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Title: Elucidating the Influence of Environmental Factors on the Inhibitory Ability of Antifungal Cutaneous Bacteria Found on Eastern Redback Salamander (*Plethodon cinereus*) Populations

Abstract:

The amphibian population is currently experiencing a critical decline, with 43% of all amphibians being listed as a threatened species. Factors that have been linked to this decline include habitat fragmentation, disease, and urbanization. Urbanization has been shown to increase the development of the chytrid fungus *Batrachochytrium dendrobatidis* (Bd) causing the bacterial infection chytridiomycosis, described as an increase in mortality of amphibians due to extra keratin growth on amphibian skin. Some amphibians such as the eastern redback salamander has been found to possess antifungal cutaneous bacteria, which mitigates the growth of Bd. It was previously undetermined how the number of salamanders and number of bacterial isolates is affected by urbanization, habitat fragmentation and habitat conditions. In order to investigate the effects of these factors, eastern redback salamanders located in high-upland, mid-upland, and stream locations at urban, suburban, and rural sites were swabbed for cutaneous bacteria, and soil and water samples were taken from each of the 11 sites used. Habitat fragmentation was analyzed through soil chemistry, as well as soil water content, pH and number of bacterial isolates expressed. There was no statistical significance between pH, soil water content, and the number of salamanders and bacterial isolates found, compared to habitat type ($p > 0.05$). It was expected that urbanization would have a negative effect on the number of antifungal bacterial isolates, however, our research discovered that urbanization has an approaching significantly positive effect on the bacterial isolates ($0.07 > p > 0.05$). There was also a statistically significant difference between phosphorus and potassium levels in comparison to number of salamanders and bacterial isolates ($p < 0.05$), finding low levels of phosphorus and high levels of potassium is optimal for a greater number of salamanders and bacterial isolates. Furthermore, discovering the most prominent conditions for the growth of epicutaneous antifungal bacteria will allow for a better understanding on alleviating the amphibian decline.