

Predation on *Alouatta guariba clamitans* Cabrera (Primates, Atelidae) by *Leopardus pardalis* (Linnaeus) (Carnivora, Felidae) ¹

João M. D. Miranda ², Itiberê P. Bernardi ², Kauê C. Abreu ² & Fernando C. Passos ²

¹ Contribuição número 1576 do Departamento de Zoologia, Universidade Federal do Paraná.

² Laboratório de Biodiversidade, Conservação e Ecologia de Animais Silvestres, Departamento de Zoologia, Universidade Federal do Paraná. Caixa Postal 19020, 81531-980 Curitiba, Paraná, Brasil. E-mail: guaribajoao@yahoo.com.br

ABSTRACT. There are a few studies about predation on primates. Howler monkeys, being relatively large animals, were believed to be preyed on successfully only by medium to large-sized carnivores and large birds of prey. Our study took place at Chácara Payquerê, which is situated in the municipality of Balsa Nova, State of Paraná, Southern Brazil. Fingers and nails from *Alouatta guariba clamitans* Cabrera, 1940 were founded in two faecal samples from *Leopardus pardalis* (Linnaeus, 1758). With our documentation large howler monkey remains in faeces, the possibility of ocelot being a potential predator of all Neotropical primates should be taken into consideration. **KEY WORDS.** Araucaria pine forest, brown howler monkey, ocelot, primate predation.

RESUMO. **Predação em *Alouatta guariba clamitans* Cabrera (Primates, Atelidae) por *Leopardus pardalis* (Linnaeus) (Carnivora, Felidae).** São poucos os estudos sobre a predação de primatas. Sendo os bugios animais relativamente grandes, acredita-se que somente médios e grandes carnívoros e grandes rapineiros possam lograr sucesso em sua predação. O estudo foi realizado na Chácara Payquerê, situada no município de Balsa Nova, Estado do Paraná, sul do Brasil. Dedos e unhas de *Alouatta guariba clamitans* Cabrera, 1940 foram encontradas em duas amostras fecais de *Leopardus pardalis* (Linnaeus, 1758) que foram coletadas. Com este registro de grande primata em fezes, a possibilidade de a jaguatirica ser um potencial predador de todos os primatas neotropicais pode ser levada em consideração. **PALAVRAS CHAVE.** Bugio-ruivo, Floresta de Araucária, jaguatirica, predação de primata.

Few studies about predation on primates can be found to date, but it is assumed that predation rates are higher for terrestrial primates than for arboreal primates (ANDERSON 1986, TREVES 1999). While the role of predation for shaping primate social organization is controversial (CHENEY & WRANGHAM 1987, HEYMANN 1990, TREVES 1999, STANFORD 2002), there is an increasing number of documented cases of primates falling prey to different species of predators.

Among the mammalian predators of primates, felids are documented by many authors in previous studies: ocelots – *Leopardus pardalis* (Linnaeus, 1758), pumas – *Puma concolor* (Linnaeus, 1771), and jaguars – *Panthera onca* (Linnaeus, 1758) (EMMONS 1987, PEETZ *et al.* 1992, JORGENSEN & REDFORD 1993, OLMOS 1993, 1994, CHINCHILLA 1997, OLIVEIRA 2002). In addition to terrestrial predators, it is important to emphasize the occurrence of predation of primates by birds of prey (Heymann 1990, Treves 1999, Stanford 2002, Miranda *et al.* in press). In this paper we report the occurrence of predation on brown howler monkeys – *Alouatta guariba clamitans* Cabrera, 1940 by ocelot.

MATERIAL AND METHODS

Observations were made at Chácara Payquerê (25°29'52"S, 49°39'24"W), located in the Municipality of Balsa Nova, State of Paraná, southern Brazil, which lies within the Araucaria pine forest and also within an Environmental Protection Area designated as "Devonian Scarp" (APA da Escarpa Devoniana). The presence of ocelot was confirmed by camera trap pictures, footprints, faeces, burrows, carcasses and other signs that could indicate the presence of that a carnivorous species along trails and river borders in that area. The brown howler monkey is the only primate species at the study site.

