

Proposal

Title: Prevalence and infection intensity of fungal pathogen *Batrachochytrium dendrobatidis* in the eastern newt (*Notophthalmus viridescens*) in relation to seasonal change

Program of Study: Biology

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Category: Basic

Abstract:

Batrachochytrium dendrobatidis (*Bd*) is a fungal pathogen that causes chytridiomycosis, an emerging infectious disease responsible for worldwide declines of amphibian species. In the eastern United States, *Bd* is widespread, but occurs sporadically across the landscape. For most species in this region, the population level impact of *Bd* is unknown and is difficult to measure without long-term studies. The objective of this study was to set up a long-term monitoring project to study the population level impact of *Bd* on the eastern newt (*Notophthalmus viridescens*) and to determine how seasonal changes affect host-pathogen dynamics. The eastern newt is highly susceptible to *Bd* infections, but the effects of chytridiomycosis on this species is unknown. To complete these objectives, 25 eastern newts were collected and sampled monthly at a pond in Campbell County, Virginia. To sample for *Bd*, each newt was individually collected and its skin was swabbed with a sterile rayon swab. The sex, snout-vent length, and mass were recorded for each newt. Environmental variables such as air and water temperature and recent precipitation history were also collected during each sampling. DNA was extracted from swabs using the Qiagen DNeasy Blood & Tissue Kit. DNA was amplified with *Bd*-specific quantitative PCR (qPCR) assays to quantify the number of *Bd* sequence copies present on each individual (infection intensity). Preliminary results show that in January 2017 a high proportion of the population (88%) was infected with *Bd* with a relatively high average infection intensity (1151 *Bd* sequence copies per newt). Based on the biology of *Bd* in culture and previous studies, it is expected that *Bd* prevalence and infection intensity will be higher during cooler months and lower during warmer months. Continued monitoring of this population will allow us to determine the population-level impact of chytridiomycosis on the eastern newt.

Christian Worldview Application:

In the beginning, God gave authority to man over all Creation, including every creature. While God deemed every aspect of His creation to be good, it was only man that was made precisely in His image, bearing the significance of God's relationship with man. "Then God said, 'Let us make man in our image, after our likeness. And let them have dominion over the fish of the sea and over the birds of the heavens and over the livestock and over all the earth and over every creeping thing that creeps on the earth.'" (Genesis 1:26 ESV). While power has been given to mankind, it also comes with the responsibility of stewardship over the wellbeing of all species.

As a Christian scientist, it is essential to honor and preserve the world which God has created. Scientific research inquires after the basis and function of living organisms, while attempting to formulate a method of preservation. The specific field of environmental research strives to discover the relationship of a species/organism and its surrounding ecosystem. Current issues such as deforestation and continual contamination propose a threat to the condition of stable populations and how they are able to coexist with competing variables. The goal of the proposed research is to identify the prevalence of the fungal pathogen *Batrachochytrium dendrobatidis* (*Bd*), corresponding to the occurrence of chytridiomycosis in the eastern newt (*Notophthalmus viridescens*). It is believed that there is a correlation to the prevalence of *Bd* within the newt population and seasonal change. Analysis of the data obtained from the newt population will enlighten the research community of the effects of the fungal pathogen. While the research is isolated to a small portion of the southeast, the results will help gain a greater understanding of the current condition of the species. Having a Christian worldview greatly influences how the experimental procedures are conducted, as it is honoring to the Lord to respect every part of His creation. From the handling of the newts, to how the surrounding environment is treated is a representation of each portion of creation is meant to be cared for. God has given authority to man, which is seen in the preservation of the greatest mountain range to the smallest of species.