

## Notes and Records

### Giraffe mothers in East Africa linger for days near the remains of their dead calves

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#### Introduction

Repeated investigation of dead young or carrying of corpses has been observed in several mammalian taxa, notably primates [e.g. yellow baboons (*Papio cynocephalus*): Altmann, 1980; chimpanzees (*Pan troglodytes*): Goodall, 1986; Matsuzawa, 1997; Biro *et al.*, 2010; ring-tailed lemurs (*Lemur catta*): Nakamichi, Koyama & Jolly, 1996; Yunnan snub-nosed monkeys (*Rhinopithecus bieti*): Li *et al.*, 2012), dolphins (*Tursiops* spp.) (Tayler & Saayman, 1972; Harzen & Dos Santos, 1992) and elephants (*Loxodonta africana*) (Moss, 1976; Poole, 1996), and was recently also described in giraffes (*Giraffa camelopardalis*) (Bercovitch, 2012). Bercovitch (2012) observed a Thornicroft's giraffe (*G. c. thornicrofti*) briefly investigate the body of her dead, possibly stillborn, calf. Here, we present two additional cases where, following calf death, giraffe mothers and other herd members exhibited prolonged interest (over several days) in calf remains and/or the site of calf death. We consider the possible function of this behaviour.

Giraffe mothers and their calves bond during the neonatal period when calves are kept in hiding (Langman, 1977; Pratt & Anderson, 1979). The mother–calf bond lasts for a minimum of 12–16 months (Langman, 1977; Leuthold, 1979), and it has been suggested that mothers and daughters may associate for several years or more (Pratt & Anderson, 1985; Estes, 1992). Giraffe calves have a high mortality rate, 58–73% in the first year (Foster & Dagg, 1972; Pellew, 1983), but the death of calves and the subsequent behavioural response of mothers are rarely

observed. This report helps to fill this void with observations of both Masai (*G. c. tippelskirchi*) and Rothschild's (*G. c. rothschildi*) giraffes.

#### Materials and methods

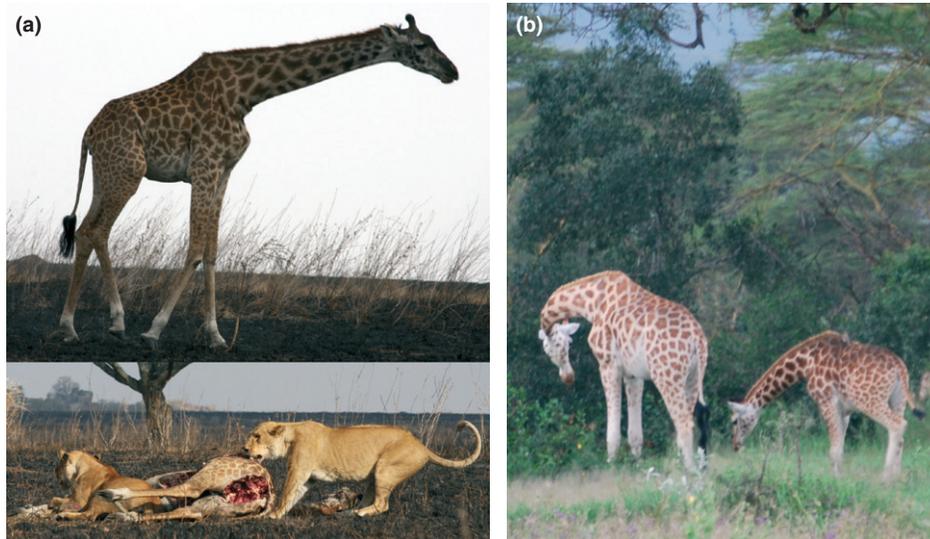
The authors collected data independently at two field sites: MKLS observed Masai giraffes in Serengeti National Park, Tanzania and ZM observed Rothschild's giraffes in Soysambu Conservancy, Kenya. At both field sites, authors made observations from a vehicle and identified individual giraffes using their unique coat markings (Foster, 1966). Following the death of a giraffe calf in each location (Fig. 1), the authors recorded the behaviour of conspecifics over several days.

#### Results and discussion

##### *Serengeti National Park*

Day 1: On 17 August 2009, lions killed a 1-year-old female giraffe in a patch of recently burned grassland near the Wandamu River. It is presumed that the giraffe herd was travelling through the area because limited browse was available near the kill site. By late afternoon, two female lions (*Panthera leo*) had gorged on the calf's body cavity. However, the calf's individual identity was confirmed with coat markings on the uneaten hindquarters. The mother of the calf and two adult female giraffes stood vigilant within 200–500 m of the feeding lions. Day 2: In the morning, lions fed and rested on the carcass, which had been dragged about 50 m from its initial location. Several spotted hyaenas (*Crocuta crocuta*) lay nearby. The calf's mother and the two female giraffes from the previous day remained near the kill site. By mid-day, the lions had moved on and hyaenas consumed remnant bones and skin. While they fed, the calf's mother approached the site of death, within about 50 m of the hyaenas, where she lowered her head several times and appeared to sniff the ground. Day 3: The calf's mother remained near the kill site and was observed standing in an alert posture. Day 4: The calf's mother was seen with three new herd members

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**Fig 1** (a) A Masai giraffe (top image) watches from 200 m away as lions feed on her 1-year-old calf in Serengeti National Park, Tanzania. (Photographs by Megan Strauss.) (b) Two Rothschild's giraffes investigate the body of a giraffe calf, hidden in the vegetation, in Soysambu Conservancy, Kenya. (Photograph by Zoe Muller.)

on the banks of the Seronera River, several kilometres from the kill site. Eleven days after the death of her calf, the mother was again observed in the burned grassland area within 2 km of the kill site.

