Captive breeding introduced infectious disease to Mallorcan amphibians

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A potentially deadly fungus that can kill frogs and toads was inadvertently introduced into Mallorca by a captive breeding program that was reintroducing a rare species of toad into the wild, according to a new study published in the September 23rd issue of the journal *Current Biology*.

The study, by researchers from Imperial College London and international colleagues, reveals that captive Mallorcan midwife toads released into the wild in 1991 were infected with the chytrid fungus *Batrachochytrium dendrobatidis* (*Bd*). Measures to screen the health of the toads did not pick up the fungus, because at the time it was not known to science.

The chytrid fungus, which lives in the water and on the skin of host amphibians such as frogs, toads, salamanders and newts, has been known to cause amphibian population extinctions in Europe. Globally, the disease has been found in over 87 countries and has driven rapid amphibian declines in areas including Australia and Central America, pushing some species to extinction. *Bd* is currently rare in the UK, having only been detected in three locations.

The new study suggests that an endangered species of frog from South Africa, *Xenopus gilli*, which was housed in the same room as the Mallorcan midwife toads, was responsible for spreading the infection to them.

The captive breeding and reintroduction program for the Mallorcan midwife toad has been highly successful in increasing the numbers of the rare toad on the island. Over half of all the current populations on Mallorca are derived from reintroductions.

Although the chytrid fungus can be deadly, toads appear to be doing well in three out of the four populations in Mallorca infected with the chytrid fungus. This finding suggests that there are unidentified factors that are preventing the extinction of these populations. The situation is being closely monitored by the Mallorcan conservation authorities.

Global efforts to save amphibians from extinction hinge on species being taken into captivity and bred until they can be reintroduced to the wild. The researchers behind the new study say their findings reveal the risks of reintroducing species into the wild even when health screening is carried out, and highlight the need to ensure that species bred in captivity do not become infected with pathogens from other species.

As soon as *Bd* was discovered in the late 1990s, screening for the disease was incorporated into amphibian conservation plans. Zoos are now moving towards breeding threatened frogs in strictly quarantined, biosecure facilities in an effort to prevent the disease spreading in captivity.

The chytrid fungus has also been added to a list of diseases that need to be quarantined compiled by the World Organization for Animal Health. It is hoped that these quarantine measures will help those involved in conservation efforts to stop *Bd* from spreading further, by controlling the international trade in infected animals.

Dr. Mat Fisher, one of the authors of the study from the Department of Infectious Disease Epidemiology at Imperial College London, said: "Our study has shown that species reintroduction programs can have

unpredicted and unintended effects. However in this case we believe that the toads are going to survive the infection. The global conservation community is united in its goal of saving species from the effects of *Bd*, and we now have international legislation which should prevent this disease being accidentally introduced into the wild."

The researchers reached their conclusions after comparing the specific genotype of *Bd* from infected wild toads from across Mallorca, and infected toads from mainland Spain, the UK and the rest of the world. They found that the disease in all Mallorcan toads was of the same genotype, and that this was a different genotype from those on mainland Europe and elsewhere.

Bd infects amphibians' skin and is thought to interfere with their ability to absorb water. Over 257 amphibian species are known to be affected by *Bd*. Some species are very susceptible and die quickly while others, which are more resistant, are carriers of the pathogen.

Source: Cell Press