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Short Note

## A lethal interaction between two female roe deer

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### Abstract

Although aggressive behavioural patterns directed by female ungulates to conspecifics of the same sex have been documented for Cervids and Bovids, lethal interactions are very rare. This note reports the observation of a lethal attack carried out by an adult female roe deer to a subadult one. Apparently, the attacking, older female killed the younger one by striking to the throat/neck and abdomen of the latter, with her incisor teeth. Female roe deer are assumed not to defend territories and live in loose, small groups only in the winter months.

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The study of aggressiveness amongst female ungulates has been neglected, with few exceptions (Schaller, 1977; Kumpula et al., 1992; Bebié and McElligott, 2006).

The apparent rarity of aggressive interactions within the female gender may be due to the fact that females rarely compete for access to males and, secondly, to the lack of antlers in most Cervid females, except *Rangifer* sp. (Clutton-Brock, 1982), and presence of only rudimentary horns amongst *Caprinae* and *Bovinae*, in respect to those of males.

Nevertheless, head bumps, butts, bites, chases and other forms of physical aggression are directed by ungulate females to other females, amongst Bovids cf. bharal *Pseudois nayaur* (Schaller, 1977), topi antelope *Damaliscus lunatus* (Bro-Jørgensen, 2002), saiga antelope *Saiga tatarica* (Milner-Gulland et al., 2003) and, amongst Cervids, roe deer *Capreolus capreolus* (Kurt, 1968; Espmark, 1969, 1974; Meschi, 2005; Börger, 2006; Bideau and Maublanc, 2012), fallow deer *Dama dama* (Schaal, 1987), red deer *Cervus elaphus* (Bebié and McElligott, 2006), white-tailed deer *Odocoileus virginianus* (Schwede et al., 1993), Chinese water deer *Hydropotes inermis* (Cooke and Farrell, 1998) and reindeer *Rangifer tarandus* (Kumpula et al., 1992).

The roe deer *Capreolus capreolus* (Linnaeus 1758), in its wide geographical and ecological distribution, i.e. nearly all Europe, is commonly known for typically displaying various aggressive behavioural patterns to conspecifics of the same sex, mostly between males (Danilkin and Hewison, 1996). From early spring, bucks begin to show increasing intolerance to each other with aggressive displays, threats and fights to establish an exclusive territory, which will be actively defended against other males up to mid-August (Andersen et al., 1998; Maublanc et al., 2012). These interactions are performed by means of chases and physical contacts which can result in serious injury or rarely death, with the winner taking over the loser's territory.

Apparently, female roe deer do not maintain territories, not even restricted to the parturition site, and for this period only a drastic nar-

rowing of the individual home range – probably aimed at fawning-site defence – has been suggested (Kurt, 1968; Maublanc, 1986; Danilkin and Hewison, 1996; San José and Lovari, 1998; Lamberti et al., 2001). Among females, aggressive displays shown by adult pregnant individuals to subadult female offspring are relatively common and probably aimed to induce them to disperse. Agonistic interactions between reproducing females have been described by Kurt (1968), Espmark (1969, 1974), Börger (2006) and Bideau and Maublanc (2012). Espmark (1969) observed a number of aggressions by mothers towards other females during the first four months of the fawns' life; Börger (2006) reports 150 records of aggressive interactions on 23 females, 61% of which involved females without fawns, 29% a female without fawn and a lactating female. Aggressive behaviour can also take place within family groups composed of several females, e.g. staring, threat approach, attempt to bite, but real attacks have never been observed.

The rarity of interactions and the lack of spectacular behavior probably led to an underestimation of intolerance between female roe deer under natural conditions (Maublanc et al., 2012). Competitive interactions may often be so subtle as to go unnoticed in behavioural observations, with conflict resolution based on threats and indirect aggression rather than direct combat (Stockley and Campbell, 2013); nevertheless, female competitive interactions include a broad repertoire of aggressive strategies, tailored to social conditions at both population and individual levels (Stockley and Campbell 2013, for a review).

