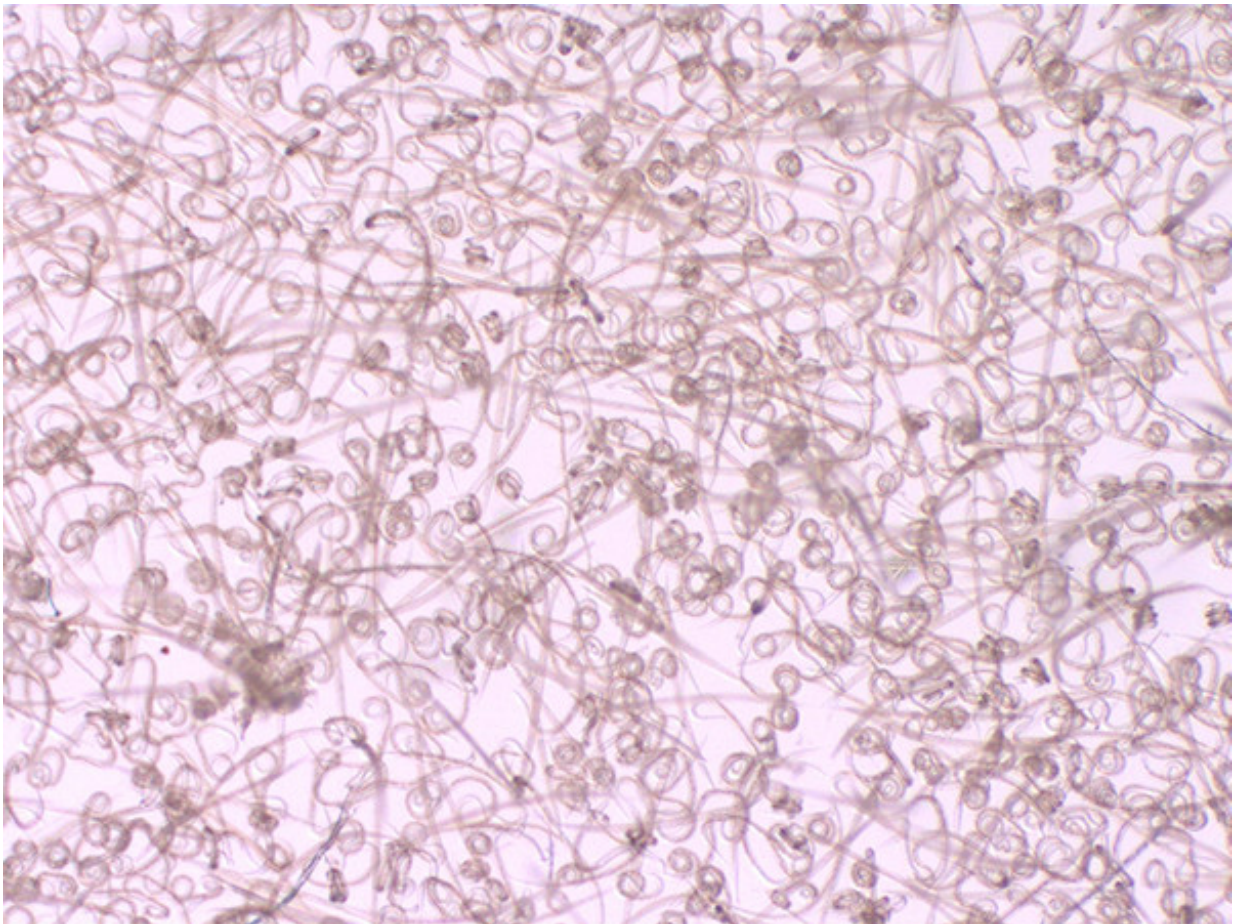


Impact of climate change on parasite infections depends on host immunity

February 16 2016, by Sam Sholtis



Free living stage of soil-transmitted parasites that infect the guts of rabbits.
Credit: Cattadori Lab, Penn State University

New research demonstrates how climate change and the immune reaction of the infected individual can affect the long-term and seasonal dynamics of parasite infections. The study, led by Penn State scientists, assessed the infection dynamics of two species of soil-transmitted parasites in a population of rabbits in Scotland every month for 23 years. The study's results could lead to new strategies for the treatment and prevention of infections from similar parasites in humans, livestock, and wildlife. A paper describing the research will be published in the online Early Edition of the journal *Proceedings of the National Academy of Sciences* during the week ending February 19, 2016.

"Our research shows that how we target treatment for parasite infections—not only in wildlife like the rabbits we studied, but also in humans and livestock—will depend on how the climate changes and whether or not the host can mount an effective immune response," said Isabella Cattadori, associate professor of biology at Penn State and a research scientist affiliated with Penn State's Center for Infectious Disease Dynamics and Huck Institutes of the Life Sciences.

Previous work in Cattadori's laboratory had shown that infections from one of the parasite species monitored in the study are controlled by an immune response in the rabbits, but infections from the other parasite species are not controlled, even though the rabbit does have an immune response to the parasite.

"Over the course of 23 years, we saw clear evidence of climate warming at our study site in Scotland. The warmer climate leads to increases in the number of soil-transmitted [parasites](#) in the pastures where the rabbits live because the parasites can survive longer in the soil," said Cattadori. "With more parasites, there is an increased risk of [infection](#), but how this increased risk affects the severity of the infection in the long term depends on the ability of the host to mount an immune response."

For the parasite that is not controlled by the rabbit's immune response, the researchers observed an increase in the intensity of infections in adult rabbits with climate warming. "Because they can't clear the infection with an immune response, the rabbits accumulate more and more parasites as they age so that older individuals carry most of the infection in the population," said Cattadori.

For the parasite that is controlled by the rabbit's immune response, the researchers saw no long-term increase with [climate warming](#) in the intensity of infections in the [rabbit](#) population overall. However, the severity of infection did increase in young rabbits that had not yet developed a very strong immune response.

"Our research shows that as climates continue to change, we will need to tailor our treatment of parasite infections based on whether or not the host can mount an effective immune response," said Cattadori. "When a host's immune response cannot control the infection, treatment should be targeted at older individuals because they carry the most severe infections. When a host's [immune response](#) can control the infection, treatment should be targeted at younger individuals because they are at the greatest risk."



Credit: JJ Harrison via CC BY-SA 3.0

More information: Host immunity shapes the impact of climate changes on the dynamics of parasite infections, *Proceedings of the National Academy of Sciences*,
www.pnas.org/cgi/doi/10.1073/pnas.1501193113

Provided by Pennsylvania State University

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