A new report of predation on the common marmoset *Callithrix jacchus* (Linnaeus, 1758) (Primates: Callitrichidae) by a common boa *Boa constrictor* Linnaeus, 1758 (Squamata: Boidae)

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Abstract - This report describes a new predation event of a marmoset *Callithrix jacchus* (Linnaeus, 1758) (Primates: Callitrichidae) by the snake *Boa constrictor* Linnaeus, 1758 (Squamata: Boidae), this time was observed in a rain forest protected area, the Restinga de Cabedelo National Forest, located in the Municipality of Cabedelo, Metropolitan Area of João Pessoa-PB, Northeast Brazil. The snake was spotted high up in a tree, swallowing the marmoset by the head, as is the common way. This occurrence one more time reinforces the understanding that callitrichids, despite their known intelligence and rapidity, are vulnerable to snake attacks, even by non-venomous species.

Keywords: Diety. Predatory behavior. Predation strategy. Interspecific interaction.

Um novo relato de predação do sagui comum *Callithrix jacchus* (Linnaeus, 1758) (Primatas: Callitrichidae) por uma jiboia comum *Boa constrictor* Linnaeus, 1758 (Squamata: Boidae)

Resumo - Este relato descreve um novo evento de predação de um sagui *Callithrix jacchus* (Linnaeus, 1758) (Primates: Callitrichidae) por uma jiboia *Boa constrictor* Linnaeus, 1758 (Squamata: Boidae), desta vez foi observado em uma unidade de conservação da mata atlântica, a Floresta Nacional da Restinga de Cabedelo, localizada no Município de Cabedelo, na Zona Metropolitana de João Pessoa-PB, Nordeste do Brasil. A serpente foi flagrada sobre uma árvore, engolindo o sagui, a partir da cabeça, como é comum. Esse incidente mais uma vez reforça o entendimento de que os calitriquídeos são vuleráveis aos ataques de cobras, inclusive não peçonhentas.

Palavras-chave: Dieta. Comportamento predatório. Estratégia de predação. Interação interespecífica.

Un nuevo informe de depredación del tití común *Callithrix jacchus* (Linnaeus, 1758) (Primates: Callitrichidae) por una boa común *Boa constrictor* Linnaeus, 1758 (Squamata: Boidae)

Resumen - Este informe describe un nuevo incidente de depredación sobre un tití (Callithrix jacchus, 1758) (Primates: Callitrichidae) por una boa constrictor (Boa constrictor Linnaeus, 1758) (Squamata: Boidae). Este incidente se observó en una unidad de conservación del Bosque Atlántico, el Bosque Nacional Restinga de Cabedelo, ubicado en el municipio de Cabedelo, en el área metropolitana de João Pessoa, Paraíba, noreste de Brasil. La serpiente fue avistada posada en un árbol, tragándose la cabeza del tití, como es común. Este incidente refuerza una vez más la comprensión de que los callitrícidos son vulnerables a los ataques de serpientes, incluidas las no venenosas.

Palabras clave: Dieta. Comportamiento depredador. Estrategia de depredación. Interacción interespecífica.

Introduction

The intricate connections between a predator and a prey species affect the ecological harmony of an ecosystem as they work like a check to population growth (Pariona 2024). In protected areas, this relationship serves to prevent any species from becoming a nuisance by overpopulating, what can make the environment worse, and degrading biodiversity. Predators help control the overexploitation of natural resources and maintenance of gene pool diversity (Li *et al.* 2024), by removing from the environment less adapted individuals. Further, the existence of predators can instigate some form of adaptive responses in the prey which, in turn, fosters evolution and robustness in ecosystems (Belgrad *et al.* 2023). Predator-prey interactions tend to help with the cycling of nutrients because elimination of the weak, sick, and poorly adapted to avoid predation individuals helps increase the health of the biota (Severtsov and Shubkina 2015).

The marmoset *Callithrix jacchus* (Linnaeus, 1758) (Primates: Callitrichidae), a species listed by the IUCN as Least Concern (Valença-Montenegro et al., 2021), is a little New World primate very common in the Northeast Region of Brazil, even in anthropized and deforested areas and into the cities. These monkeys lives in groups that, according to Alonso and Langguth (1989), can range from 3 to 15 individuals; however, they commonly have an average of 9 members. They are primarily insectivore-gummivores, possessing long and narrow lower incisors that facilitate gnawing on tree trunks to extract exudates. However, since they must wait for the tree to release the gum, these feeding sites are marked with urine and scent gland secretions (scent marks), as there is intense intraspecific competition for gum, which can be mitigated this way. Additionally, they can feed on fruits, flowers, spiders, lizards, small snakes, worms, as well as bird hatchlings and eggs (Lyra-Neves *et al.* 2007; IEC 2022).

Members of the Family Boidae Gray, 1825, are non-venomous snakes with a robustly developed axial musculature used for prey immobilization and suffocation by constriction (Ferreira-Cunha and Passos 2024). The species *Boa constrictor* Linnaeus, 1758 (Squamata: Boidae) is a very large snake species found in tropical forests of North, Central, and South America, as well as in some Caribbean islands (Gonzalez *et al.* 2024). In Brazil, it is commonly found in various regions, such as the Amazon, the Atlantic Forest, the Cerrado, the Caatinga, and the Pantanal (Vanzolini and Calleffo 2002; Alves *et al.* 2012). It is primarily a nocturnal animal (as indicated by its vertically slit pupils) but also exhibits diurnal activity (Alves *et al.* 2012).

