

Editorial: What is in a Name? A Proposal to Use Geomycosis Instead of White Nose Syndrome (WNS) to Describe Bat Infection Caused by *Geomyces Destructans*

Vishnu Chaturvedi · Sudha Chaturvedi

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In 2006, a mysterious condition was first observed in hibernating bats near Albany, NY, US [1]. The affected animals and carcasses displayed a prominent cotton-like growth around the nostrils, which came to be colloquially termed White Nose Syndrome (WNS). Subsequent studies indicated that the cottony appearance was due to fungal growth. The extensive fungal colonization of bat skin and hair, characteristic histopathological appearance, and exclusive presence of a specific fungal DNA in the animals' tissues led to the discovery of the causal agent—a newly described species called *Geomyces destructans* [2–6]. Subsequent studies revealed that this condition has caused the deaths of nearly a million bats in the Northeast and it has rapidly spread to other parts of the country [7]. Unfortunately, the prognosis for bats remains poor at present. The US Fish and Wildlife Service has decided to impose extreme measures, such as barring human access to the caves and the mines where bats live, in an attempt to stop further spread of this disease (http://www.fws.gov/whitenosesyndrome/pdf/NWRS_WNS_Guidance_Final1.pdf). Recently, *G. destructans* growth

was reported on bats from many European countries, but the associated morbidity or mortality seen in the US bats was absent from the European animals [8, 9]. Thus, *G. destructans* causes both colonization and invasive infections in *Chiroptera*. The underlying mechanisms causing such a wide spectrum of host–pathogen interactions still remain unknown.

Bats afflicted with WNS have many symptoms, such as, emaciation, epidermal erosion and ulcers, and extensive wing damage [4, 10]. Accordingly, this disease can be confirmed by the morphological appearance of the fungus on any part of the body, histopathology of affected tissues with demonstration of hyphae–conidia, or demonstration of *G. destructans* by PCR–nucleotide sequencing [3, 4, 6, 11]. Thus, it is reasonable to conclude that WNS is neither an exclusive presentation nor an all-encompassing description of *G. destructans* infections in bats. The continued use of this terminology to describe bat disease carries the risk of undue focus on one symptom of what is likely to be a complex host–pathogen interaction.

In the fungal kingdom, *Geomyces destructans* has the closest affinity with *Geomyces pannorum*, which is widely distributed from the Arctic and the Antarctic to temperate climate zones in cave soil and other substrates [12–15]. The two species can be distinguished by their characteristic conidia and subtle differences in the nucleotide sequences of the ribosomal DNA [5, 16]. *Geomyces pannorum* is a rare pathogen of humans and animals. It has been

V. Chaturvedi (✉) · S. Chaturvedi
Mycology Laboratory, Wadsworth Center, New York
State Department of Health and Department of
Biomedical Sciences, University at Albany School of
Public Health, 120 New Scotland Ave., Albany, NY
12208, USA
e-mail: vishnu@wadsworth.org

S. Chaturvedi
e-mail: schaturv@wadsworth.org

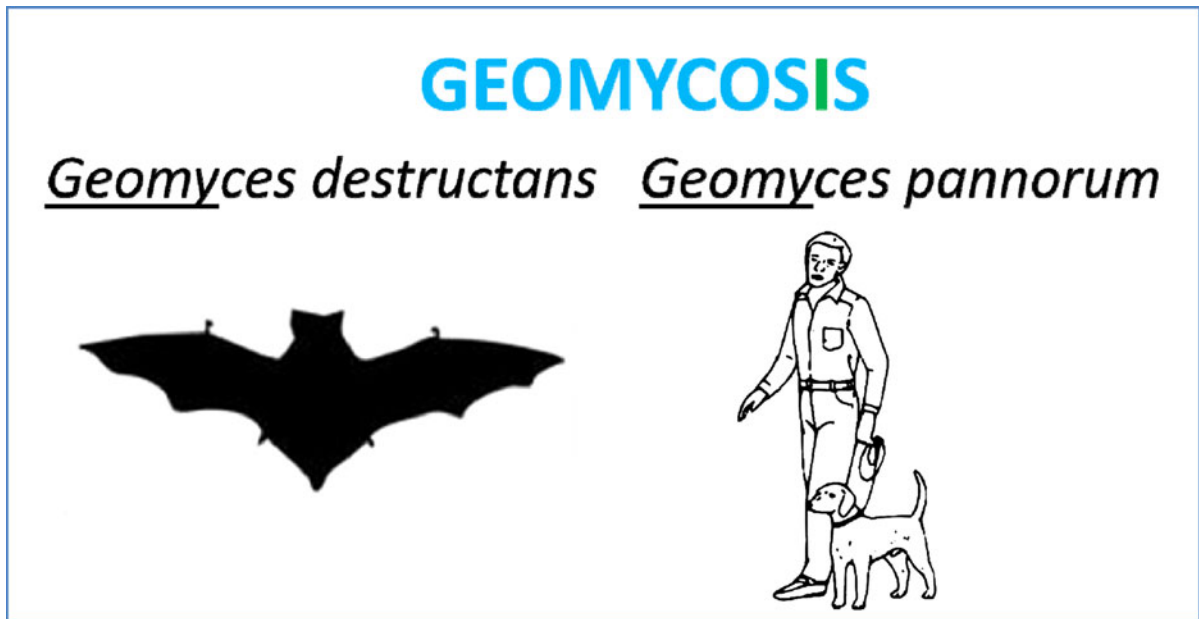


Fig. 1

documented as a cause of skin and nail infections in humans, and bone infections in dogs [16–20]. Thus, two closely related psychrophilic (“cold-loving”) fungi are now documented as pathogens of humans and animals. It is conventional in medical and veterinary mycology to name diseases by combining the specific epithet of the etiologic agent and the suffix *-cosis* (singular, [Gr.], disease, morbid state, abnormal increase) or *-coses* (plural). Thus, candidiasis encompasses a wide variety of illnesses caused by *Candida* species, and geotrichosis refers to infections caused by *Geotrichum* species. As explained in Fig. 1, we propose that the term “geomycosis” be adopted to describe infections caused by both *G. destructans* and *G. pannorum*. The adoption of this term for bat infections would properly describe a disease that has been described so far in peer-reviewed literature by a prominent symptom (WNS). An associated benefit of using an accurate descriptive term would be to recognize that the current diagnostic criteria for *G. destructans* disease in bats might include, exceed, or even exclude WNS. Geomycosis also establishes a logical link between *G. destructans* and *G. pannorum*, which could promote meaningful comparisons between the two to understand their pathogenic mechanisms for mammalian hosts. Finally, an appropriate disease

name would elicit increased attention from the wider scientific community outside of the wildlife experts. Ideally, such attention would prompt future studies on outstanding questions, such as, how psychrophilic or psychrotrophic fungi acquire pathogenic traits, how these attributes are maintained and enhanced, and what causes the emergence of these particular human and animal diseases.

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