about 15 m above the ground, looking about while pacing and making a low chuck vocalization. The females were together about 10 m from the male. They appeared agitated and moved closer to the male as I observed. At 11:09 a large raptor flew from the interior of the reserve toward the group. The bird, a crested eagle, swooped down into the tree where the younger female was last seen. There was a loud screaming vocalization by the female and a loud sound of breaking branches. The attack took less than ten seconds. The eagle then flew at midstory toward the edge of the reserve. Immediately after the eagle left, the adult male saki returned to the location of the attack and appeared piloerected. The adult female then moved closer to the male and both left the area silently. I did not observe the eagle with the saki, nor did I find the body of the juvenile female. I did not see the younger female again however on repeated surveys of the group.

This is the first reported observation of an avian attack on *P. pithecia*. Crested eagles prey on a variety of small to medium-sized mammals. At a crested eagle nest in one of the BDFFP reserves, Bierregaard (1984) found the remains of small rodents, marsupials and two kinkajous (*Potos flavus*) whose adult weight is approximately 2.6 kg (Fonseca *et al.*, 1996). Julliot (1994) observed a crested eagle take a six to eight-month old spider monkey in French Guiana. An adult white-faced saki weighs approximately 1.5-2.25 kg (Buchanan *et al.*, 1981). An immature individual, weighing closer to the lower end of the range, could be a likely prey item for a crested eagle.

Buchanan *et al.* (1981) reported that a captive juvenile *P. pithecia* displayed an alarm reaction of freezing without vocalization when exposed to large bird silhouettes and to the overhead movement of large objects. This behavior is in contrast to the agitated behaviors of the sakis observed in this case. The saki group in the reserve was not habituated, so the reaction observed may have been due to the presence of the observer.

Observations of predation and attempted predation on primates are rare. In the neotropics, harpy eagles have been the most common predators observed to take immature and adult howling monkeys (Rettig, 1978; Eason, 1989; Peres, 1990; Sherman, 1991). Peres (1990) reported secondhand but reliable observations of harpy eagle predation on sakis and other primate species in Amazonia. The crested eagle needs to be considered a significant primate predator as well. Information on predation is needed for a more comprehensive examination of the constraints on free-ranging primate sociality. It is also important to note that the isolation of forest fragments, in this case, did not eliminate a large avian predator.

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INFANTICIDE FOLLOWING IMMIGRATION OF A PREGNANT RED HOWLER, *ALOUATTA SENICULUS*

Erwin Palacios

Red howler monkeys are among the several primate species showing male and female transfer (Crockett and Eisenberg, 1987; Glander, 1992; Crockett and Pope, 1993). Nevertheless, this emigration pattern differs from most polygynous primates in that red howler immatures of both sexes emigrate from natal groups (Crockett and Eisenberg, 1987), with females rarely succeeding in entering and breeding in a previously established troop (one that has produced offspring) (Crockett, 1984; Crockett and Pope, 1993). One of the facts preventing female immigration into an established troop is the aggressive attitude adopted by female residents. This is indeed a manifestation of the complex behavior identified

to mediate the emigration of some females. Female-female reproductive competition in this species appears to be directed at limiting the number of reproductive positions in a troop, and hence maintain small troop size (Crockett and Pope, 1993; Crockett, 1996).

Recently, a new hypothesis has pointed out infanticide as the most reasonable fact to explain small troop size in red howlers (Crockett and Janson, 1993, 2000). Infanticide has been well documented in red howlers (Rudran, 1979; Crockett and Sekulic, 1984; Izawa and Lozano M., 1994; Agoramoorthy, 1994; Crockett, 1998), and it is associated with male invasions of established groups, or within group male status changes, in order to gain access to reproductive females. By killing infants, males reduce the time to the mother's next conception.

During 1996, I studied the diet and ranging patterns of a group of red howler monkeys at Caparú Biological Station (1°5.55'S, 69°30.8'W), lower Rio Apaporis River, Colombia (Palacios, 1997, 1998; Palacios and Rodríguez, in review). I observed the group from January to December. The group was usually contacted for 3-5 days per month. At the beginning of the study, two adult females, one subadult female, an infant female, and three males (adult, juvenile and infant) composed the study group. The adult male was the same individual during the entire study period. I was able to recognize him by his particular facial physiognomy, and a little scar on his upper lip. This male was observed in the same group on November 1997, and on several additional occasions afterward.

Female immigration

On April 1, 1996, the group was moving to the western border of their home range, and arrived at a *Couma macrocarpa* tree (#84) (about 200 m away from the home range's border), where they spent 19 minutes feeding on ripe fruits. This part of the home range is located about 80–100 m from the highest water level of the Taraira Lake, and is deluged by small creeks flowing into the lake. The forest growing in this area is very low and shrubby, and heavy arboreal animals such as red howlers must circumvent it.