#### *Soysambu conservancy*

**Day 1:** On the morning of 4 May 2010, a 4-week-old giraffe was found dead in riverine bush. It is suspected that the calf died of natural causes. The calf had a severe leg deformity and was seen alive only an hour earlier that morning. Predation was ruled out as a cause of death because the leopard, the only large predator in the area, rarely kills giraffe calves and no bite or claw marks were observed on the calf's remains. During the morning, the calf's mother and sixteen female giraffes stayed within 20 m of carcass, approaching it at intervals and lowering their heads. Some females nudged the carcass with their muzzles and both adults and juveniles sniffed the remains. By that afternoon, the number of giraffes investigating the carcass had increased to 23 females and four juveniles. By evening, the mother and fourteen females remained clustered closely around the body. **Day 2:** The carcass remained intact and the calf's mother and six females continued to inspect and nudge it. In the afternoon, four adult males approached but stayed approximately 100 m from the carcass. By that evening, only the mother and

two adult females remained near the carcass. **Day 3:** In the morning, the mother was observed standing over her calf's remains. Over the previous night, the calf had been partially consumed by scavengers and dragged 50 m from the site of death. The mother stayed nearby that afternoon and evening. **Day 4:** The carcass was completely consumed but the mother remained at the site until afternoon. **Days 5–10:** no giraffes were observed near the site of the calf's death.

These cases have some clear similarities despite differences in calf age and probable cause of death. Both mothers sniffed calf remains or the site of death, supporting Pratt & Anderson's (1979) hypothesis that olfactory cues may play a key role in calf recognition. Each mother stayed near the site of death for three to four consecutive days. Giraffes consume up to 34 kg of browse per day (Estes, 1992), but mothers fed sparingly or not at all while under observation. These observations therefore build significantly on Bercovitch (2012), which reported an investigation period of only several hours.

In contrast to follower species, such as wildebeest (*Connochaetes* spp.), where precocious young stay close to their mothers from birth, the giraffe is a hider species (Langman, 1977). To travel to food and water, giraffe mothers often leave their calves, alone or in crèche groups, for hours at a time (Langman, 1977; Pratt & Anderson, 1979). When a calf is left in hiding, its mother returns to

search for it in the area where she last saw it alive. If she does not find her calf, she must decide between abandoning a calf that might actually be alive and continuing to search at a cost to her own physiological needs and safety. In wildebeest, abandonment of live calves is not uncommon and dead calves are quickly left behind (e.g. western white-bearded wildebeest (*C. taurinus mearnsi*): Estes & Estes, 1979). However, in giraffes, prolonged lingering near the site of calf death may be a consequence of the hider strategy and the adaptive 'search' response. If a mother finds her calf's carcass or is witness to its death, it may be that her repeated investigation of the remains is to check for calf responsiveness – a calf with minor injuries might recover. While it is unclear what triggers the cessation of maternal instincts in giraffes, it is possible that diminishing olfactory, visual and other calf recognition cues are involved. The lingering/investigation period may also vary with calf age at death (e.g. Li *et al.*, 2012), prior maternal experience with offspring death (Harzen & Dos Santos, 1992) and maternal access to food, water and safety.

Giraffes of all age–sex classes are attentive to new calves, approaching, sniffing and touching them (Pratt & Anderson, 1979). However, at neither site did we observe adult male giraffes in close proximity to calf remains. In Soysambu Conservancy, adult males approached, possibly attracted by the large grouping of females, but were only observed pursuing and inspecting females and stayed >100 m from the carcass, showing no apparent interest in it.

In the Serengeti, lions and hyaenas fed continuously on the carcass and nearby giraffes could not freely approach the remains. In Soysambu Conservancy, where there are no lions, adult females and juveniles of unknown relation to the calf exhibited substantial interest in the carcass, sniffing and nudging it. Perhaps, these individuals had bonded with the calf through crèche groups and association with the mother–calf pair. Alternatively, nonmaternal females may have investigated the carcass in response to the vigilance and investigation behaviour displayed by the calf's mother.

The authors received multiple anecdotal reports from researchers and professional game guides across East and southern Africa of giraffes similarly investigating the bodies of dead conspecifics. While it is not apparent that giraffes 'understand' death, this intriguing behaviour raises questions about the cues giraffes use to recognize conspecifics and the complexity of giraffe social bonds.

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