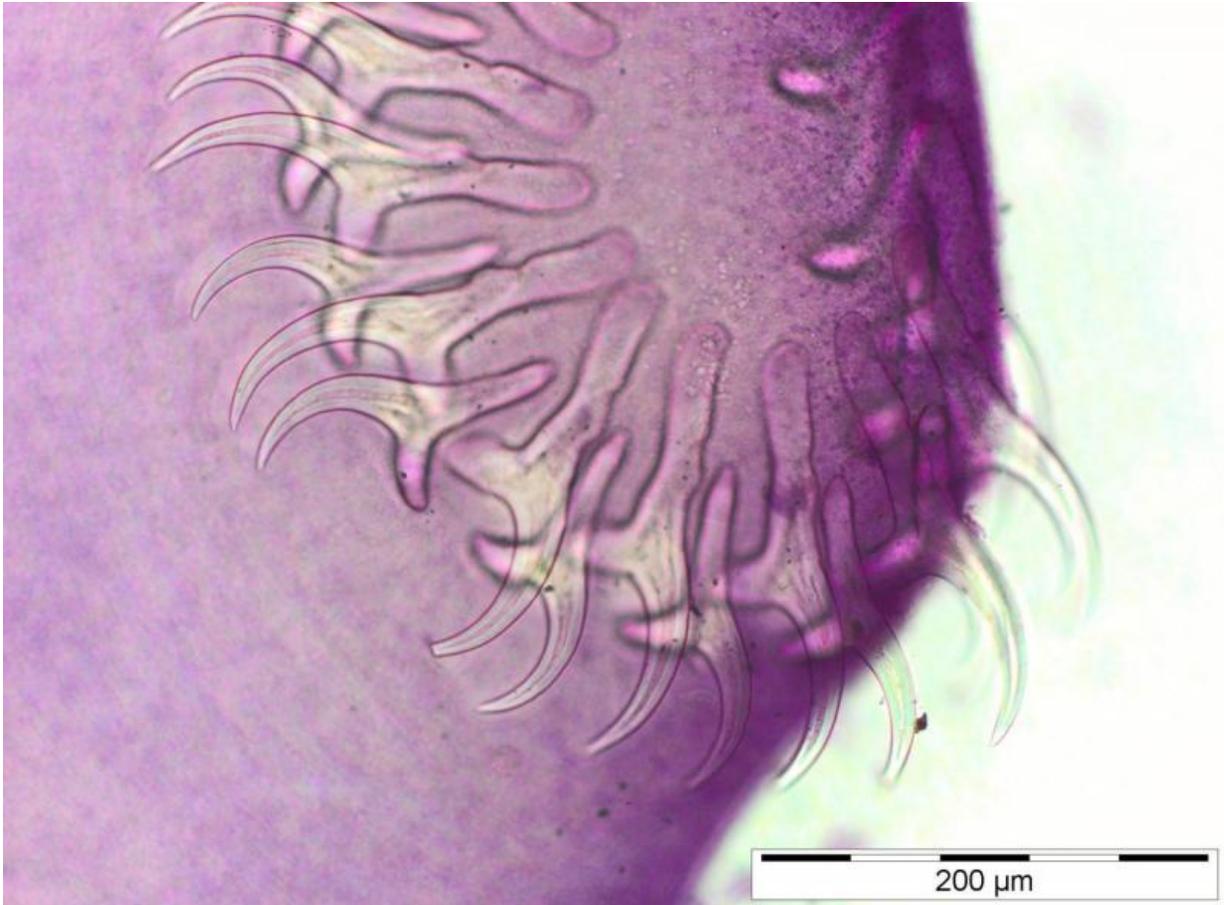


Researchers study wolf parasites

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Stained head double hook ring tapeworm. Credit: Forschungsverbund Berlin e.V. (FVB)

Since the year 2000, the Eurasian grey wolf, *Canis lupus lupus*, has spread across Germany. Ines Lesniak, doctoral student at the Leibniz

Institute for Zoo and Wildlife Research (Leibniz-IZW), and her colleagues, have taken a closer look at the parasites of this returnee to determine whether the number and species of parasites change with an increasing wolf population. This was the case, because the number of parasite species per individual wolf increased as the wolf population expanded. Furthermore, cubs had a higher diversity of parasite species than older animals. The good news: wolf parasites do not pose a threat to human health. The results of this study were published in the scientific online journal *Scientific Reports*.

