PREY TRANSFER THROUGH DELAYED SCROUNGING OF A RHIPIDOMYS RODENT HUNTED BY AN ALPHA MALE *SAPAJUS CAY*

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Abstract

Cebines' unique foraging strategies, including opportunistic hunting, allow them to access food sources unavailable to other primates. Although instances of mammal predation have been documented in Sapajus species, reports of spontaneous food sharing and meat interaction remain rare. This study, using ad libitum observations, reports opportunistic hunting and delayed scrounging in a group of *Sapajus cay* in Mato Grosso do Sul, Brazil. An alpha male was recorded capturing and consuming a rodent (*Rhipidomys* sp.). While consuming the prey, he dropped scraps that were collected by other group members through delayed scrounging. An estrous female followed the alpha male, exhibiting courtship behaviors but showing no interest in the prey. This event represents a rare observation of vertebrate consumption and passive food transfer in *S. cay*. These findings highlight the need for further behavioral studies on geographically restricted primate species like *S. cay*.

Keywords: Capuchin; group behavior; social hierarchy; interaction

Introduction

Cebines live in social groups consisting of multiple males and females (Carosi et al., 2005; Tiddi et al., 2011) in a linear social hierarchy, where the alpha male is the dominant and often largest individual (Izawa, 1980; Janson, 1984). They have hunting behavior characterized by hand dexterity (Christel and Fragaszy, 2000; Torigoe, 1985), exploratory behavior (Perry et al., 2017), and spontaneous food interaction (de Waal et al., 1993; Perry and Rose, 1994). These behaviors and their size allow them to explore food sources unavailable to other primate species. Among foraging strategies in the genus *Sapajus*, opportunistic hunting and consumption of small mammals are well known, such as *Sapajus* sp. hunting a common marmoset (*Callithrix jacchus*) (Albuquerque et al., 2014), a black-horned capuchin (*S. nigritus*) attempting to consume a Caluromys lanatus that was hit by a car (Palmeira and Pianca, 2012), *S. cay* hunting *Rhipidomys* sp. that were just released from a live trap (Milano and Monteiro-Filho, 2009), and a black-capped capuchin (*S. apella*) hunting an *Oecomys* sp. (Lee and Huang, 2021). Predation of larger mammals were observed in black-horned capuchin (*S. nigritus*) hunting an infant howler monkey (*Alouatta guariba*) (Genty and Cäsar, 2014) and Kerodon rupestres hunted by a group of black-striped capuchins (*S. libidinosus*), followed by a tolerated scrounging interaction between the alpha male and the other males in the group (Filho et al., 2021). While these reports show that capuchin monkeys hunt other mammals, events of spontaneous meat interaction are rare and have been observed in *S. cay* only once, while consuming a marmoset, *Mico melanurus* (Costa et al., 2020). In this case, two adult *S. cay* individuals were observed feeding, while other members of the group were vocalizing close to them. After consumption, pieces of the carcass were discarded on the ground and other individuals of *S. cay* picked them up and disappeared into the forest (Costa et al., 2020).

The most common prey transfer in primates is termed delayed scrounging; it occurs when one individual eats the leftovers of another already out of that individual's possession, after being dropped or discarded. Other types

of prey transfer described for primates include tolerated scrounging—the possessor allows another individual to come near and retrieve dropped scraps; facilitated scrounging—the possessor moves towards an individual, drops food scraps and allows the other to retrieve them; passive food-sharing - the possessor permits another to retrieve food items from his/her hands or mouth; and theft—one individual seizes the food directly from another (de Waal et al., 1993; Ferreira et al., 2002). Here we report a case of hunting by a *S. cay* alpha male followed by the delayed scrounging of prey leftovers by group mates.

Materials and methods

The behavior of a group of *Sapajus cay* was recorded from January to July 2012 in a private 286-ha forest fragment (21°21'42.62"S, 56°09'20.58"W) in Mato Grosso do Sul, Brazil. The dominant vegetation was deciduous and semi-deciduous forest (Klink and Machado, 2005).

We used *ad libitum* observations (Altmann, 1974) to record the event of opportunistic hunting and food transfer reported in this work, within observations carried out for a larger behavioral study of the capuchins using Nikon Monarch 10 × 42 binoculars, a Canon t2i camera with a 100–400 mm interchangeable lens, and field logs, totaling 255 h of direct observations. The group consisted of 21 individuals (nine adult females, eight adult males, one sub-adult male, one sub-adult female, and two young males), all identifiable through natural characteristics such as tuft size and shape, scars, age, sex, and fur color. We followed the ethical standards in the guidelines of the American Society of Mammologists.