Boa constrictor is often referred to as a sit-and-wait or ambushing forager that chooses key locations to maximize the likelihood of encounters with prey (Sorrell *et al.* 2011). This species doesn't have particular eating habits and eats mammals such as rodents and marmosets, as well as birds and lizards, which it kills using suffocation. Similar to most snakes, *Boa constrictor* has a slow digestion which, on average, lasts a week, and at some times can reach several weeks when in a state of torpor (Boback *et al.* 2015).

In Atlantic Forest fragments in the Northeast Region of Brazil, these two species live in the same habitats. So, predation events between them would not be uncommon. Thus, this paper reports a new occurrence of predation of the common marmoset *Callithrix jacchus* (Linnaeus, 1758) (Primates: Callitrichidae) by a common boa *Boa constrictor* Linnaeus, 1758 (Squamata: Boidae) in the Restinga de Cabedelo National Forest, a legally protected area of the Atlantic Forest biome in the State of Paraíba, Northeast Brazil.

Material and methods

The predation event was occasionally photographed by the first author on the morning of April 3, 2024, using the camera of a Samsung cellphone, in a tree just above the buildings of the Wild Animal Screening Center (CETAS), of the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA), located in the Restinga de Cabedelo National Forest (reference coordinates 07° 03' 47" S, 34° 51' 24" W), a protected area managed by the Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio), in the Municipality of Cabedelo, on the coast of the State of Paraíba, Northeast Brazil. This protected area houses a little fragment of a rare kind of forest formation, the arboreal restinga forest, as it developed on a totally sandy peninsula.

The region, located in the Metropolitan Area of João Pessoa, State Capital, has a climate classified as hot and humid tropical, of type AS', in the Köppen's Classification (Alvares et al., 2013), with rainfall concentrated between April and June, an average annual precipitation of 1,600 mm, and an average annual temperature ranging from 24.3 °C to 26.8 °C.

Results and discussion

This new predation event of a common marmoset by a boa(sex not determinedof both individuals) (Figure 1), was observed through afortuitous encounter. The predatorwas spotted by the first author swallowing the marmoset high up in a tree, ingesting it starting from the head, as it is the most common way.The head of the snake was hanging downwards during the observation with almost all its body well wrapped around the tree branches at the first moment of capture, and a little later more stretched out, hanging from the branches (Figure 1). For about one hour, first and second authors observed the snake ingesting its prey, which was believed to be completely dead, as it didn't exhibit no movement. Despite all people moving in the area below and observing it, the predator did not have an escape reaction or regurgitate the primate during its feeding event. The snake total length was estimated as being about 1.5 m, while the primate maybe has 60 cm in cephalocaudal length, the average size of the species. No vocalizations were heard that could confirm the presence of other marmosets around the boa or in the tree. After swallowing its prey, the boa remained motionless for about an hour and then moved away.

There are several reports in the scientific literature of snake attacks on small primates. For example, Tello *et al.* (2002) observed the attack of a boa on a moustached tamarin *Saguinus mystax* (Spix, 1823) and its rescue, in Estación Biológica Quebrada Blanco in North-Eastern Peru; Teixeira *et al*. (2016) reported a simultaneous fatal attack of *Boa constrictor amarali* (Greene 1983) on two juveniles black-tufted-ear marmosets *Callithrix penicillata* (É. Geoffroy, 1812), at the Brazilian Cerrado biome (Town of Campos Belos, State of Goias); Jack *et al.* (2020) witnessed the rescue of a juvenile white-faced capuchin *Cebus imitator* (Thomas, 1903) from predation by a boa in the Sector Santa Rosa of the Área de Conservación Guanacaste, Costa Rica; and Barbosa *et al.* (2022) recorded a predation event on a marmoset, on the ground, at 2:30 PM, in a restinga environment, in the Environmental Protection Area of Barra do Rio Mamanguape, on the North Coast of Paraíba, Northeast Brazil.

After compiling 91 reports of predation by the *B. constrictor* across its entire geographic range, but primarily in Brazil, Henderson (2023) found that all evidence indicates *B. constrictor* is an opportunistic predator that hunts mostly by ambush, both during the day and at night, on the ground as well as in trees. Eight instances of mammal predation were observed between 08:00 AM and 03:00 PM, while none nocturnal predation was recorded, maybe for the difficulty of spotting and recording at night.

In view of these attacks by snakes against small primates, Ferrari and Beltrão-Mendes (2011), and Liborio and Martins (2013) theorized that snakes would represent the main predatory threat to callitrichids, after humans, of course, and Meno *et al.* (2013) observed the development of antipredatory behavior in white-faced capuchin monkey *Cebus capucinus* (Linnaeus, 1758) directed at snakes through direct alarm calls, in Lomas Barbudal Biological Reserve, located in Guanacaste Province, in Northwestern Costa Rica.

Figure 1: Predation of a marmoset *Callithrix jacchus* (Linnaeus, 1758) (Primates: Callitrichidae) by a boa *Boa constrictor* Linnaeus, 1758 (Squamata: Boidae), observed within the Restinga de Cabedelo National Forest, located in the Municipality of Cabedelo, in the Metropolitan Area of João Pessoa-PB, Northeast Brazil, in April 2024.



Final considerations

Knowledge of fauna biodiversity, interspecific interactions and feeding habits within protected areas is very important for efficient management of these conservation sites and is considered a key element for understanding ecosystem dynamics. It is also crucial for making informed decisions about conservation, preservation, and protection of species. Finally, this event once again reinforces the understanding that callitrichids are vulnerable to snake attacks.

Conflicts of interests

The authors declares that they have no known competing interests or personal relationships that could have appeared to influence the work reported in this paper.

Disclaimer

The points of view, interpretations, and conclusions expressed in this article are solely those of the authors and do not necessarily reflect the official position or policies of the institutions with which they are affiliated.

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