After feeding in tree #84, with the adult male leading the progression, the group moved 150 m to the west, going around the low vegetation area, and stopped for a moment. The adult male grunted, and then all the group members but the adult male moved back (i. e., to the east) around the low vegetation area, but following its southern border, until arriving at tree #85 (*Maquira guianensis*) where they began another feeding bout.

While the group was moving back, the adult male repeatedly grunted and then hid in the canopy. I kept contact with the rest of the group, waiting for the male to join the troop later. Ten minutes after the troop began to feed on tree #85, the adult male and a new female (that I had not observed before) moved toward the *Maquira* tree. The male grunted

twice, entered the tree with the female, and both began to feed with the other troop members. Female residents showed no aggression towards the female immigrant at that time, nor on the three subsequent days of observation in April.

Infant killing

In early May the immigrant female was observed with a newborn male (28 days old, according to our last date of contact with the group). On May 2, after feeding for a long time on tree #121 (*Couma macrocarpa*), the group moved in the linear fashion progression typical of red howlers, with the immigrant female being the closest one to the adult male, which was following them. At 2:52 h the adult male rapidly approached the immigrant female and attacked her, causing her to fall about 16 m to the ground. The adult resident females were about 20 m ahead, and rapidly returned. While they approached, the female climbed to a tree, where the male attacked her again, and roughly took away her little infant. The male moved to an adjacent creek area, where I was not able to observe him due to dense foliage and vines. I could not detect if the infant fell down, probably because of his very light weight. It was also possible that his small body remained wedged within the branches and dense vines.

Five minutes after this episode the group continued moving, with females in front and continuously grunting. The immigrant female was piloerected and clearly frightened by the male, which moved behind her, also grunting repeatedly. Thereafter, the group engaged in three feeding bouts on three different trees. The male participated in all but one. When he was not feeding, he remained watching the rest of the group from a neighboring tree, and continuously grunted. Some minutes later, when the group was feeding on young leaves at tree #116 (unidentified Fabaceae), the two adult female residents chased and expelled the adult male from the tree, when he approached where the immigrant female was feeding. Later the group arrived at sleeping tree #19, this tree had been used by the group before, and although they usually formed two or three subgroups (adult male always alone), the animals used to rest relatively close to each other (6–10 m apart), the animals entered the tree, adult male being the last one, and all but the male settled down to rest. The male moved to an adjacent tree, ten minutes later returned to the sleeping tree, and then he settled about 15 m away from the rest of the group, already resting in three different groups very close together (3–6 m apart). The next morning the male was observed resting in an adjacent tree, while the rest of the group remained in the sleeping tree. On the following two days, female residents displayed aggressive attitudes towards the male on three occasions, all in a feeding context. Over the next two days, the male repeatedly approached the immigrant female, but she always fled. On the second day, while the troop was moving, the immigrant female jumped between two trees, and the male grabbed her by the tail, pulled her towards him and mounted her. Copulation lasted 119 s. I did not observe further copulation bouts until the end of the study period (December 15, 1996).

Discussion

Red howler females may emigrate from natal groups because of within-group competition for breeding positions (Crockett, 1984, 1996). After dispersal, they attempt to join a troop in which to breed, but are more likely to succeed in joining a newly-formed troop and rarely enter established troops. In the present study, the troop composition included a juvenile, suggesting that it was not newly formed. No cases of female emigration in red howlers to date (Crockett, 1984, 1996; Crockett and Pope, 1993) have reported on emigrating pregnant females. On the contrary, this could be possible in mantled howler transient immigrant females (Glander, 1992). It is uncertain whether the immigrant female became pregnant in a newly formed troop that failed and broke up or in her natal group.

Successful red howler immigration into established troops is very infrequent (Crockett, 1984). By showing an aggressive attitude towards immigrants, female residents limit reproductive female membership to four (Sekulic, 1982; Crockett, 1996). The howler group at Caparú had only two adult females, both rearing infants, and a subadult. No aggressive attitudes were observed between resident and immigrant females, probably because female membership positions were not fully occupied. Nevertheless, it is uncertain whether resident females were able to detect the immigrant female's pregnancy, and whether this affected their decision. Glander (1992) described how mantled howler females joined established groups; males do help extragroup females entering a group, and once a female achieves entry into a group this way, it is no longer chased by the resident females and becomes a group member. The male's explicit acceptance of the new female is in accordance with Glander's observations, and could be considered as a definite fact leading to the extragroup female's success in entering the group.