Here I report on a lethal attack by an adult doe to a subadult one. The latter, estimated at one year of age, was recognized as such by its body size and abdomen noticeably not concave, compared to the adult one. A subsequent inspection on the place where the carcass was lying, allowed an evaluation of tooth development and wear, confirming the previously estimated age. To my knowledge, no comparable interaction among females has ever been reported in literature for any ungulate species. The event occurred on the 28th of June 2013 in a valley just in the southern outskirts of the town of Siena (Tuscany, Central Italy). It took place in an overgrown abandoned meadow with a southern exposure, where grasses and herbs reached the height of 1-1.5 meters. Around the

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meadow, in a radius of 150 metres, there were olive groves, an orchard, scattered fruit trees, a stone pine *Pinus pinea* plantation, cultivated domestic gardens, woodlots and an abandoned vineyard. The vineyard has been a long-term refuge for several female roe deer throughout the year. Farther on, the valley opened to the countryside, with wheat *Triticum* sp. fields and small wood patches. What follows was observed with a 16×50 binoculars at a distance of about 50 metres. Most likely, the interaction observed was the end of a longer contest. At 08:00 PM, a fight between two roe deer females, a subadult and an adult, was taking place in an abandoned meadow. At the beginning of the observation, another individual was detected fastly moving away in the opposite direction with respect to the fight site, but its age and sex could not be determined. The attacks were solely carried out by the adult female to the subadult one, who appeared unable to react and already quite weakened. During the first recorded attack, the adult female first kicked the neck of the subadult with one foreleg and immediately after with its nose, probably biting or hitting the neck with her incisors, a detail that I could not detect because of the distance. Then, the subadult doe fell to the ground on its back and remained in this position completely motionless for a few minutes. Meanwhile the adult female cautiously approached the body of the subadult with its snout, seemingly to sniff and butt at her. A few minutes later the younger female managed to get up and made some leaps, immediately chased by the adult. Two more attacks with the same patterns were carried out by the adult doe, ending up with the attacked one immobile in the grass, with the other constantly gazing at her. Finally, the last attack was carried out hitting the abdomen with her snout (incisors?), displacing the younger female and making it fall on her right side. The adult female again sniffed and butted at her for a few minutes and then turned away. The observation ended at 08:20 PM. The subadult one did not move anymore from its final position after the interaction ended, and was considered dead. Unfortunately, due to logistical and temporal constraints, it was not possible to immediately retrieve the carcass and perform an autopsy. The night after, the carrion was eaten by unidentified carnivores. A necropsy would have assessed the health condition and the actual cause of death, e.g. bites, wounds, internal hematoma, infection caused by internal parasites. One other major limitation of my observations, is the fact that certainly the interaction had started earlier. As the period of births was just over, guessing what led the older female to this aggressive and unusual behaviour to a younger conspecific of the same sex may not be easy.

Aggressive displays have been documented among between females in other species of Cervids and Bovids; nevertheless, no lethal interaction has ever been reported. Schaller (1977) observed bharal females clashing with and biting others on several occasion. For topi antelopes Bro-Jørgensen (2002) reported aggressive encounters between females competing for mating opportunities with preferred lekking males. For red deer, Bebié and McElligott (2006), recorded female-female aggression within “harems”, among oestrous females, during the breeding season: the most common forms of aggression were displacements, nose threats and kicks. Biting and ear threats occurred less frequently, and chases were also rare. In another study on dominance

relationships among semi-domesticated female reindeer, Kumpula et al. (1992) observed subordinate females being often targets of aggression, mostly head nodding, approaching head down with ears back, butting with antlers, kicking with forelegs, and chasing. Females of Apennine chamois *Rupicapra pyrenaica* have been reported to engage in vicious attacks and fights, but never lethal ones (Locati and Lovari, 1990). Although these studies concerned species with different social and reproductive systems compared to roe deer, Espmark (1969, 1974), Meschi (2005), Börger (2006), and Hewison (pers. comm.) observed aggressive interactions between roe does several times, but never so determined and with a lethal outcome as in this case. ☞

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