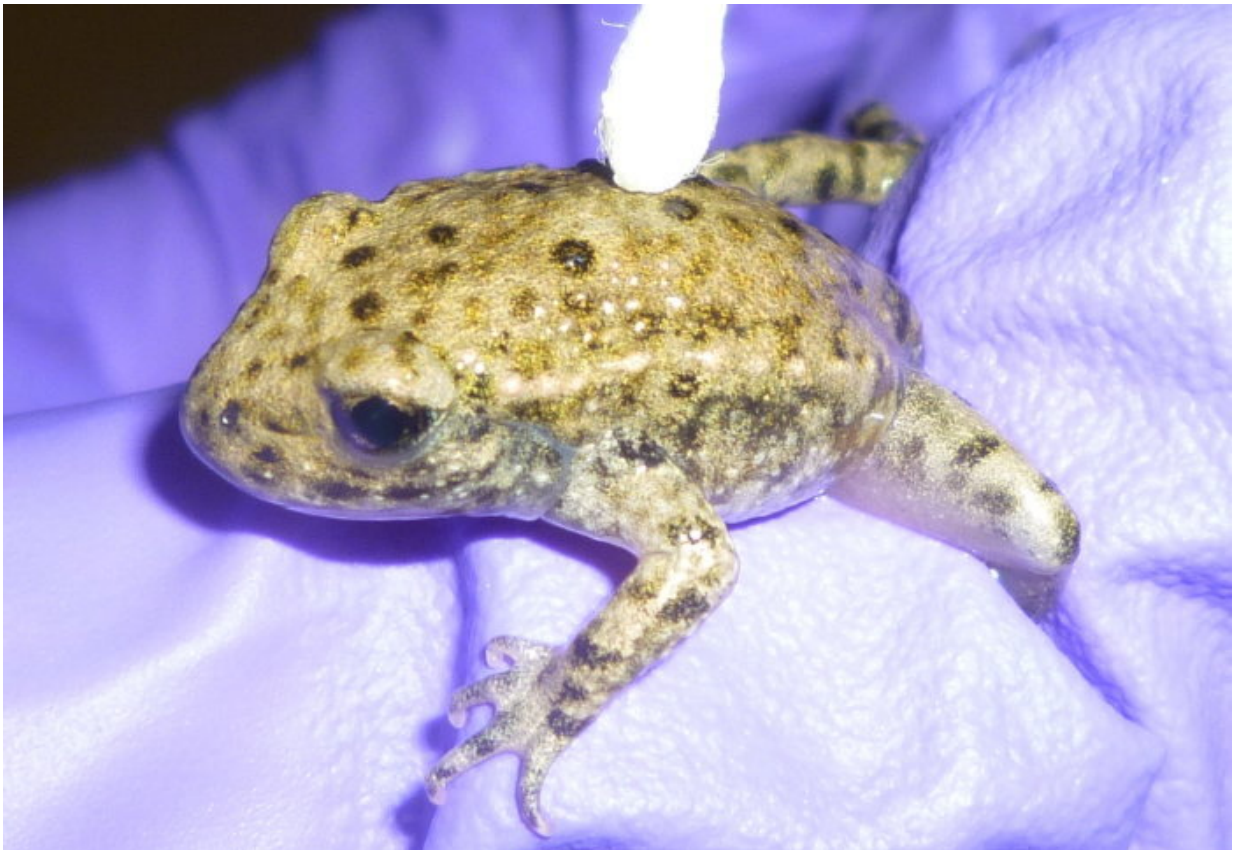


Skin bacteria may predict vulnerability of amphibians to killer chytrid fungus

February 19 2018, by Ryan O'hare



Credit: Imperial College London

Bacterial communities that live on the skin of frogs and toads could provide vital clues to species' vulnerability to the lethal chytrid fungus.

The fungus (*Batrachochytrium dendrobatidis* or (Bd)) is currently decimating [amphibian populations](#) worldwide, and has been linked with the decline and extinction of tropical species.

According to a pioneering new genetic study, led by Zoological Society of London and involving Imperial researchers, the animals' own microbes could play a key role in the course of [disease](#).

Previous studies indicate that the outcome of infection is linked to the virulence of the particular Bd strain the animals come into contact with, but more recent evidence suggests that bacteria living naturally on amphibian [skin](#) can actually provide protection from the fungus.

In the latest study, published in the journal *Nature Communications*, researchers used more than a decade of data collected from midwife toads (*Alytes obstetricans*) in the French and Spanish Pyrenees to investigate why certain populations of the toads demonstrated a degree of resistance to Bd, while elsewhere the disease has contributed to catastrophic declines in similar animals.



A midwife toad killed by chytrid. Credit: Matthew Fisher

Lead author Kieran Bates, from Imperial College London and ZSL's Institute of Zoology, said: "We were surprised to find that populations of midwife toads suffering severe Bd-driven declines all possessed very similar skin microbial communities, which were themselves distinct from those in populations proving more resistant to the chytrid pathogen.

"What these findings mean in practice is that [skin microbes](#) may play a more central role in dictating disease outcome for amphibians than was previously thought.

"Our next goal is to determine exactly how these skin microbes may be protecting the toads. This would open up exciting new possibilities with conservation applications that may protect this and other species from disease."

Dr Xavier Harrison from ZSL's Institute of Zoology and senior co-author, added: "What's really interesting about our findings is that there appears to be no obvious geographic relationship between individual toad populations and resistance to disease. Nor did we find evidence that declines in response to the presence of Bd were associated with unique genetic variants of the pathogen."



The toads' habitat in the Pyrenees . Credit: Kieran Bates

"This leaves us with the exciting possibility that skin microbes in Bd-resistant populations may actually be protecting the toads in question from the disease."

Following this discovery, the team's next priority is to determine exactly how skin [microbes](#) may be protecting the toads from chytrid. By shedding light on this amphibian-microbe relationship, it is hoped that they will open up exciting new approaches to the future conservation of this and other species.

More information: Kieran A. Bates et al. Amphibian chytridiomycosis outbreak dynamics are linked with host skin bacterial community structure, *Nature Communications* (2018). [DOI: 10.1038/s41467-018-02967-w](#)

Provided by Imperial College London

Citation: Skin bacteria may predict vulnerability of amphibians to killer chytrid fungus (2018, February 19) retrieved 9 April 2024 from <https://phys.org/news/2018-02-skin-bacteria-vulnerability-amphibians-killer.html>

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