New insights in the evolution of disease virulence from frog killing fungus

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The chytrid fungus is responsible for the major decline in frog populations most notably in Australia and Central America.

Now a new study by academics from Plymouth University and James Cook University, Queensland, has found that evolution and climate change could be contributing to the intensification of the disease.

Their research paper has been published in the Royal Society of Biological Sciences journal '*Proceedings of the Royal Society B*' this month.

The researchers took advantage of good records kept on the spread of the fungus and the decline of frogs in Central America to investigate the relationship between the two.

They found that the lag time between the arrival of the pathogen and the decline of the frog population diminished over time.

Robert Puschendorf, lecturer in animal physiology and health in Plymouth University's School of Biomedical and Biological Sciences, explained: "We have found an interesting pattern during the spread of one frog killing disease in Central America: an increased virulence as it spreads over the landscape.

"We suggest that perhaps the pathogen is evolving towards increased virulence as it spreads. The pathogens at the edge of the wave of spread

are being selected to produce more offspring and spread quicker over time, which could explain why we find this increase pattern of virulence. An alternative is that the environment is shifting in favour of the pathogen and at this stage we cannot tell which one of these mechanisms is the right one, but most likely both are at play."

The researchers found that when the fungus first arrived in Mexico in the late 1960s/early 1970s, it took around nine years for the frog population there to show a decline. But, as the fungus spread southward via Costa Rica, the lag time got smaller. By the mid-2000s the chytrid fungus was in Panama and the decline in frog population happened within a matter of months.

Ben Phillips is a Senior Research Fellow at James Cook University. He said: "This is a really striking pattern. There is no doubt that this fungus was having more rapid impacts on populations as it spread south."

Robert said that the findings could have implications for how we study the spread of human diseases: "With a dramatic increase in emerging diseases affecting humans and wildlife, understanding how virulence during an invasion is a basic question if we want to effectively manage them."

Provided by University of Plymouth