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Significant 5-year survey on amphibian diseases in Hoang Lien range

One of the largest-scale epidemiological studies ever conducted on the pandemic *Chytridiomycosis* on Vietnam's amphibians has found a low prevalence of the disease-causing fungi, a significant good news story for Vietnam and the global fight for amphibian conservation.

Chytridiomycosis is caused either by the amphibian chytrid fungi *Batrachochytrium dendrobatidis* (Bd) infecting the order Anura (containing frogs and toads), or *Batrachochytrium salamandrivorans* (Bsal) infecting the order Caudata (consisting of newts and salamanders). Chytridiomycosis, which was first confirmed as a chytrid fungus in 1998 in Australia, has infected 500 amphibian species worldwide to date, especially those Australia, Europe, and North and South America. It is interesting that the disease has very low prevalence in Asia given that East Asia is known to be the home of these fungi.

Possibly, these fungi are less active or even 'asleep' in this origin region. However, due to the pet trade of some Asian species of genus *Bombina* to the other regions/continents, the fungi have been spread and activated, due to some unknown factors, becoming a deadly assassin to countless amphibians globally. As a consequence, dozens of amphibian species have been pushed to the brink of extinction or gone forever.

Due to the fatal effects of these fungi, many groups of international researchers have been conducting research in new areas where the fungi have not been detected yet to alarm the local authorities to the presence of the fungi, if any, and to propose and provide feasible protective measures.

Nevertheless, in Vietnam, concerns about the state of amphibians and the threats to them were quite limited with little research on these fungi carried out.

International experts, who are fully aware of the fungi's danger to amphibian populations, have joined up with Vietnamese scientists to detect traces of prevalence of these fungi. Hoang Lien range, a biodiversity hotspot in northern Vietnam, has been selected to be the site of the research.

Since 2015, a group of international and domestic researchers have conducted various field trips to the far and hard reaching mountain-top areas. Up until now, 601 samples belonging to over 40 species, accounting for half of amphibian species known in Hoang Lien Range, have been collected. Specialized, sterile swabs were used to collect samples from different parts of the animal, including on the skin and limbs, to detect trace



A Yunnan Firebelly Toad (*Bombina microdeladigitora*). A sample of this species was found positive with *Batrachochytrium dendrobatidis* (Bd).

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of the fungi. During this epidemiological survey, strict sterilization procedures have been followed in accordance with the global standards to avoid infectious spread between different areas and individuals.

Swab samples then were sent and analysed at Imperial College London and the Institute of Zoology (Zoological Society of London) in the UK. The results were quite reassuring with only 6 samples, accounting for 1% of samples, being positive for Bd and none positive for Bsal. Moreover, no observed frogs showed any signs of disease. The 6 samples positive for Bd belong to 5 species: Yunnan Firebelly Toad (*Bombina microdeladigitora*), Common toad (*Duttaphrynus melanostictus*), Mount Fansipan horned frog (*Megophrys fansipanensis*), Hoang Lien Horned Frog (*Megophrys hoanglienensis*), and Sapa Treefrog (*Gracixalus sapaensis*).

The findings show low prevalence and only a minor impact of the *Chytridiomycosis* causing-fungi. It is still unclear whether the fungi's lethal effects could be activated in some way, by unusual weather events and climate change etc.

So far, the survey has been considered the largest ever epidemiological analysis on *Chytridiomycosis* in Vietnam. It is hoped that the results can highlight the appearance of threats to amphibians and call for the stricter management and control of the pet trade to prevent the further spread of the disease.

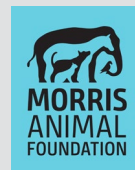
This work has been done under a collaboration of scientific staff from the Australian Museum, Indo-Myanmar Conservation and ZSL London Zoo.

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A researcher is taking a swab sample on the toe of a frog.
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For more information on this study, please refer to:

Tapley, B., Jervis, P., Nguyen, L.T., Portway, C., Nguyen, C.T., Luong, H.V., Kane, D., Brookes, L., Perkins, M.W., Ghosh, P., Wierzbicki, C., Shelton, J., Fisher, M.C. & Rowley, J.J.L. (2020). Low Prevalence of *Batrachochytrium dendrobatidis* Detected in Amphibians from Vietnam's Highest Mountains. *Herpetological Review*. 51(4), 726–732.

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An individual of Mount Fansipan Horned Frog (*Megophrys fansipanensis*). A sample of a member of this species was tested positive with *Batrachochytrium dendrobatidis* (Bd).

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