

## Field observation of male infanticide in the American mink (*Neovison vison*)

Pablo GARCÍA-DÍAZ<sup>1,2,\*</sup> and Miguel LIZANA<sup>1</sup>

1. Department of Animal Biology, University of Salamanca, Campus Miguel de Unamuno, E-37007, Salamanca, Spain.

2. School of Earth and Environmental Sciences, The University of Adelaide, North Terrace SA 5005, Australia.

\*Corresponding author, P. García-Díaz, Email: [garciap@usal.es](mailto:garciap@usal.es) / [pablo.garciadiaz@adelaide.edu.au](mailto:pablo.garciadiaz@adelaide.edu.au)

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**Abstract.** Infanticide is becoming an issue of great interest among mammalogists and so are the forces driving infanticidal behaviour in territorial carnivores. Here we report a case of male-driven infanticide in the American mink. The victimized female defended her two cubs against a male. After several violent encounters, the male wounded the female, and then it was able to kill the offspring. The male later copulated with the female, thus we suppose that the case is more related to sexual selection than intraspecific aggression. Nonetheless, the female died before the potential parturition, and owing that female mink breed once per year, there are some pitfalls in the interpretation of this case.

**Key words:** central Spain, intraspecific aggression, Mustelidae, sexual selection.

Infanticide, defined as the killing of cubs by an adult, is increasingly being recognized as a key adaptive behaviour affecting the reproductive tactics and ecology of a wide variety of animals (Ebensperger 1998, Hausfater & Hrdy 2008). Three main reasons account for the existence of male infanticide in non-social mammals (Ebensperger 1998, van Schaik & Jansonn 2000, Hausfater & Hrdy 2008). First, it could be a simple way to obtain food. Second, according to the sexual selection hypothesis, non-parental male infanticide promotes the fitness of the killer animal through increasing breeding opportunities. This last hypothesis indicates that the increase in fitness arises either by prompting the female to mate and/or by eliminating cubs with no clear kinship (Wolff & Macdonald 2004). Finally, the resource competition hypothesis indicates that infanticide could liberate some resources for the perpetrator or their related conspecifics. For instance, it has been demonstrated that promiscuity and spacing ecology of some female mammals are primarily driven to avoid infanticide (Wolff & Peterson 1998, Wolff & Macdonald 2004). While a female usually acts to maintain her cubs' safety (although even it can commit infanticide), males seem to achieve some benefit from killing the current offspring (Ebensperger 1998, van Schaik & Janson 2000, Hausfater & Hrdy 2008).

The American mink (*Neovison vison*) is a medium-sized mustelid originating from North America, but introduced worldwide due to intensive fur farming (Dunstone 1993, Larivière 1999). Female American minks exhibit a promiscuous mating system (Thom et al. 2004, Yamaguchi et al.

2004), probably focused on confusing paternity and thus avoiding potential male aggression and infanticide (Wolff and Macdonald 2004).

American minks are born vulnerable and need maternal care until they reach a size similar to that of their mother, at an age of four months (Dunstone 1993, Wolff & Peterson 1998, Larivière 1999). American mink present two forms of spatial population structure. Apart from the breeding season they follow the general mustelid spacing pattern (Powell 1979), where males have home ranges that also encompass that of one or several females. There is a high degree of overlap between contiguous home ranges and there is scarce support for exclusive territoriality (Yamaguchi & Macdonald 2003). During the breeding season male mink roam over the considerable area, searching for mates (Yamaguchi et al. 2004). There is no paternal care in the species (Dunstone 1993, Larivière 1999, Wolff & Macdonald 2004). Animals present in the population for less than two months are considered to be transients, while the others are residents (Dunstone 1993). Male infanticide has been reported in the taxonomically related European mink (van Schaik & Jansonn 2000) and it is thought to occur also in the American mink (Dunstone 1993, Larivière, 1999), although only female infanticide has been described in captivity (Malmkvist et al. 2007). This lack of information may be caused by the natural difficulty of observing male infanticide in the field.

