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Nota



PREDATION OF THE BLACK-AND-WHITE TEGU (*Salvator merianae*) BY THE LESSER GRISON (*Galictis cuja*)

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ABSTRACT. This study describes the hunting and predatory behavior of the lesser grison on an adult black-and-white tegu as recorded by camera traps in an Atlantic forest remnant in the União Biological Reserve (Rio das Ostras, RJ, Brazil). This is the first record of a mustelid preying on this large lizard species and the first direct record of a hunting event of *S. merianae* by a mammal. The observed hunting behavior is heavily based on olfactory search, and the long struggle to kill and remove the prey from a burrow is described.

RESUMO. Predação de teiú *Salvator merianae* por furão-pequeno *Galictis cuja*. Neste trabalho descrevemos o comportamento de caça e predação de um lagarto *Salvator merianae* adulto pelo furão-pequeno, registrado por armadilhas-fotográficas na Reserva Biológica União (Rio das Ostras, RJ, Brasil). Este é o primeiro registro de um mustelídeo predando esta espécie de lagarto, e o primeiro registro direto de um evento de caça de *S. merianae* por um mamífero. São descritos o comportamento de caça baseado na busca olfativa e a longa luta até a morte e retirada da presa de dentro de um buraco no solo.

Key words: diet, hunting, mustelid, olfactory search, predatory behavior.

Palavras-chaves: caça, comportamento de predação, dieta, olfato, mustelídeo, toca.

The lesser grison, *Galictis cuja* (Molina, 1782), is widely distributed in South America occurring in Peru, Bolivia, Chile, Paraguay, Uruguay, Argentina, and southeastern Brazil, at elevations from sea level to 4161 m (Poo-Muñoz et al. 2014; Tellaecche et al. 2014). Still, it is one of the least-known species of mustelid with respect to its natural history (Larivière & Jennings 2009; Poo-Muñoz et al. 2014). The diet of *G. cuja* has mostly been described based on prey remains identified in scats, and most studies encompass only the southern part of the distribution,

where its diet is predominantly composed of small mammals (80-90%), especially rabbits *Oryctolagus cuniculus* (Linnaeus, 1758) and hares *Lepus europaeus* (Pallas, 1778) (Delibes et al. 2003; Zapata et al. 2005). There are also records of amphibians, birds, lizards, and snakes making up a smaller proportion of its diet (Jackson 1979; Ebensperger et al. 1991; Delibes et al. 2003; Kasper et al. 2013), although most studies do not identify non-mammalian species in the diet (Delibes et al. 2003; Zapata et al. 2005; Sade et al. 2012). The predatory behavior of *G. cuja* is also

poorly studied, with information limited to anecdotal records (Rood 1970; Jackson 1979; Yensen & Tarifa 2003).

Here we describe the predatory behavior of *G. cuja* in an Atlantic forest remnant at União Biological Reserve, Rio de Janeiro state, Brazil. The area is covered by lowland rainforest (Primo & Völker 2003) and the climate is tropical humid according to Nimer (1979). The records were obtained from videos recorded by two Trophy Cam Bushnell HD camera-traps installed opposite one another in a tropical evergreen rain forest site (22° 26'55.41"S, 42° 03'22.06"W). These cameras were aimed at a burrow in the ground and were installed to monitor the nesting behavior of small mammals. The cameras were installed on tree trunks (~50cm above the ground) and programmed to film 30-second videos with a 0.6-second interval between them, 24 hours a day. A total effort of 205 056 camera-hours had accumulated prior to the first video recording of hunting behavior for a lesser grison in the area.

On January 15th, 2020, at 12:51, the first and only record of an individual *Salvator merianae* (Dumeril & Bibron, 1839), commonly known as the black-and-white tegu was obtained; moving uphill through the forest, at a normal pace, moving its head from side to side darting its tongue, while passing alongside a burrow being monitored for use by small mammals (Fig. 1A, Video S1). Six minutes later, an adult male *G. cuja* was recorded walking quickly following a similar path to that followed by the *S. merianae* (Fig. 1B, Video S1). The grison left the camera's field of view for 2 min and 11 sec, appearing to have diverted its route from the path followed by the tegu, but returned to the field of view via the path exited by the tegu, keeping its nose lowered to the ground as it moved once again through the camera's upper field of view. The cameras did not film the exact moment the tegu returned and entered into the burrow, but at 13:01, the grison was recorded returning to the perimeter of the burrow. It moved swiftly back and forth around the perimeter of the burrow with its nose to the ground for a few seconds, then quickly entered it, without stopping to sniff the entrance (Fig 1C, Video S1). The grison spent about 1 minute and 45 seconds out of view after entering the burrow. The grison's hindquarters then reappeared at the burrow entrance. It appeared to struggle with something inside the burrow, kicking soil out from under its hind legs, using them for leverage to pull itself partially outside the burrow, and with tail flicking rapidly in all directions. After 30 seconds of visible struggle at the entrance of the burrow, the grison

