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A CASE OF INFANTICIDE IN TUFTED CAPUCHIN MONKEYS (*Cebus nigritus*)

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ABSTRACT: According to behavioural ecology, infanticide by males would be an adaptive reproductive strategy because it allows faster fertilization of the females and reduces investment in unrelated offspring. Critics of this view indicate the lack of evidence of the behaviour for several primate species, hence the relevance of reports of observed infanticide events. Here we report a case of infant killing in a free-ranging group of tufted capuchin monkeys (*Cebus nigritus*).

RESUMEN: Un caso de infanticidio en un grupo de monos capuchinos (*Cebus nigrites*). Según la ecología del comportamiento, el infanticidio realizado por los machos podría ser una estrategia reproductiva adaptativa porque permite mayor rapidez en la fertilización de las hembras y reduce la inversión en crías no emparentadas. Los críticos de este punto de vista advierten sobre la falta de evidencia de este comportamiento en varias especies de primates, de ahí la relevancia de los relatos de observación de eventos de infanticidio. En este trabajo reportamos un caso de infanticidio en un grupo silvestre de monos capuchinos (*Cebus nigritus*).

Key words. Infanticide. Male reproductive behaviour. Social structure.

Palabras clave. Comportamiento reproductivo de machos. Estructura social. Infanticidio.

According to behavioural ecology, when there are differences in the evolutionary interests between males and females, or sexual conflict (Parker, 1979), males should evolve strategies to manipulate female mate choice (Kappeler and van Schaik, 2004). From this point of view, infanticide by males would be adaptive because it allows faster fertilization of the females and reduces investment in unrelated offspring (Hrdy, 1979). Hence, infanticide is expected when the probability that the infanticidal male had sired the killed infant was very low, the mother can be fertilized earlier than if the infant had lived, and the infanticidal male has an increased probability of siring the next infant relative to the current offspring (see van Schaik, 2000 for a review).

Critics of the adaptionist explanation of infanticide indicate the rarity or lack of evidence of infant killing for several primate species. Moreover, it is argued that many cases of alleged infanticide are in fact inferences from the disappearance of infants after between-males overt aggression (Bartlet et al., 1993; Susmann et al., 1995). Therefore, observations

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of actual infant killing are worth reporting. Here we describe an observed case of infant killing by the dominant male in a free-ranging group of *C. nigritus* that has been studied for 14 months in the Jaraguá State Park, São Paulo, Brazil.

The capuchin group lives at Jaraguá State Park, one of the last Brazilian Atlantic Forest patches from São Paulo city (23º27'42" S, 46º45'44" W). It comprises ca. 500 ha of Ombrophyla Dense Forest and Semidecidual Seasonal Forest, with many tree species (including exotic ones), such as jatoba trees (*Hymaenaea* sp.), jeriva palms (*Syagrus romanzoffiana*), plum trees (*Prunus domestica*), and fig trees (*Ficus* sp.). The landscape is hilly, with altitude varying from 700 to 1135 meters.

This research was conducted from January/2004 to February/2005, for a total of 500 hours of observation. When the incident took place, the group had 30 monkeys, being 11 adults (four males and seven females), 4 subadult males, 8 juveniles, 5 infants III (nearly 1.5 year-old) and 2 newborns (one was two days old, the other was seven days old). Study group's home range size was 117 ha, including 34 ha where tourism was allowed. They foraged on natural available food, but they also received food from tourists, especially on weekends.

From January to August/2004, we could not identify the dominant male between two (GUE and VIN) of the four adult males present in the group based on body size or behavioural observations. It seems that we started data collection during a period of male dominance transition. On 11/08/2004 GUE defeated VIN in a serious fight (both of them were wounded, but VIN was severely injured). After that, GUE reached the top dominance rank, having priority of access to food resources, exhibiting strong vigilance behaviour, and staying in close proximity to several immature monkeys and adult females, with the exception of adult females PIE and SAR that stayed in closed proximity to the subordinate and peripheral male ZUL. This is the typical pattern of dominant male behaviour in tufted capuchin monkeys (Fragaszy et al., 2004).

