

Creature Feature

Luminous Squid Lights up Research on Beneficial Bacteria

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Hawaiian bobtail squid (*Euprymna scolopes*)

UNH microbiologists have received a \$716,000 to study the evolution of beneficial microbes by examining the relationship between the Hawaiian bobtail squid and a bacterium that helps it avoid predators by emitting light. Cheryl Whistler and Vaughn

Cooper, both associate professors of microbiology and genetics, are the investigators on the three-year grant from the National Science Foundation.

“Beneficial bacteria are the foundation of health of all plants and animals, including humans, but because most research has focused on disease-causing bacteria, we don’t understand these beneficial associations very well,” says Whistler, who is principal investigator on the grant. “Why some closely related bacteria evolve to become trusted partners with their hosts while others evolve to cause disease remains unknown.”

To better understand how these beneficial host-microbe associations evolve and function, Whistler and Cooper will turn to the tiny Hawaiian bobtail squid (*Euprymna scolopes*), which plays host to the light-producing bacterium *Vibrio fischeri*. In exchange for a home and nutrients, *V. fischeri* lights up the nocturnal squid’s underside, fooling predators below into seeing this phony moonlight but not the dark shape of the tasty squid.

With its invisibility cloak trick, the squid-*V. fischeri* symbiosis is a well-studied model, giving the UNH researchers a strong scientific foundation on which to base their work. “It’s a charismatic host and a glow-in-the-dark symbiont, making this system an excellent symbiosis ambassador,” says Whistler.

[See the video on YouTube](#)

LEARN MORE ABOUT THE SYMBIOTIC RELATIONSHIP BETWEEN BOBTAIL SQUID AND *V. FISCHERI* IN THIS NATIONAL SCIENCE FOUNDATION VIDEO.

For the grant-funded project, “The Molecular Basis of Host Adaptation and Origin of New Mutualisms,” the researchers will experimentally evolve non-symbiotic *V. fischeri* in juvenile squid to probe the question of how this bacterium adapts to a new host and initiates the symbiosis. They will then identify the genetic basis of adaptation and study how these mutations influence their host.

“A major question in evolution is whether key innovations – such as the ability to initiate a new mutualism – arise by few mutations of large effect or by more subtle mutations,” says Cooper. “We aim to learn how selection acts on bacteria with different evolutionary histories to achieve these innovations.”

Whistler and Cooper anticipate that their work, by illuminating how the vast, unseen majority of bacteria living on us or in us evolve to form beneficial relationships with us, will help with strategies for improving human health.

In addition to Whistler and Cooper, both of whom are in the department of molecular, cellular and biomedical sciences in the College of Life Sciences and Agriculture at UNH, the grant will fund the interdisciplinary training of two graduate and multiple undergraduate students, and will develop educational resources for middle and high school teachers.

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