entered completely into the burrow once again. No videos were recorded for about 25 minutes (13:03:32-13:29:02), suggesting that the grison remained within the burrow during that time. At 13:28, the grison was once again recorded at the entrance of the burrow. With its body completely outside the burrow and covered in red soil, it stood at the entrance panting for 7 seconds (Fig. 1D, Video S1) and then reentered the burrow. Between 13:29 and 13:40, the grison's hindquarters once again appeared out of the burrow. Using its hind legs as leverage, pumping its hindquarters up and down with rapid upward jerks of the torso, stopping momentarily to remove its the head from the burrow and look around, the grison struggled to remove the lizard. Then the grison pulled a dead tegu by its neck from the burrow (Fig. 1E-F, Video S1). The tegu was severely injured along the lateral region of the body just anterior to the right hind leg. The grison then dragged the tegu out of view. The tegu prey was an adult, with snout to vent length (SVL) estimated at 460 mm based on the reference length of a measured root at the entrance of the burrow (Fig. 1A). The tegu was 76% the size of the grison, which measured 600 mm from the tip of the nose to the anus (beginning of the tail). (Fig. 1F). Total time elapsed during this record was 49 minutes (12:51 – 13:40)

The observed predatory behavior of the lesser grison is compatible with a hunting strategy relying on olfactory search, not requiring visual contact. This olfactory-based behavior is similar to the behavior observed for grisons preying on apereas *Cavia aperea* Erxleben, 1777, in Uruguay (Barlow 1969; Yensen & Tarifa 2003), and has been observed for other better studied mustelids (Larivière & Jennings 2009). Based on the presence of nocturnal cricetid rodents in the stomach of roadkilled *G. cuja*, a diurnal forager, Kasper et al. (2016) hypothesized that the foraging strategy of the species is associated with locating and attacking nests and den sites. The predatory behavior of the lesser grison is also consistent with its short-legged and slim body form, which facilitates the entrance in burrows while chasing prey. Lesser grisons also present well-developed axial and neck musculatures compared to other musteloids, which confers higher mobility inside underground galleries and greater strength to handle and carry heavy prey (Ercoli et al. 2013; 2014; 2017). These powerful musculatures can be seen in action when the grison struggles to pull out the large tegu from the burrow or when it drags its dead prey away.

Salvator merianae has a wide geographic distribution and is locally abundant in some areas



Fig. 1. Hunting and predatory behavior of *Galictis cuja* on *Salvator merianae* at União Biological Reserve, Rio de Janeiro state, Brazil. A) *S. merianae* moving uphill through the forest (Camera 1 at 12:51); B) *G. cuja* walking quickly following a similar path to that followed by the *S. merianae*, lowering its nose to the ground (Camera 1 at 12:57); C) *G. cuja* entering the burrow (Camera 2 at 13:01); D) *G. cuja* standing at the entrance of the burrow panting (Camera 2 at 13:28); E and F) Different views of the *G. cuja* pulling the dead tegu from the burrow (Camera 2 at 13:40 and Camera 1 at 13:40, respectively).

in Southeastern Brazil. However, previous reports of consumption of this large lizard by mammals are scarce and based mainly on stomach and scat content analysis. This records mammalian predators much larger than the tegu or the lesser grison, such as the canids *Cercdocyon thous* (Linnaeus, 1766) and *Chrysocyon brachyurus* (Illiger, 1815) (Bueno & Motta-Junior 2004) the felids *Herpailurus yagouaroundi* (É. Geoffroy Saint-Hilaire, 1803) (Migliorini et al. 2018), *Leopardus geof-*

froyi (d'Orbigny & Gervais, 1844) (Guidobono et al. 2016), *Leopardus pardalis* (Linnaeus, 1758) (Bianchi & Mendes 2007; Martins et al. 2008; Cassia Bianchi et al. 2010), *Leopardus wiedii* (Schinz, 1821) (Rinaldi et al. 2015; Migliorini et al. 2018), *Panthera onca* (Linnaeus, 1758) (Garla et al. 2001; Silveira et al. 2010), and *Puma concolor* (Linnaeus, 1771) (Azevedo et al. 2018) and the procyonid *Procyon cancrivorus* (G. Cuvier, 1798) (Pellanda et al. 2010; Quintela et al. 2014). Therefore, the present record is the first

to document tegu lizards as prey of *G. cuja*, which represents the smallest mammalian predator of this reptile species known to date.

The previous records of lizards identified to the species level in the diet of the lesser grison were *Notomabuya frenata* (Cope, 1862) (Yensen & Tarifa 2003) and *Liolaemus chiliensis* (Lesson, 1830) (Ebensperger et al. 1991), both species much smaller than the tegu. The average SVL of an adult tegu is 377 mm for females and 426 mm for males (Winck et al. 2011), while *L. chiliensis* presents an average SVL of 73.4 mm (± 5.7 mm) (Jaksic et al. 1980), and *Notomabuya frenata* may reach up to 91 mm (Vrcibradic & Rocha 2011). Our observation shows that lesser grisons can be fierce predators, not restricted to small prey as suggested by previous dietary studies, capable of killing vertebrate prey of their own body size.

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ONLINE SUPPLEMENTARY MATERIAL

Supplement 1

Video S1. Compilation of videos taken by two Bushnell HD camera traps showing the hunting and predation of a black-and-white tegu by a lesser grison at União Biological Reserve (Rio das Ostras, RJ, Brazil), January 15th, 2020.