



AMERICAN MUSEUM OF NATURAL HISTORY

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STUDY WARNS THAT SNAKE FUNGAL DISEASE COULD BE A GLOBAL THREAT MODELS SHOW EMERGING DISEASE COULD INFECT ALL SNAKES

New research suggests that a potentially fatal snake fungus found in several species in the United States and three in Europe could be global in scale. The study, published today in the journal *Science Advances*, shows that the snake fungal disease caused by *Ophidiomyces ophiodiicola* can infect snakes of many species regardless of their ancestry, physical characteristics, or habitats. The study's authors, including researchers from the American Museum of Natural History, the U.S. Geological Survey, and the University of Maryland, College Park, warn that future surveys for the disease should assume that all snake species harbor this pathogen.

"This really is the worst-case scenario," said Frank Burbrink, an associate curator in the Museum's Department of Herpetology and the lead author of the publication. "Our study suggests that first responders shouldn't just be looking for certain types of snakes that have this disease, but at the whole community. All snakes could become infected, or already are infected."

The emerging snake fungal disease has been documented in 23 wild species in the United States, predominantly in rat snakes, milk snakes, gartersnakes, and viperids in the eastern part of the country. Recently, it was also detected in three species commonly found in Europe. The disease primarily affects snakes' skin, forming lesions that spread quickly and can cover a large part of the body. Although molting can resolve most cases, snakes can

die from the infection. In addition, behavioral changes that snakes undergo while battling the disease—for example, spending more time basking as their skin molts—put them at increased risk of death by predation, environmental exposure, or starvation.

“Some of the most devastating wildlife diseases ever documented, such as white-nose syndrome in bats and chytridiomycosis in amphibians, are caused by fungal pathogens,” said Jeffrey Lorch, a microbiologist with the U.S. Geological Survey (USGS) National Wildlife Health Center. “These diseases have had such great impacts because they affect multiple species, and it now looks like the same is true of snake fungal disease.”

Predicting the disease’s potential impact is difficult because snakes can be hard to locate for study in the wild. Researchers built a model based on the evolutionary history, ecology, and physical traits of known infected species and analyzed it using a neural network to look for associations that could be used to predict which species of snakes might be susceptible to the disease. Results showed that hosts for snake fungal disease were randomly dispersed among the data. Based on their findings, the authors suggest that all 98 groups of snakes in the eastern United States could be susceptible, and that the epidemic might extend globally.

“The data for our model may not be perfect, but it will tell you if there’s even a weak association between a characteristic—for example, eating a certain type of animal or living in a particular environment—and the potential to get this disease,” Burbrink said. “And in this study, our model found no association other than ‘you are a snake.’”

“Scientists have learned a lot about research and monitoring needs from 25 years of studying the effects of chytrid fungi on amphibians, and those lessons tell us that prevention is the best policy,” said Karen Lips, a professor of biology at the University of Maryland, College Park. “Researchers need to work with decision makers to prevent snake fungal disease from spreading, survey museums and field sites to determine the current distribution of the disease, run trials in the lab, and start working on treatments.”

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Science Advances paper: <http://advances.sciencemag.org/content/3/12/e1701387>

AMERICAN MUSEUM OF NATURAL HISTORY (AMNH.ORG)

The American Museum of Natural History, founded in 1869, is one of the world's preeminent scientific, educational, and cultural institutions. The Museum encompasses 45 permanent exhibition halls, including those in the Rose Center for Earth and Space and the Hayden Planetarium, as well as galleries for temporary exhibitions. It is home to the Theodore Roosevelt Memorial, New York State's official memorial to its 33rd governor and the nation's 26th president, and a tribute to Roosevelt's enduring legacy of conservation. The Museum's five active research divisions and three cross-disciplinary centers support approximately 200 scientists, whose work draws on a world-class permanent collection of more than 34 million specimens and artifacts, as well as specialized collections for frozen tissue and genomic and astrophysical data, and one of the largest natural history libraries in the world. Through its Richard Gilder Graduate School, it is the only American museum authorized to grant the Ph.D. degree. Beginning in 2015, the Richard Gilder Graduate School also began granting the Master of Arts in Teaching (MAT) degree, the only such freestanding museum program. Annual visitation has grown to approximately 5 million, and the Museum's exhibitions and Space Shows are seen by millions more in venues on five continents. The Museum's website, mobile apps, and MOOCs (massive open online courses) extend its scientific research and collections, exhibitions, and educational programs to additional audiences around the globe. Visit **amnh.org** for more information.

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