RESULTS AND DISCUSSION

On May 14th, 2003, a faecal sample of *Leopardus pardalis* containing fingers and nails of *Alouatta guariba clamitans* was found. On August 2nd, 2003, an additional sample was collected at the same site. The sample also contained the same anatomical parts in addition with bone's fragments and hair of brown howler monkeys. No evidence of fly grubs or eggs was found

in the faecal samples to support the possibility of ocelots feeding on dead howlers.

The specific location where the faecal samples were collected is situated within the home range of two howler monkey groups, although no howler disappeared from either group during the study (MIRANDA & PASSOS 2005). Considering that the home range of ocelots is much larger (117-312ha) (LUDLOW & SUNQUIST 1987, EMMONS 1988, SUNQUIST *et al.* 1989, CRAWSHAW & QUIGLEY 1989) than the home range of howler monkeys in this study area (17ha – J.M.D. MIRANDA, unpublished data). It is obvious that the body remains belonged to animals from other howler monkey groups.

R.C. BIANCHI in her Master's Thesis (unpublished data) discussed the high frequency (25% of faecal samples collected) of howlers in the ocelot diet at Estação Biológica Caratinga (State of Minas Gerais, Brazil), and the authors explained that these felids are essentially opportunistic feeders on whatever prey is available. In that site there is a high density of brown howler monkeys (the second highest known, 1.1 individuals/ha – MENDES 1989), which can explain the high predation rates. The data of brown howler monkey density at Chácara Payquerê is 0.38 individuals/ha, which is an average density for this species, according to J.M.D. MIRANDA at his Master's Thesis (unpublished data).

The impact of predation on primate populations and the evolution of anti-predator behavior are hard to determine due to the difficulty in obtaining predation data for primates (HEYMANN 1990, TREVES 1999, STANFORD 2002). However, our report of *L. pardalis* feeding on *A. g. clamitans*, even though scarce, confirm that howler monkeys are part of the ocelot's diet at this study site. Ocelots can be a potential predator of all neotropical primates, because they can feed on bigger species such as brown howler monkeys and woolly spider monkeys – *Brachyteles hypoxanthus* (Kuhl, 1820)(R. C. BIANCHI, unpublished data) and smaller and faster primates such as black lion tamarins – *Leontopithecus chrysopygus* (Mykán, 1820)(J. CARVALHO, personal communication) and brown capuchin monkey – *Cebus nigritus* (Goldfuss, 1809)(R. C. BIANCHI, unpublished data).

ACKNOWLEDGEMENTS

The authors would like to thank Emygdio L. A. Monteiro-Filho for the ideas and discussions on this project. This study could not have been done without the assistance of Lucas M. Aguiar, Gabriela Ludwig, Lucielle M. Bertolli, Bárbara T. Dedavid, Fernando L. Klisiewicz. We thank too Aaron J. Kim and Burton K. Lim revised the manuscript and the English language. We also wish to thank CAPES (to JMDM) and CNPq (process 300667/99-0 to FCP) for supporting this study. We would like to thank Júlio César Bicca-Marques and an anonymous referee for contributions on manuscript.

REFERENCES

ANDERSON, C.M. 1986. Predation and Primates evolution. **Prima-**

tes, Ichi, 27 (1): 15-39.

CHENEY, D.L. & L.W. WRANGHAM. 1987. Predation, p. 227-239. *In*: B.B. SMUTS; D.L. CHENEY; R.M. SEYFARTH; R.W. WRANGHAM & T.T. STRUHSAKER (Eds). **Primates Societies**. Chicago, University of Chicago Press, 578p.

CHINCHILLA, F.A. 1997. La dieta el jaguar (*Panthera onca*), el puma (*Felis concolor*) y el manigordo (*Felis pardalis*) (Carnivora, Felidae) en el Parque Nacional Corcovado. **Revista de Biología Tropical**, San José, 45: 1223-1229.

