

Science for Environment Policy

European salamanders and newts under threat from fungus spread by wildlife trade

A new disease capable of devastating European salamander and newt populations was probably introduced via international wildlife trade, new research has found. The study shows that the disease is deadly for many European species of salamanders and its analysis of more than 5000 amphibians from across four continents suggests the pathogen spread from Asia to Europe via the pet trade.

Following widespread deaths of frogs in Australia and Central America in 1998, the fungal pathogen *Batrachochytrium dendrobatidis* (Bd) was discovered. This disease infects the skin of amphibians, disrupting a number of essential processes, such as respiration, and eventually causes death. It is thought to have originated in Africa, and spread across the globe, including to Europe, largely as a result of trade in exotic pets. It has devastated amphibian populations and been linked to species extinctions. There is no known way to control Bd in the wild.

Recently, a new disease related to Bd, *Batrachochytrium salamandrivorans* (Bs) has been identified which has infected wild salamanders in Belgium and the Netherlands. Based on experiences with Bd, the discovery of this second disease may spell danger for amphibian populations.

To better understand Bs, this new research investigated which groups of amphibians might be at risk of infection, as well as the geographic range of infections and possible origins of the disease. The scientists exposed three different groups of amphibians to Bs in the laboratory. These included frogs and toads, salamanders and newts and Caecilians (legless amphibians). Thirty-five species were tested in total.

The disease only affected salamanders and newts and could prove damaging to populations of these species. For instance, 41 of the 44 individual Western Palearctic salamanders, a group which includes both newts and salamanders, died soon after infection.

The researchers also found evidence that the disease may have originated in East Asia and only recently entered Europe. Three Asian salamander species (*Cynops pyrrhogaster*, *Cynops cyanurus* and *Paramesotriton deloustali*) infected with Bs showed only mild signs of disease and recovered. This might be the result of co-evolution of the species and the disease over time.

Animals may evolve resistance to the pathogen, but equally the pathogen may evolve to be less harmful. This is because dead animals can no longer spread disease, unlike living, infected individuals. Because disease spreads better if the animal lives, pathogens often evolve to become less deadly over time. The survival of Asian, but not European, salamanders suggests that co-evolution has been occurring in Asia for longer, and this region may therefore be the source of the disease.

The researchers then screened more than 5000 skin samples from wild amphibians across four continents for Bs infection. Bs was detected in salamander samples from Netherlands and Belgium and the animals showed active symptoms of the disease. Salamanders and newts from East Asia (Thailand, Vietnam and Japan) also tested positive, but did not show symptoms.

An additional 2335 amphibian samples taken from European pet shops, London Heathrow Airport (confiscated and quarantined animals), an exporter in Hong Kong and captive animals were tested for Bs. Three positive, but symptom-free, samples were found. These were all specimens of Asian newt species, two of which were imported into Europe in 2010.

The findings do not conclusively prove that Bs originated in Asia, however, they do strongly suggest that human activity, and the wildlife trade in particular, has been instrumental in spreading the disease. As European salamanders have not been exposed to the pathogen over long periods, the disease could potentially put many populations under threat of extinction.



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