

University of Wisconsin-Madison News

Bad news for bats: deadly fungus persists in caves

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by [David Tenenbaum](#)

Researchers have found that the organism that causes deadly white-nose syndrome persists in caves long after it has killed the bats in those caves. A study just published in *Applied and Environmental Microbiology* shows that the fungus can survive in soil for months, even years, after the bats have departed.



A biologist takes samples from a cave in an early attempt to determine the cause of the deadly white-nose syndrome in hibernating bats. New research indicates the fungus causing the disease persists in caves long after the bats it afflicted have died.

Photo: USGS National Wildlife Health Center

This is not good news for the bat population, says lead author [Jeff Lorch](#), a research associate in the [Department of Forest and Wildlife Ecology](#) at the University of Wisconsin-Madison.

"We have found that caves and mines, which remain cool year-round, can serve as reservoirs for the fungus, so bats entering previously infected sites may contract white-nose syndrome from that environment. This represents an important and adverse transmission route."

"This certainly presents additional challenges," adds [David Blehert](#), a microbiologist at the U.S. Geological Survey [National Wildlife Health Center](#) in Madison, who also led the study. "It's important that we have completed this foundational work that further implicates the environment in the ecology of this infectious disease. We can now collectively move forward to address this problem."

The fungus cannot grow at warm temperatures, so scientists have long wondered how it survived over the summer. The new study sheds light on this mystery, proving that the fungus can survive over the summer in the cool soil of the caves and mines where bats hibernate.

The researchers analyzed soil samples collected during the summer (when bats were absent) from 14 caves and mines in which bats had been observed with white-nose syndrome, and they found viable samples of the fungus, called *Geomyces destructans*.

White-nose syndrome has killed millions of bats in at least seven species since it was first detected in North America in 2006. From an epicenter in New York state, it has spread into New England, West Virginia, Missouri and Canada north of Michigan's Upper Peninsula. The disease has not yet appeared in Wisconsin.



Lorch

Although the new study did not assess how effectively the soil-borne samples could cause disease in bats, they probably can, says Lorch. "Other studies, along with some of our current work, show that isolates we have found in North America are genetically identical, so there is no reason to think the fungus found in the soil would be less virulent. However, it would require additional experimentation to confirm that."

The study reveals the challenges involved in repopulating caves after bats have been wiped out by white-nose syndrome, says Lorch. "A lot of people were wondering whether the bats would eventually recolonize caves they had disappeared from due to the disease. It now appears as though this may be a challenge for susceptible bats because the pathogen is living in the soil."

The results also support current disease management recommendations to limit access to caves, Lorch adds. "Some of the states have put restrictions on entry into caves or require those entering to decontaminate gear and clothing to prevent transmission. We cultured the fungus from 200 milligrams of soil, and that amount could easily be transported in the tread of a boot. So even if a cave does not have bats, there is still a risk that people going in could spread the fungus."

Based upon analysis of samples from 55 bat hibernation sites, the scientists also found that the fungus was present in caves and mines where the disease had been found, but not in disease-free sites. Therefore, this study supports other ongoing work indicating that *G. destructans* is probably not native to North America but rather was introduced from Europe.

Still to be determined is why a few bats survive white-nose syndrome. "We have documented the recovery of some bats, and we might speculate that this has to do with the environmental conditions in which the bats chose to hibernate," says Blehert, who is also an honorary associate in the UW-Madison [School of Veterinary Medicine](#). When bats hibernate at near-freezing conditions, fungal growth is much slower than at temperatures just a few degrees warmer, and it could be that the survivors have the habit of hibernating in colder conditions.

This might be good news for the bats, Blehert adds, because if inherited, this behavior could eventually protect some American bats from the fatal fungus.