

How to stop future dispersal

The fungus can be spread by humans through boots, boats and equipment or by moving amphibians. It is therefore important to have good disinfection routines for boots and equipment used when working in and around water with free-range amphibians.

Imported amphibians account for a large part of the spread of the disease and many of these can carry the fungus without showing signs of infection or illness. Many exotic amphibian species are therefore believed to have contributed to the spread of the disease to new countries and continents.



Precautions

- have good quarantine routines for purchase, import and all handling of amphibians
- clean boots and equipment when visiting new waters
- never release water, plants and animals from aquariums into nature

What is allowed?

All free-living amphibians in the Nordic countries are protected and can not be captured or moved without permission. Even if permission has been granted for translocations, sampling for possible infections should be done prior to moving animals to avoid the spread of unwanted diseases. Exotic amphibians and amphibians from other countries may not be released into the wild. In Norway, it is forbidden to keep amphibians for private purposes.

Contact

Denmark the Danish Veterinary and Food Administration

Sweden the Swedish Board of Agriculture

Norway the Norwegian Food Safety Authority

Finland the Finnish Food Authority

The Nordic Network for Actions Against Chytridiomycosis granted by the Nordic Council of Ministers



Länsstyrelserna



Photo, illustration and text: Ekolf/AB



Chytridiomycosis a worldwide threat to amphibians



The Nordic Network for Actions Against Chytridiomycosis

The chytrid disease

Amphibians are in a worldwide decline and are among the most threatened organisms. The threats are numerous and one of the most severe is the chytrid fungus *Batrachochytrium dendrobatidis* (Bd). Bd causes the disease chytridiomycosis in amphibians and has been detected in over 700 different amphibian species all over the world. The disease was first discovered in the 1970s in Australia, however the fungus (Bd) has been known since 1902. Recently, a second species, *Batrachochytrium salamandrivorans* (Bsal), has been detected in Belgium and resulted in chytridiomycosis and death of salamanders and newts.

What species are infected?

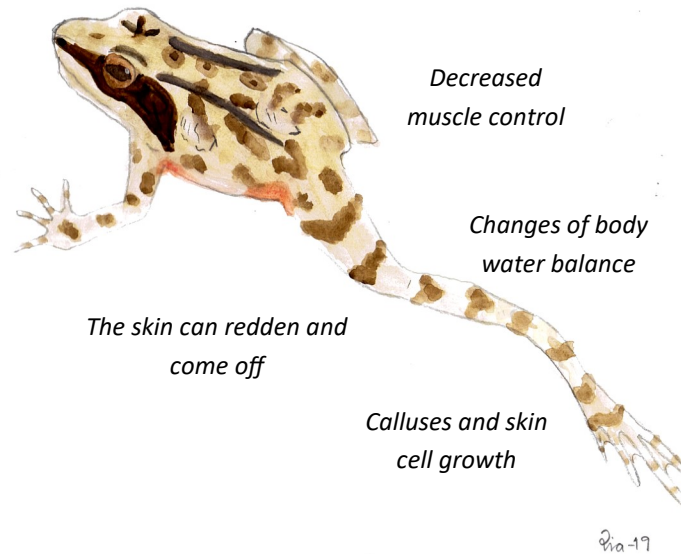
All species of frogs, toads and newts found in the Nordic region may be susceptible to infection by Bd. There are species-specific differences in sensitivity which affect how serious the disease gets and how severe mortality becomes. However, the amphibians rarely die from the disease in Europe. Bsal, on the other hand, infects newts and is highly lethal. Today, there is no suitable way to treat wild amphibians.



The symptoms of infection

The chytrid fungus (Bd) releases zoospores which infect the skin of the amphibian, mainly through water exposure. The symptoms are calluses (hyperkeratosis) and cell growth in the skin (epidermal hyperplasia), as well as wounds, impaired oxygen uptake and changes of the body water balance (osmotic regulation). Changes in behaviour have been observed in adult animals. The mouthparts are malformed in infected larvae which can lead to increased mortality because they cannot eat.

The symptoms



Ecology of the fungi

The fungus spreads naturally between bodies of water via migrating animals such as amphibians, birds and insects. It prefers water temperatures between 17 and 25° C. Since it has no resting stages, habitats without amphibians are subsequently free from Bd. The Bsal fungus can, on the other hand, survive longer outside the amphibian host and thrive in cooler water with water temperatures between 4 and 23° C. Bsal has also been found to survive longer periods outside the host.

The chytrid fungus in the north

How to detect the fungus

The chytrid fungus can be sampled by either swabbing the adult animals on the skin or taking water samples for eDNA analyses. The samples can then be analyzed genetically and a positive result indicates the presence of the fungus.

Water samples are quick and easy to take. Swabbing animals is more time-consuming but the results indicate both the number of infected animals and what species that are infected.

The geographic distribution

The disease has been found on all continents with amphibians and is widely spread throughout Europe. In the Nordic countries, the chytrid disease was detected in Denmark in 2007, in Sweden in 2010 and in Norway 2017, but it has not yet been detected in Finland. In Sweden, Bd is found from the south up to the area northwest of Stockholm, and in Norway, in a restricted area south of Oslo.

Bsal has been found in wild salamanders in Belgium, the Netherlands and Germany and is today known from captivity in the UK and Spain.

Reporting observations

Observations of Bd can be reported to the citizen science databases in Sweden www.artportalen.se and Norway www.artsobservasjoner.no, as well as on the Global Bd-Mapping site www.bd-maps.net.