On 22/11/2004, PIE was first seen carrying a newborn. The infanticide episode occurred two days later, on 24/11/2004. At 10:27 h, one of us (EDRS) suddenly heard monkeys vocalizing and saw GUE being chased by two adult females other than PIE. His mouth was bloodstained. Few minutes later, PIE went down to the ground carrying the already dead infant, whose belly was ripped and bleeding. For ca. one hour, some group members approached PIE, inspected the dead infant and left. By the end of the day, she still carried the corpse, whose legs and tail were detaching from the body. On the next day she was not carrying the dead body anymore.

GUE had not been observed behaving aggressively towards females or any other infant before or after his raise to the dominant position and until the end of the research on February 2005. PIE had no injury herself and GUE had never been observed attacking her before. The other newborn infant survived well till the end of the study.

Sommer (2000) argues that the threat of infanticide by male primates might have selected "sophisticated counterstrategies" by females. These counterstrategies would account for the rarity (or even absence) of the phenomenon in extant primates. Janson (2000) considers that these female counterstrategies can be of two types: alliances with resident males or promiscuous mating. Both types are observed within the genus *Cebus*. In *Cebus capucinus*, females mate with several males in the group, and social groups are periodically invaded (every three to four years, on average; Fedigan, 2003) by two or three adult males that usually evict former resident males and may fatally wound dependent infants (Fedigan, 2003; Fedigan and Jack, 2004). The pattern of social relationships between group members, particularly the coalitionary relationships and the more tolerant dominance relationships between males, can be understood as a defence strategy against group invasion by extraneous males (Perry 1997, 1998). In

Cebus apella and *C. olivaceus*, male dominance relationships are despotic and females show a strong preference to establish affiliative relationships and to copulate only with the dominant male, whose tenure is relatively long (Janson, 1984, 1986; O'Brien, 1991; Di Bitetti and Janson, 2001).

Differences in social structure among *Cebus* species are better explained by the hypothesis that risk of infanticide and the mating systems, rather than ecological differences, are determinants of social evolution in capuchin monkeys (Janson, 1986; Fragaszy et al., 2004; Izar et al., in press). In accordance, infant killing has already been reported in the genus *Cebus* for *C. capucinus* (Rose 1994; Fedigan 2003; Manson et al. 2004), and *C. olivaceus* (Valderrama et al., 1990), but only suggested for tufted capuchin monkeys (*C. apella*, Izawa, 1994). The present report, in conjunct with other observations of infant killing in wild groups of *Cebus nigritus*, after a take-over of the dominant male's position (J. Rímoli, pers. comm.), confirms that the phenomenon is present in at least three *Cebus* species.

The infanticide episode described here is consistent with the three conditions in which male infanticide is considered to be adaptive (van Schaik, 2000). Considering the mean gestation period of tufted capuchin monkeys (ca. 5 months, Di Bitetti and Janson, 2001) and that in these species the dominant male sires most infants of the group (Escobar-Páramo, 1999), the male killed an infant that was sired before his raise to the dominant position, therefore, probably not his offspring. Because the infanticidal male was the new dominant, the probability that he would sire her next offspring increased. Moreover, the interbirth interval of tufted capuchin monkeys lasts ca. 18 months but the death of the infant can abbreviate this period (Di Bitetti and Janson, 2001), so killing a newborn, as in the case described here, is consistent with the condition that the mother can be fertilized earlier than if the infant had lived. The fact that infanticide is adaptive for males does not mean that it will always occur, since females can defend their offspring or else the male may not have the opportunity. Thus, the survival of the other newborn in this study should not be considered as evidence against the hypothesis. All observed cases of infant killing by adult males in tufted capuchins occurred after male takeovers, suggesting that infanticide in this species is an adaptive reproductive strategy.

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