

THERMAL TOLERANCE MISMATCH EXPLAINS PATTERNS OF PATHOGEN PREVALENCE WITHIN AND AMONG FROG SPECIES

Richard Duncan¹, Benjamin Scheele², and Simon Clulow¹

¹University of Canberra

²Australian National University

March 22, 2024

Abstract

Emerging infectious diseases threaten many wildlife populations, yet there is considerable variation in pathogen impacts both within and among species. Understanding this variability is key to identifying where and when pathogens will have substantial effects. Here we use data on prevalence of the invasive pathogen *Batrachochytrium dendrobatidis* (Bd) in Australian frogs to test two predictions derived from the hypothesis that mismatches in host-pathogen thermal tolerances can explain prevalence patterns. We show that: 1) the slope of the relationship between Bd prevalence and temperature within host species transitions predictably from positive to increasingly negative as the host species' thermal optima increases; and 2) among host species, mean Bd prevalence increases, peaks, and declines as the host species' thermal optima increase. Both results align with theoretical expectations and suggest that mismatches in environmental tolerance between hosts and pathogens can explain much of the variation in pathogen impacts observed within and among species.

Hosted file

Chytrid prevalence_02_02_2024.docx available at <https://authorea.com/users/387007/articles/731423-thermal-tolerance-mismatch-explains-patterns-of-pathogen-prevalence-within-and-among-frog-species>