

Notes and Records

An observation of leopard (*Panthera pardus* Linnaeus) mating behaviour in Serengeti National Park, Tanzania

We report here on the sighting of a pair of leopards (*Panthera pardus* Linnaeus) which copulated thirteen times during one and a half hours of observation. Leopard mating behaviour has been well described from captivity (Rosevear, 1974; Kitchner, 1991), but published accounts of leopards mating in the wild are limited to observation of a single mounting by Schaller (1972) and a brief glimpse of a copulating pair by Hamilton (1976). No further descriptions of mating in the wild are provided in recent leopard studies or reviews (Kingdon, 1977; Estes, 1991; le Roux & Skinner, 1989; Bailey, 1993).

Data presented were collected on 13 September 1992 at a kopje in northern Serengeti National Park, Tanzania. We came across the leopards at ≈ 1640 h and observed them from our vehicle 30–40 m away. They mated for the first time at ≈ 1645 h and the time of each subsequent copulation was recorded. Behavioural notes made in the field were supplemented by review of videotape and still photographs of the matings.

Between 1645 and 1809 h we observed 13 copulations. All matings were initiated by the female walking back and forth in front of the resting male, sometimes brushing against him and waving her tail in his face. The male would then mount the presenting female, often biting her on the nape. Matings were accompanied by loud growling by both the male and female, reminiscent of mating domestic cats but much louder. Mounting lasted an average of 3.0 s (Table 1). The average interval between copulations was 6.5 min (Table 1). The pair rested within a few metres of each other between copulations.

At the same kopje, a second female leopard was seen that we presumed to be a full grown offspring of the mating female. The two females were seen together when we arrived at the site, and while one female mated with the male and rested between matings, the second female moved around the kopje. When we left the area at 1810 h, the leopards had given no indication of ceasing mating activity. We returned to the site at 0620 h the following morning but did not see them again.

In terms of female initiation, posture, and vocalization, our observations of leopard mating behaviour in the wild closely match previous descriptions based on captive animals (Rosevear, 1974; Kitchner, 1991). While copulation frequency varies considerably in the Felidae, based on captive data leopards are believed to be at the high end of the scale along with lions and jaguars with rates on the order of 100 copulations per day (Kitchner, 1991). Based on observations from radio tracking studies of males and females associating for one to several days during mating periods (Hamilton, 1976; Bailey, 1993), it seems reasonable to assume that the episode we witnessed was only part of a longer consortship. The rate we observed of almost 10 copulations per hour suggests that frequencies of 100 copulations per day could easily occur for leopards in the wild.

Table 1. Mating behaviour of wild leopards in Serengeti National Park, Tanzania. Duration of copulation for seven clearly observed copulations timed with a stopwatch, and interval between copulations for 12 consecutive matings between 1657 and 1809 h on 13 September 1992

	Mean	SD	Range	N
Duration of copulation	3.0 s	± 0.8	2–4 s	7
Interval between copulations	6.5 min	± 5.4	2–17 min	11

Why many large felids such as lions, jaguars and leopards have such high copulation frequencies is not fully understood. Repeated copulation may be related to their being induced ovulators (Kitchner, 1991), but this does not explain the variation in copulation frequency among species (Eaton, 1978a). For lions, it has been hypothesized that high copulation frequency coupled with low mating success decreases male competition over matings and thus increases pride stability (Bertram, 1976, 1979). Given the differences in social organization among the large cats (Eaton, 1978b; Packer, 1986), however, it seems unlikely that social factors can explain why leopards and jaguars, which are solitary, have similar copulation rates to lions. Eaton (1978a) has hypothesized that high copulation frequency allows female felids to assess male vigour. This hypothesis again fits quite well for lions, which have opportunities to mate with multiple males, but for leopards, in which one male generally controls the territories of two or more females (Bailey, 1993), females would seem less likely to have opportunities to discriminate between males on the basis of copulatory vigour. A better understanding of both the physiology and behaviour of large felids may be necessary before this question can be fully resolved.

Acknowledgments

We thank the Peabody Museum of Harvard University, the Mellon Foundation, Sigma Xi Scientific Society and the Explorers Club for financial support, and Onesmo Lashiko for assistance in the field.

References

- BAILEY, T.N. (1993) *The African Leopard: Ecology and Behavior of a Solitary Felid*. Columbia University Press, New York.
- BERTRAM, B.C.R. (1976) Kin selection in lions and in evolution. In: *Growing Points in Ethology* (Eds P.P.G. Bateson & R.A. Hinde). Cambridge University Press, Cambridge.
- BERTRAM, B.C.R. (1979) Serengeti predators and their social systems. In: *Serengeti: Dynamics of an Ecosystem* (Eds A.R.E. Sinclair and M. Norton-Griffiths). University of Chicago Press, Chicago.
- EATON, R.L. (1978a) Why some felids copulate so much: a model for the evolution of copulation frequency. *Carnivore* **1**, 42–51.
- EATON, R.L. (1978b) The evolution of sociality in the Felidae. In: *The World's Cats* (Ed. R.L. Eaton). Estes, R.D. (1991) *The Behavior Guide to African Mammals*. University of California Press, Berkeley.
- HAMILTON, P.H. (1976) *The Movements of Leopards in Tsavo National Park, Kenya as Determined by Radio-tracking*. MSc thesis, University of Nairobi.
- KINGDON, J. (1977) *East African Mammals: An Atlas of Evolution in Africa*. Academic Press, New York.

- KITCHENER, A. (1991) *The Natural History of the Wild Cats*. Comstock Publishing Associates, Ithaca, New York.
- LE ROUX, P.G. & SKINNER, J.D. (1989) A note on the ecology of the leopard (*Panthera pardus* Linnaeus) in the Londolozi Game Reserve, South Africa. *Afr. J. Ecol.* **27**, 167–171.
- PACKER, C. (1986) The ecology of sociality in Felids. In: *Ecological Aspects of Social Evolution* (Eds D.I. Rubenstein & R.W. Wrangham). Princeton University Press, Princeton.
- ROSEVEAR, D.R. (1974) *The Carnivores of West Africa*. The British Museum, London.
- SCHALLER, G.B. (1972) *The Serengeti Lion: A study of Predator-Prey Relations*. University of Chicago Press, Chicago.

Timothy G. Laman¹ and Cheryl D. Knott², ¹*Arnold Arboretum, Harvard University, 22 Divinity Ave.*, ²*Department of Anthropology, Harvard University, 11 Divinity Ave., Cambridge, MA 02138, U.S.A.*

(Manuscript accepted 4 July 1996)