

CHYTRIDIOMYCOSIS

Other names: Chytrid disease, *Bd*

CAUSE

Chytridiomycosis is an infectious disease of amphibians caused by the fungus *Batrachochytrium dendrobatidis* (*Bd*). It was first discovered in 1993 in Australia after a massive mortality event involving several species of frog. Further studies conducted on preserved amphibian specimens have shown that *Bd* has been present in Australia since 1978 and that the disease may have originated in Africa in as early as 1938.

SIGNIFICANCE

Chytridiomycosis is an emerging disease that is significantly impacting amphibian populations across the globe. In the past few decades, the disease has caused the decline or complete extinction of over 200 species of frogs and other amphibians. Chytrid disease is believed to be responsible for one of the most significant disease-caused losses of biodiversity in recorded history.

SPECIES AFFECTED

Currently, chytrid disease is known to affect over 350 species of amphibians, though it appears to be affecting frog species most severely. However, the disease does not affect all frog species. The American bullfrog and the African clawed frog appear to be resistant to the disease, but may still act as carriers. The disease is not known to affect humans.

DISTRIBUTION

Chytridiomycosis is present on every continent except for Antarctica, though the disease is having the biggest impact in South and Central America, Australia, and North America. In the United States, chytrid disease has been confirmed in 46 out of the 50 states. In Canada, infection with *Bd* has been found in various species of frogs from at least 7 provinces and the Northwest territory. The highest incidence of disease is occurring in the Western part of the United States.

TRANSMISSION

Bd is a waterborne fungus that disperses zoospores (a flagellum used by the fungus for movement) into the environment in order to search for a new host. The fungus travels through water sources until it finds a new host, which it then enters cutaneously (through the skin). Once the host is infected with *Bd*, chytridiomycosis may or may not develop. The disease is also believed to be transmitted through direct contact with diseased amphibians, though this has not yet been confirmed.

Research has shown that *Bd* grows best in water that is between 17-25°C (62-77°F) and that in the wild, most disease outbreaks occur at higher elevations during cooler months.

CLINICAL SIGNS

Clinical signs of chytridiomycosis vary by species. The earliest signs of chytrid disease tend to be anorexia and lethargy. Most frogs experience excessive shedding of skin, which appears opaque and gray-white or tan in color. Many frogs also experience a thickening of the skin, which may prevent breathing, thermoregulation, nutrient intake, hydration, and/or the release of harmful toxins. Other common signs include red skin, convulsions, lack of the righting reflex (a reflex that corrects the orientation of the body after it has been taken out of its normal upright position), abnormal feeding behavior, and discoloration near the mouth.

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DIAGNOSIS

Laboratory tests are used to isolate the Bd from the skin (either direct skin samples or a skin swab) of infected animals. Diagnosing true chytridiomycosis (disease, not just infection) requires histopathologic examination of tissues from dead animals preserved in either 70% ethanol or 10% formalin.

TREATMENT

Captive animals may be treated for chytridiomycosis with antifungal medications and heat therapy. However, it is very difficult to treat amphibians in the wild due to the inability to regulate the temperature of natural bodies of water and the difficulty of dispersing antifungal treatments into the environment. There is no vaccine.

MANAGEMENT AND PREVENTION

Chytridiomycosis is easily spread during anthropogenic activities. Boots, clothes, and all field equipment should be cleaned with a 5% bleach-water mixture before moving between sites. Wild amphibians should not be moved between habitats, and captive amphibians should not be released into the environment or used as shing bait. All newly acquired captive amphibians should be initially quarantined from other amphibians until it has been confirmed that they are disease free. Chytridiomycosis is a reportable disease and any detection of the disease should be reported to the appropriate wildlife authorities.

SUGGESTED READING

Whittaker, K and Vredenburg, V. 2011. An Overview of Chytridiomycosis. Amphibiaweb.
www.amphibiaweb.org/chytrid/chytridiomycosis.html

The Merck Veterinary Manual. 2013. Infectious Diseases of Amphibians- Fungal Diseases

The Amphibian Ark. 2014. Chytrid Fungus.
www.amphibianark.org/the-crisis/chytrid-fungus/

Weldon, C. et al. 2004. Origin of the Amphibian Chytrid Fungus. Emerging Infectious Diseases. 10 [12]. 2100-2105

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