducted in the same region as the present record.

Chaetomys subspinosus is classified as Vulnerable to extinction and its main threats are the loss of habitat to agriculture (crop and livestock production) and the isolation of populations due to habitat fragmentation [17,18]. The genetic assessment from natural populations along its geographical distribution (sampled from south of Sergipe, central coast of Bahia and south of Espírito Santo) shows that the species may have formed a continuum along its past distribution but the recent human historical events in the biome resulted in recent divergence among sampled populations [11]. The hunting pressure [17,19] and roadkills [20,21] are other relevant threats that also should be considered to the species.

The Thin-spined Porcupine is present in lowland forest [5,8,19] and mountain forest [6], in primary and secondary forests, although it's found much more commonly in Restinga, a vegetation type of Atlantic Forest occurring on sandy soils close to the beach [7,10]. However, the high abundance in Restinga may be a biased data because might be easier to spot the species in forests with less complex structure [7]. Whereas the remaining of native vegetation in Sergipe, Bahia and other regions of Espírito Santo are small sized fragments, the BLS is currently the largest Atlantic Forest remaining with confirmed occurrence of this endemic species. In this scenario, this large remnant may be classified as the most important area for *Chaetomys subspinosus* conservation in the entire biome. Future studies on population ecology in this area are strongly recommended to access the local status of the species.

The present communication provides information on the natural history of *Chaetomys subspinosus*, confirming that medium to large-sized bird of prey, in addition to the harpy eagle, can be its predators. It also reinforces the importance of the lowland forests of the northern Espírito Santo, specially the BLS, for the knowledge and conservation of this threatened porcupine species.

Conflicts of Interest

The author declares that there are no conflicts of interest associated with this publication.

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