In the course of a long-term study of [wolf](#) health in Germany, the internal organs of 53 wolf carcasses were studied in detail. They came from wolves that had died in traffic accidents or were illegally killed between 2007 and 2014.

"Whereas tapeworms are recognisable with the naked eye, the identification of single-celled Sarcocystis [parasites](#) was a real challenge, since the [species](#) of this genus do not differ morphologically," explains Lesniak.

According to their developmental cycle, endoparasites can be grouped into two types: Some, such as many tapeworms, infect their hosts directly. Others, such as Sarcocystis parasites, first live in an intermediate host, specifically the prey animal of the wolf. These parasites are released back into the environment in the wolf faeces. Potential prey animals of the wolf feed on vegetation contaminated with the parasites. The parasites thereby invade the intermediate host and settle in the muscle flesh. Roe deer, red deer and wild boar are such intermediate hosts in central Europe. When these are eaten by a wolf, the parasites infect the wolf and reproduce in its intestines.

By applying sophisticated molecular genetic analyses, the scientists identified 12 Sarcocystis species in the wolf carcasses. They also found

four tapeworm species (cestodes), eight roundworm species (nematodes) as well as one fluke species (trematode). In order to examine parasite infections also in the wolf's large prey species, the team collected internal organs of shot prey animals from hunting parties.

In Germany, wolves mainly feed on roe deer, but also red deer and wild boars. Small mammals, such as hares, voles or mice, are very seldom on the menu. The identified parasites provide indirect evidence for this insight, since fox tapeworms were found in only one of the 53 wolves. Fox tapeworms are transmitted by mice and can occur in all canids, but particularly frequently in foxes. This is good news, Lesniak says, because the larvae of fox tapeworms can cause severe diseases in humans.

The scientists found that the infestation of wolves with parasites varied over their lifetime. "Cubs carry many more [parasite species](#) than yearlings or adults." According to Ines Lesniak, such variation in parasite species prevalence can be explained by the more robust immune system of older wolves. Wolves, just like any other wild canid – other than domestic dogs – are never dewormed, after all.

Wolves that died at the beginning of the study period had a lower parasite diversity than those who died later. "The bigger the population, the more often wolves are in contact with each other and their prey, and the more often they became infected with different parasites," Lesniak says.

Currently, there are 46 wolf packs settled within Germany. A pack consists of the parents as well as the cubs of the current and the previous year and can comprise up to ten individuals. "Genetic analyses conducted by our cooperation partners for this study show that the ancestors of the Central European lowland population, which nowadays ranges from Germany to Poland, originated from Lusatia in eastern

Germany," Lesniak says. This population was probably initiated by individuals who migrated from the Baltic region at the beginning of the millennium and settled between southern Brandenburg and northern Saxony. From there, they began to spread across northeastern Germany and southwestern Poland, a process which continues to this day.

"Wolves are shy, wild animals. Thus, contact between people and wolves is rare," Lesniak emphasises. "Nevertheless, hunters should boil the leftovers of shot game thoroughly before feeding this to their hunting dogs, in order to avoid possible parasite infections," warns Lesniak. It is also essential to regularly deworm hunting dogs in regions occupied by wolves.

Occasionally, it has been reported that wolves come closer to residential areas; sheep farmers are complaining about losses. "It may well be that today's [wolves](#) have learnt that it is easier to find food closer to humans – those, who once eradicated their wolf forefathers," says Lesniak. Of course, it is more convenient for a wolf to break into a sheep enclosure than to chase [roe deer](#) in the forest. Therefore, the implementation of appropriate protective measures of domestic animals is very important and now also financially supported by the government in Germany.

More information: Ines Lesniak et al. Population expansion and individual age affect endoparasite richness and diversity in a recolonising large carnivore population, *Scientific Reports* (2017). [DOI: 10.1038/srep41730](https://doi.org/10.1038/srep41730)

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