Infanticide of infants born to pregnant females some time after entry of new males was reported by Crockett and Sekulic (1984). These observations and my own are consistent with the hypothesis that males can remember which females they mated with. Infanticide in red howlers has always been reported as a consequence of male status changes, whether this occurs by male takeovers, or changes within a troop. This is the first report on infanticide not associated with a male status change, and, regardless of the context in which it occurred, was related to the same benefit that infanticidal males seek after taking over a group or deposing a male of their own: a reproductive advantage by having access to a reproductive female. Nevertheless, this did not represent an immediate profit to the male, nor to the immigrant female; no new infants of the immigrant female were observed during the rest of the study period. I observed a new infant on November 1997, belonging to one of the adult female residents. This clearly agrees with Crockett's (1984) proposed costs of emigration; although the immigrant female succeeded in entering an established troop, she did not breed successfully (paying a high cost losing her infant) and, very likely, delayed her age at first, successful breeding. The latter could also be affected by the fact that the other two infants (about eight and nine months old) in the group disappeared during June–July 1996 (probably because of food shortage or predation), leaving the male free to mate with any of the three reproductive females.

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Levantamento Preliminar de Endoparasitas do Tubo Digestivo de Bugios *Alouatta guariba clamitans*

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Introdução

As doenças parasitárias são responsáveis por considerável morbidade e mortalidade em todo o mundo, e freqüentemente estão presentes com sinais e sintomas não específicos. A recente descoberta de uma série de agentes infecciosos, inclusive definindo quadros clínicos até então não descritos, bem como a crescente expansão de doenças já conhecidas, tem feito ressurgir o debate sobre a importância das doenças infecciosas e parasitárias (DIPs), mesmo nos países de primeiro mundo (Berkelman, 1994). Yamashita (1963), em estudos parasitológicos com primatas do gênero *Alouatta* detectou a presença de *Mathevotaenia megastoma, Anchylostoma mycelis, Longiastriata dubis, Enterobius minutus, Dipetalonema atelenses, Microfilaria* sp., *Controrchis biliophilus, Filariopsis aspera, Raillietina demerariensis, Raillietina multistesticulata, Squanema bonnei* e *Raillietina alouattae*. Martins *et al.* (1997) encontraram ovos de parasitas em 33% das amostras de fezes de *Alouatta guariba,* porém não as identificaram. Luz *et al.* (1987) encontraram cistos de *Entamoeba coli, E. histolytica, Taenia* sp. e *Strongiloides* sp. em fezes de *Alouatta guariba.* Quanto à anatomia do trato digestivo, o gênero *Alouatta* possui estômago avantajado, intestino curto, mas espaçoso, com fermentação bacteriana. Quanto à dieta, são folívoros comportamentais, possuindo seletividade quanto ao alimento, apresentando organização social, locomoção e nível de atividade que os torna adaptados à sua dieta (Milton, 1977). A espécie *Alouatta guariba*, descrita na região há 70 anos, encontra-se ameaçada devido a devastação da mata, ação de predadores e caça. Por isso, surgiu há sete anos o interesse pelo desenvolvimento de estudos científicos sobre o comportamento e hábitos destes animais, por professores e acadêmicos da Universidade Regional de Blumenau, Santa Catarina, com a finalidade de subsidiar as ações de preservação. O estudo de endoparasitoses intestinais em primatas no Brasil é bastante escasso, mas de extrema importância principalmente em populações que ocorrem em ambientes fragmentados, como é o caso da Mata Atlântica em Indaial, Santa Catarina.

Métodos

As coletas foram realizadas no período de julho de 1998 à março de 1999, sendo avaliados oito animais machos e duas fêmeas de diferentes faixas etárias, mantidos em cativeiro durante e pós quarentena, totalizando 165 amostras. A coleta de material de animais foi realizada semanalmente, no período da manhã, as fezes coletadas em frascos plásticos descartáveis contendo conservante SAF (920ml de solução fisiológica 0,85%, 50ml de ácido acético glacial, 30ml de formol e 5ml de glicerol). Durante o trajeto do CEPESBI-Centro de Pesquisas Biológicas de Indaial, Santa Catarina (local de coleta) até o laboratório, as amostras foram mantidas em conservante, dentro de caixa de isopor evitando calor excessivo e conseqüente deterioração de alguns organismos. A pesquisa e identificação dos parasitas foi realizada através de dois diferentes métodos: Método de Faust y Cols.-centrífugo flutuação em sulfato de zinco 33%; e Sedimentação Hoffmann -sedimentação espontânea das fezes em água (Moraes, 1984 e Pessoa, 1988).

Resultados e Discussão

Além dos resultados apresentados acima, nos animais de quarentena foram encontradas combinações de 5,46% de dois tipos de parasitas (*Giardia* sp. e *Enterobius* sp.). Nos animais de pós-quarentena observou-se a mesma combinação de parasitas, porém com maior freqüência (11,52%).

Estes resultados devem-se, talvez, pelo fato de que os animais de quarentena encontravam-se isolados em processo de aclimatação, sendo que, no período pós-quarentena os mesmos

Tabela 1. Freqüência relativa (%) dos parasitas encontrados nas amostras de fezes de dez animais analisados, durante nove meses de amostragem.

Parasitas	Quarentena (%)	Pós – quarentena (%)
Giardia sp.	61,54	77,92
Enterobius sp.	38,47	8,7
Entamoeba sp.	0	8,7
Ancylostoma sp.	0	8,7