

# Scientists use forensic technology to genetically document infanticide in brown bears

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The female's body hidden under the vegetation by the male. Credit: M. Baggia e R. Calvetti Archivio Prov. Aut. di Trento

Scientists used a technology designed for the purposes of human forensics, to provide the first genetically documented case of infanticide in brown bears, following the murder of a female and her two cubs in Trentino, the Italian Alps, where a small re-introduced population has been genetically monitored for already 20 years.

The study, conducted and authored by Francesca Davoli, The Italian Institute for Environmental Protection and Research (ISPRA), Bologna, and her team, is published in the open access journal *Nature Conservation*.

To secure their own reproduction, males of some social mammalian species, such as lions and bears, exhibit infanticidal behaviour where they kill the offspring of their competitors, so that they can mate with the females which become fertile again soon after they lose their cubs. However, sometimes females are also killed while trying to protect their young, resulting in a survival threat to [small populations](#) and endangered species.

"In isolated populations with a small number of reproductive adults, sexually selected infanticide can negatively impact the long-term conservation of the species, especially in the case where the female is killed while protecting her cubs," point out the researchers.

"Taking this into account, the genetic identification of the perpetrators could give concrete indications for the management of small populations, for example, placing radio-collars on infanticidal males to track them," they add. "Nevertheless, genetic studies for identifying

infanticidal males have received little attention."



The killed cubs. Credit: M. Baggia e R. Calvetti Archivio Prov. Aut. di Trento

Thanks to a database containing the genotypes of all bears known to inhabit the study site and an open-source software used to analyse human forensic genetic profiles, the scientists were able to solve the case much like in a television crime series.

Upon finding the three corpses, the researchers were certain that the animals had not been killed by a human. In the beginning, the suspects were all male [brown bears](#) reported from the area in 2015.

Hoping to isolate the DNA of the perpetrator, the researchers collected three samples of hairs and swabbed the female's wounds in search for

saliva. Dealing with a relatively small population, the scientists expected that the animals would share a genotype to an extent, meaning they needed plenty of samples.

However, while the DNA retrieved from the saliva swabs did point to an adult male, at first glance it seemed that it belonged to the cubs' father. Later, the scientists puzzled out that the attacker must have injured the cubs and the mother alternately, thus spreading blood containing the inherited genetic material from the father bear. Previous knowledge also excluded the father, since there are no known cases of male bears killing their offspring. In fact, they seem to distinguish their own younglings, even though they most likely recognise the mother.

To successfully determine the attacker, the scientists had to use the very small amount of genetic material from the saliva swabs they managed to collect and conduct a highly sophisticated analysis, in order to obtain four genetic profiles largely overlapping with each other. Then, they compared them against each of the males reported from the area that year. Eventually, they narrowed down the options to an individual listed as M7.

"The monitoring of litters is a fundamental tool for the management of bear populations: it has allowed the authors to genetically confirm the existence of cases of infanticide and in the future may facilitate the retrieval of information necessary to assess the impact of SSI on demographic trends," conclude the researchers.

**More information:** Francesca Davoli et al, Infanticide in brown bear: a case-study in the Italian Alps – Genetic identification of perpetrator and implications in small populations, *Nature Conservation* (2018). [DOI: 10.3897/natureconservation.25.23776](https://doi.org/10.3897/natureconservation.25.23776)

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