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OU ecologist's NSF grant supports research into deadly amphibian disease

Dr. Thomas Raffel, an assistant professor of biological sciences at Oakland University, has been awarded a five-year grant totaling nearly \$1 million from the National Science Foundation for his research on the effects of temperature variation on chytridiomycosis, an infectious disease that has been linked to mass amphibian die-offs and extinctions throughout the world.

"There has been a major decline in amphibian species around the world, and there's evidence that many of those extinctions were directly or indirectly caused by this disease," Raffel said. "In fact, it's thought to be perhaps the most extinction-causing disease ever."

According to the NSF, the Faculty Early Career Development (CAREER) award is presented annually to non-tenured faculty who have demonstrated the potential to serve as academic role models in research and education, and to lead advances in the mission of their department or organization.

"It's considered to be a highly prestigious award," Raffel said.

Over a five-year period, Raffel will receive approximately \$964,898 from the NSF. He plans to use the funds to test assumptions and predictions of a new metabolic theory based approach to modeling parasite-host interactions in variable temperature environments, using chytridiomycosis in amphibians as a model parasite system.

"The goal is to be able to better predict what's going to happen with the disease when you have a variable temperature environment, where the temperature is fluctuating up and down," he said.

First discovered in 1993 in dead and dying frogs in Queensland, Australia, chytridiomycosis (also known as the amphibian chytrid fungus disease) invades the surface layer of the frog's skin, causing it to thicken over time. Since frogs use their skin in respiration, to take in nutrients and release toxins, this typically leads to death occurring approximately 21 days after infection.

"There's a lot of evidence that temperature is an important driver of this disease," Raffel said. "Therefore, my work on temperature dependence of the immune system and parasitism is highly relevant."

Funds from the NSF CAREER award will also be used to support a new thermal-physiology classroom lab activity for use in Introductory Biology and Project Upward Bound's summer academy, an annual summer workshop to train graduate teaching assistants and early-career faculty in modern teaching methods, and at least four graduate students and over a dozen undergraduate student researchers.

"The amazing thing about a CAREER Award is you've got five years and a relatively large budget to work with to be able to do something really major and groundbreaking," Raffel said. "I think this has the potential to be really major and groundbreaking."

Raffel said he's grateful to have been selected to receive the NSF CAREER Award, and for the support he's received at Oakland University.

"One asset that I have at Oakland University that helped me get this award is that I have this outdoor space," he said. "At most universities it's very difficult for someone who does aquatic ecology to get access to an outdoor space on campus where you can do your outdoor experiments, and I had a very specific need. I needed an outdoor space where I could run experiments in large temperature-controlled outdoor mesocosms. There aren't many people in the world who have access to this type of resource. It doesn't look very fancy, but it's amazing to have."



Dr. Thomas Raffel, an assistant professor of biological sciences at Oakland University, has received a grant from the National Science Foundation to study the effects of temperature variation on chytridiomycosis, an infectious disease that has been linked to mass amphibian die-offs and extinctions throughout the world.