During the intensive monitoring (2006-2010) of the invasive population of American minks in the River Tormes, central Spain (province of Salamanca: 40°57'21.46''N, 5°39'28.2''W; 800 m a.s.l.; García et al. 2009 2010, García-

Díaz & Lizana in press), we observed an event of male infanticide behaviour. Observations were done by means of binoculars and a telescope, with the animals at distances ranging from 1 to 10 m from the observers. Individual minks were identified by means of their patterns of white spots on the throat and neck. A female mink was located and monitored on a daily basis from November 2008 until May 2009 and was first observed with cubs on 12 April 2009. Using the methods outlined in García-Díaz & Lizana (2012-on-first) we confidently aged these cubs as up to two months old when we made the observation.

The male infanticide observation began at 19:00 hours (GMT) on 2 May 2009, when the female mink was observed fishing and carrying the fish to the cubs. The cubs remained relatively hidden inside some rushes (*Juncus sp.*) on a small island close to a deserted waterwheel. The female did not move further than 4 m away from the cubs. Foraging behaviour took place during about 23 minutes. At 19:23 a male American mink (about two times the size of the female) arrived from the riparian vegetation at a dam from the waterwheel.

The male was initially located at a distance of 7 m from the female and 8 m from the cubs. When the male watched the female, he approached her in an exploratory way. Whenever the female noticed the proximity of the male, she directed herself towards the male, displaying aggressive screaming. After a short aggressive encounter in the water, involving some display of teeth, the male returned to the dam and the female to the proximity of the cubs. Due to the presence of the male on the dam and the continuous approaches to the site where the cubs rested, the female finally aggressively answered one approach of the male. On the dam of the waterwheel, the aggressive encounter between the two minks continued for five minutes. During this time, both animals showed the common aggressive behaviours, with frequent screams, the male pursuing the female, and the continuous exhibition of the dental armaments. This fight lasted about ten minutes; the male succeeded in the end and was able to bite the female on three occasions.

This point was in fact a threshold in the interaction, after which the victimized female ran over through the dam in the opposite direction from both the male and the cubs. Finally, she stopped at a distance of about 40 m from the male and 50 m from the position of the cubs. The male then swam to the island where the two cubs remained throughout the entire encounter of adults. The male, which was about 4–5 times larger than the cubs, took the cubs one by one in the teeth and

killed them. The complete event lasted no more than 12 minutes. The male mink left the carcasses of both cubs and moved towards the female staying on the dam. After some minutes of trials, the male mink was allowed to copulate with the female. The male observed in this interaction was not previously recorded in the area, so it was considered a transient one (Dunstone 1993).

Our observation may suggest some sort of coercion of the female to gain copulation, which is somewhat unreliable when females have no dependent cubs (Ebensperger 1998). To try to determine the real success of this male's behaviour, the female mink was tracked weekly from this moment. Two weeks later, the female was found dead on the same waterwheel dam, perhaps as a consequence of the serious injuries caused by the wounds. The poor condition of the female's carcass did not permit a necropsy.

Our observation confirms the existence of male infanticide in the American mink contributing to extend the list of species known to commit male infanticide (van Schaik & Jansonn 2000, Hausfater & Hrdy 2008).

The fact that the infanticidal male was a transient (therefore supposed to be a non-parental male infanticide) and the observation of copulation after the event suggest that it could be a case of sexually selected infanticide.

However, in light of the sexual selection hypothesis there is a major pitfall in our observation. Female American minks breed only once a year (García-Díaz & Lizana in press), instead of a continuous reproductive state, as observed in several species with proven sexual selection infanticide, and thus it is not expected that the victim's mother will mate until the next season (one year later; Dunstone 1993), even though sexually selected infanticide is known to occur in monoestric mammals (Ebensperger 1998). Therefore, the infanticidal male may not gain any benefit, as the female will not come into oestrus sooner and cannot mate with him. Just after killing the cubs, the male mink copulated with the female, although we could not ensure whether the female was really receptive or whether she was weakened by the encounter and/or coerced by the male, and copulated to avoid further injuries as previously reported in this population (García 2010).

To evaluate the exact cause of this behaviour more data is needed to clarify the role of infanticide in mink, however, their secretive habits make this a complicated task.

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