Results

The episode occurred on July 17, 2012, at 10:45 a.m. The group of *Sapajus cay* was foraging in a stratified manner with adult females and juveniles foraging only in the understory, and other individuals (adult males and sub-adults) foraging on the ground in the riparian forest. The vegetation structure was composed of branches, logs, litter, and lianas around "acuri" palms (*Attalea phalerata*). The alpha male foraged among the leaf litter near a burrow and pulled out a rodent of the genus *Rhipidomys* (Figures 1 and 2) with his hands. The burrow where the rodent was found was composed of a dead "acuri" palm suffocated by a fig tree, forming an environment like a "den." Due of the difficulty in identifying rodents to the species level, we only categorize the rodent as belonging to the genus *Rhipidomys* (characterized by darker fur in the hind paw) (Figure 1). The visible scrotum of the rodent helped to identify it as an adult male (Figure 2).

The alpha male bit the rodent's skull and killed it at 10:46 a.m. By 10:48 a.m. the head was separated from the prey's body. Then, the male moved to a larger and taller tree with the prey, sat down, and started feeding by tearing the forelimbs with his teeth. During capture and eating of the prey he emitted a "huh" call, a vocalization associated with feeding-related behaviors (Bastos et al., 2015). The alpha male moved with the prey between 10:49 and 11:07 a.m., during which time an estrous female followed him while displaying courtship behavior, as described by Janson (1984); however, she was not begging for food but rather only focused on soliciting sex (Figure 2). The male start eating the prey at 11:07 a.m. and kept moving through the trees. He repeatedly looked down and dropped different body parts (viscera, ribs, head, and limbs) one at a time while he moved through the forest. About five groupmates descended to the ground and collected prey remains to eat in neighboring trees. Different pieces of the remains were dropped between 11:07 a.m. and 12:30 p.m. and the participants who consumed the scraps produced "huh" vocalizations and remained close to the alpha male throughout the entire period.

Discussion

In our observations of a unique hunting episode by the *Sapajus cay* alpha male, he ate most of the carcass and dropped some of the leftover scraps, which other group members retrieved from the ground and ate in nearby trees. We consider this interaction to be tolerated, delayed scrounging as the male watched the others retrieve the food from below him (Ferreira et al., 2002). However, the estrous female sitting next to the alpha male did not eat any of the meat; she appeared to be sex-motivated and not food-motivated, as she followed the male, and approached the male with grimaces and vocalizations, as has previously been described in courtship behavior for female *Sapajus* species (Janson, 1984; Lynch Alfaro, 2005).

In a previous study of the same *Sapajus cay* group, vertebrate prey was the rarest component in the food budget, and only the alpha male was observed to consume these vertebrates, which included small rodents (Júnior et al., 2020). For *S. cay*, there is only one previous publication documenting predation of *Rhipidomys* sp. individuals, one by a sub-adult and another by an adult female capuchin during an opportunistic release of small mammals, but there was no food transfer in these cases (Milano and Monteiro-Filho, 2009).

In *Sapajus*, alpha males have a higher daily energy requirement because of their morphological and physiological characteristics (Agostini and Visalberghi, 2005; Fedigan, 1990; Perry, 2011). Delayed scrounging was previously described in *S. cay* (Costa et al., 2020), but it is a rare event. As this record refers to an alpha male hunting, his position at the top of the hierarchy might mean that he tolerates delayed scrounging to help maintain his position in the group, as observed by Ferreira et al. (2002). Previous reports on *S. cay* hunting referred to two individuals that ate their prey 5 m away from other

Figure 1. An estrous female (left) and the alpha male (right) of a *Sapajus cay* group; the male hunted and caught the *Rhipidomys* sp. rodent. Circle indicates the dark fur on the rodent's hind paw, helping to identify it as *Rhipidomys*. Photo by Oscar Fernandes Júnior.

Figure 2. The alpha male of the *Sapajus cay* group (on the right) eating the *Rhipidomys* sp., with an adult estrous female (on the left) sitting by his side; the prey item was not shared with the female. Circle indicates the genitals of the rodent, identifying it as an adult male. Photo by Oscar Fernandes Júnior.

group members (Milano and Monteiro-Filho, 2009) and to two adult males that performed delayed scrounging subsequent to a dispute over the carcass within the group (Costa et al., 2020). This new finding highlights the importance of collecting data on this geographically restricted cebid species that still remains poorly studied for behavior.

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