

## FIRST QUANTITATIVE DESCRIPTION OF SENTINEL POSTS IN WILD MEERKATS

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Meerkats (*Suricata suricatta*) are small, cooperative, carnivorous mammals that engage in sentinel behaviour in which an individual keeps guard from an elevated post while the rest of the group is foraging. I present the first quantitative description of where and how high meerkats guard.

**Key Words:** sentinel behaviour, sentinel post, vigilance, meerkat

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Merkati (*Suricata suricatta*) su mali, društveni sisavci mesojedi u čijim društvenim grupama jedna ili više životinja stoji na 'stražarskoj dužnosti' na povišenoj podlozi, pretražujući okoliš zbog predatora, dok ostatak grupe traga za hranom. Ovdje po prvi put kvantitativno opisujem na kakvim mjestima i koliko visoko merkati stražare.

**Ključne riječi:** stražarenje, stražarska dužnost, merkati, budnost, pretraživanje okoliša, društvene životinje

A sentinel is an alert, non-foraging individual, standing guard at an elevated post while its group is foraging. Sentinel behaviour occurs in a variety of bird and mammal species and may have anti-predatory and social purposes (for a review, see TATALOVIĆ, 2009).

It was reported that meerkats, *Suricata suricatta*, guard on »a mound or a dead tree« (CLUTTON-BROCK *et al.*, 1999), but this was never quantitatively analysed before.

Several studies mentioned meerkats' habit of keeping guard at elevated posts in captivity (WEMMER & FLEMING, 1975; EWER, 1963; MORAN, 1984) and it has been suggested that providing sentinel posts at preferred heights would promote environmental enrichment in zoos (MINER, 2007). But no one has yet examined the range of sentinel post heights used by wild meerkats.

Here, I present a preliminary analysis of the variation in the type and height of meerkat sentinel posts.

The analyses are based on 53003 sentinel bouts of 696 meerkat individuals from 22 groups recorded between April 1996 and October 2004 at the Kalahari Meerkat Project, in the south Kalahari Desert, 30 km west of Van Zylsrus, Northern Cape,

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South Africa (25° 58 'S, 21°49 'E). Heights of sentinel posts were estimated by eye and recorded, together with the type of vegetation around the post, by trained volunteers who could observe habituated meerkats within a distance of 0.5m. Data collection on sentinel behaviour was conducted from when they emerged from their sleeping burrows, while they were foraging, until they went below ground to sleep in the evening. Volunteers also carried out vegetation surveys once a month, recording grass height at designated points near meerkat sleeping burrows. Averaged grass height values across burrows never exceeded the height of 80cm, and at some months there was no grass at all.

Meerkats climbed a variety of objects to perform sentinel duty. They stood guard most often on dead trees – fallen and standing timber and logs – (55%) and shrubs (32%), but also climbed man-made objects, which included fences, barrels, backpacks, scales and even human observers (7.5%), grass tufts (3%), living trees (2%), and sand and termite mounds (0.5%) (N=52090). There were no data on the abundance of these substrate types, so it is not clear if meerkats chose where to stand guard, or simply went to the nearest available post.

Meerkat sentinels stood guard from as high as 6 m on tall trees (see Image 1) although the mean height was 65 cm (Standard deviation=46.71, N=53003). The median height of sentinel posts (averaged across all groups) was highest on trees (75 cm) and dead trees (65 cm), followed by man-made objects (41 cm) and shrubs (40 cm), and lowest on grass tufts (22 cm).

Height of sentinel posts was positively correlated with the height of the grass recorded at the burrows (Pearson correlation,  $t=0.446$ , N=48,  $p=0.002$ ).

Sentinel posts were also higher when the predominant vegetation in the immediate vicinity of the sentinel was grass, rather than open areas (no vegetation), forbs (non-woody annuals), shrubs (woody, multi-stemmed plants), trees (live trees) and dead trees (standing or fallen timber) (Friedman test,  $S=21.57$ , DF=5, N=13,  $p=0.001$ ).

Previous studies have mentioned that grass may affect the height of sentinel posts (EBENSPERGER & HURTADO, 2005; RASA, 1989), but this is the first time that height of sentinel guards has been shown to correlate with the height of grass. Correlation does not necessarily imply causation so further studies could try to determine if the increase in grass height causes the increase in sentinel height.

Further studies could also look into whether meerkats choose where and how high to guard in response to predation pressure and ecological factors or whether they simply choose the nearest post. Several studies suggested that a higher elevation of sentinel posts in other species may afford a better view over the grass and therefore more efficient predator detection (BARASH, 1976; ENSTAM & ISBELL, 2004; MACHUTCHON & HARESTAD, 1989; RASA, 1989; TYSER, 1980) and some have shown that higher posts are associated with increased fitness (YASUKAWA *et al.*, 1992). Others have suggested that choice of post may be related to how visible the sentinel is to the group (GASTON, 1977); or result from a trade-off between seeing a certain distance and expending an acceptable amount of energy to get there (WRIGHT *et al.*, 2001).

Given the natural variation of sentinel posts used by meerkats, there is scope for further research on this variation and its exact role in the complex social lives of meerkats.

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## SUMMARY

### First quantitative description of sentinel posts in wild meerkats

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Meerkats (*Suricata suricatta*) are small, cooperative, carnivorous mammals that are commonly kept in zoos. One of the main cooperative behaviours meerkats perform is sentinel behaviour where an individual keeps guard from an elevated post while the rest of the group is foraging. So far, no published quantitative information was available about the type and height of posts wild meerkats choose for this behaviour. Here, using an analysis of a long-term dataset, I show what

substrates and what heights wild meerkats at the Kalahari Meerkat Project, in South Africa, use for sentinel behaviour. I also show that height of guarding is correlated with height of grass. These results are the first attempt at quantifying meerkats' use of different types and heights of guarding substrates.