

Copulatory lock of wild red fox (*Vulpes vulpes*) in broad daylight

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On 1 February 2014, at 9:20 a.m. local time, a male red fox (*Vulpes vulpes*) closely trailed a female onto a small heath in Berkenheuvel, western Drenthe, northern Netherlands. It was clearly the bigger mammal, with darker fur and slightly bushier tail. Halfway the heath, at a distance of 50 m from my observation site (a solitary house in the edge of the forest, overlooking the heath), the female suddenly crouched, and was immediately mounted by the male. The initial copulation took about 25 seconds of pelvic thrusting of the male after intromission, upon which he lifted his right hind leg over the female's back and remained locked back to back to the female for 29 minutes. During this prolonged period of time, the sexes faced away from each other, one tail sticking up, the other held down, in various positions of lying down and standing. About once every minute, one of the foxes unsuccessfully tried to get away, which resulted in fight-like jumping and tugging behaviour, and the male biting the female, or vice versa, in leg, neck or face till calm was restored. On average, the female was least attentive during the copulatory lock with eyes half closed, compared to the male's head-up position and scanning of the environment. Usually, one tail was sticking up (could be the male's or female's), which made for high visibility of the otherwise well-camouflaged foxes. They had a full view for at least 75 metres in each direction, albeit half-concealed by common heather (*Calluna vulgaris*), purple

moor grass (*Molinia caerulea*) and some Scots pine (*Pinus sylvestris*). The stalemate came to a sudden end when another outburst of biting resulted in sudden separation of the sexes, the male with a high jump landing a metre away, the female landing in a crouching position. The male trotted to a higher elevation point nearby, the female shook itself and joined the male (but keeping away) before the latter left for the forest, shortly afterwards followed by the female. The entire copulation took place in full view of my house, in the open and in broad daylight.

Despite having spent 66,470 hours in the field in 1966-2013 (of which 6070 hours in December-February, when males are fecund), this was the first copulation of red foxes that I witnessed. This is probably typical. Reports of copulation behaviour in foxes, including related *Vulpes* and *Canis* species, are mostly based on observations in captivity (Pearson & Bassett 1946, Tembrock 1957, Valdespino et al. 2002, Pal 2003). For the much smaller fennec fox (*Vulpes zerda*), it was shown that in captivity no copulation took place in the presence of people (Valdespino et al. 2002). It is likely that most copulations occur at night (or even underground?), as the prolonged copulation increases their vulnerability to predators (among others: people). Although Berkenheuvel is owned and managed by Vereniging Natuurmonumenten, an organisation that does not permit hunting in their reserves, red foxes are intensively persecuted in areas adja-

cent to Berkenheuvel. The duration of copulatory ties, as construed from observations in captivity, averaged 26 minutes in *Vulpes vulpes fulva*, with some variation according to age (Pearson & Bassett 1946), very similar to those of free-ranging feral dogs (*Canis familiaris*) in India (on average 31 minutes in uninterrupted conditions; Pal 2003) and my observation, but much shorter than in fennec foxes in captivity (mean almost two hours, but this species mated only once per estrous cycle; Valdespino et al. 2002). red foxes belong to a small group of mammals, mostly consisting of canids and several species of neotomine-peromyscine rodents, that display a lock during copulation (Dewsbury 1972, Langtimm & Dewsbury 1991). Locked copulation is associated with a thick glans penis with large penile muscles (Hart 1972) and a baculum (an extra-skeletal bone to stiffen the penis during intromission; Sharir et al. 2011). Locked copulation could have evolved in species living in 'safe' habitats, but is thought to have mostly got lost during evolution when predation increasingly turned safe into unsafe habitats and unlocked, brief copulatory strategies were selected for (Langtimm & Dewsbury 1991). However, whether copulation behaviour can be used in phylogenetic analyses of animal behaviour remains to be seen: copulation behaviour is known for less than 5% of the mammal species (Dewsbury 1972).

References

- Dewsbury, D.A. 1972. Patterns of copulatory behavior in male mammals. *Quarterly Review of Biology* 47: 1-33.
- Hart, B.L. 1972. The action of extrinsic penile muscles during copulation in the male dog. *Anatomical Record* 173: 1-6.
- Langtimm, C.A. & D.A. Dewsbury 1991. Phylogeny and evolution of rodent copulatory behaviour. *Animal Behaviour* 41: 217-225.
- Pal, S.K. 2003. Reproductive behaviour of free-ranging rural dogs in West Bengal, India. *Acta Theriologica* 48: 271-281.
- Pearson, O.P. & C.F. Bassett 1946. Certain aspects of reproduction in a herd of silver foxes. *American Naturalist* 80: 45-67.
- Sharir, A., D. Israeli, J. Milgram, J.D. Currey, E. Monsonogo-Ornan & R. Sharar 2011. The canine baculum: The structure and mechanical properties of an unusual bone. *Journal of Structural Biology* 175: 451-456.
- Tembrock, G. 1957. Zur Ethologie des Rotfuchses (*Vulpes vulpes* L.) unter besonderer Berücksichtigung der Fortpflanzung. *Zoologischer Garten (N.F.)* 23: 289-532.
- Valdespino, C., C.S. Asa & J.E. Bauman 2002. Estrous cycle, copulation, and pregnancy in the Fennec Fox (*Vulpes zerda*). *Journal of Mammalogy* 83: 99-109.

Samenvatting

Copulatieslot van wilde Vossen overdag

Op Berkenheuvel, Drenthe, vond op 1 februari 2014, om 9:20 uur lokale tijd, een copulatie plaats van vossen (*Vulpes vulpes*). De rekel liep achter het moertje aan, dat plotseling hurkte en onmiddellijk werd bestegen door de rekel. Na 25 seconden stotende achterlijfbewegingen overstapte hij haar met zijn rechterpoot, waarna beide dieren 29 minuten lang kont aan kont gekoppeld bleven liggen. Geregeld probeerde een van beide los te komen van het copulatieslot, hetgeen resulteerde in wederzijds bijten en trekken. Na de ontkoppeling vertrok de rekel vrijwel direct naar de dichtstbijzijnde bosrand, kort daarop gevolgd door het moertje. De copulatie vond plaats in vol zicht van een huis in de bosrand, op een half-open heide met zicht rondom. Ondanks ruim 66.000 uur veldwerk in 1966-2013, waarvan 9.1% in de periode dat rekels seksueel actief zijn (december-februari), had ik nooit eerder een vossencopulatie gezien.

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