CRAWSHAW, P.G.J. & H.B. QUIGLEY. 1989. Ocelot movement and activity patterns in the Pantanal region, Brazil. **Biotropica**, Lawrence, 21 (4): 377-379.

EMMONS, L.H. 1987. Comparative feeding ecology of felids in a neotropical rainforest. **Behavioral Ecology and Sociobiology**, Heidelberg, 20: 271-283.

EMMONS, L.H. 1988. A field study of ocelots (*Felis pardalis*) in Peru. **Revue d'Ecologie la Terre et la Vie**, Paris, 43: 133-157.

HEYMANN, E.W. 1990. Reactions of wild tamarins, *Saguinus mystax* and *Saguinus fuscicollis* to avian predators. **International Journal of Primatology**, Chicago, 11 (4): 327-337.

JORGENSEN, J.P. & K.H. REDFORD. 1993. Human and big cats as predators in the Neotropics, p. 367-390. *In*: N. DUNSTONE & M.L. GORMAN (Eds). **Mammals as Predators**. London, Oxford Science Publications, 485p.

LUDLOW, M.E. & M.E. SUNQUIST. 1987. Ecology and behavior of ocelots in Venezuela. **National Geography Resources**, Washington, 3 (4): 447-461.

MENDES, S.L. 1989. Estudo ecológico de *Alouatta fusca* (Primates: Cebidae) na Estação Biológica de Caratinga, MG. **Revista Nordestina de Biologia**, João Pessoa, 6 (2): 71-104.

MIRANDA, J.M.D. & F.C. PASSOS. 2005. Composição e dinâmica de grupos de *Alouatta guariba clamitans* Cabrera (Primates, Ateleidae) em Floresta Ombrófila Mista no Estado do Paraná, Brasil. **Revista Brasileira de Zoologia**, Curitiba, 22 (1): 99-106.

MIRANDA, J.M.D.; I.P. BERNARDI; R.F. MORO-RIOS & F.C. PASSOS. (in press). Antipredator behavior of brown howlers attacked by black hawk-eagle in Southern Brazil. **International Journal of Primatology**, Chicago, 27.

OLIVEIRA, T.G. 2002. Ecología comparativa de la alimentación Del jaguar y Del puma em el neotrópico, p. 223-235. *In*: R.A. MEDELÍN; C. EQUIHUA; C.L.B. CHETKIEWICZ; P.G. CRAWSHAW JR.; A. RABINOWITZ; K.H. REDFORD; J.G. ROBINSON; E.W. SANDERSON & A.B. TABER (Eds). **El Jaguar en el nuevo milenio**. México, Fondo de Cultura Económica, Universidad Nacional Autónoma de México, Wildlife Conservation Society, 647p.

OLMOS, F. 1993. Notes on the food habits of brazilian caatinga carnivores. **Mammalia**, Paris, 57: 126-130.

OLMOS, F. 1994. Jaguar predation on muriqui *Brachyteles arachnoides*. **Neotropical Primates**, Washington, 2 (2): 16-16.

PEETZ, A.; M. A. NORCONK & W.G. KINZEY. 1992. Predation by jaguar on howler monkeys (*Alouatta seniculus*) in Venezuela. **American Journal of Primatology**, Calgary, 28: 223-228.

SUNQUIST, M.E.; F. SUNQUIST; & D.E. DANEKE. 1989. Ecological

- separation in a venezuelan Llanos carnivore community, p. 197-232. *In*: K.H. REDFORD & J.F. EISENBERG (Eds). **Advances in Neotropical Mammalogy**. Gainesville, Sandhill Crane Press, 614p.
- STANFORD, C.B. 2002. Avoiding predators: expectations and evidence in Primate antipredator behavior. **International Journal of Primatology**, Chicago, **23** (4): 741-757.
- TREVES, A. 1999. Has predation shaped the social systems of arboreal primates? **International Journal of Primatology**, Chicago, **20** (1): 35-67.

Received in 18.I.2005; accepted in 25.VIII.2005.