

Research shows ocean bacteria glow to attract those that would eat them

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(PhysOrg.com) -- In most situations in the wild, animals develop abilities to help them avoid being eaten. The chameleon, for example, can change its color to avoid being seen by predators. What's less usual, are animals or organisms that develop abilities that do the opposite, i.e. develop traits that encourage predators to eat them. But that's just what certain ocean bacteria appear to do. Margarita Zarubin, a marine science grad student in Israel, and her colleagues have shown, as they report in their paper published in the *Proceedings of the National Academy of Sciences*, that a certain type of bioluminescent bacteria glow to attract the attention of other organisms, so as to be eaten; and they do so as a means of assisted dispersal.

For years scientists have speculated that some ocean bacteria may glow to encourage others to eat them, but till now, no one had actually tested the theory. Zarubin and her colleagues thought it was time.

As a means of proof, the team put a bag of water with normal *Photobacterium leiognathi* bacteria in it into a tank of water that held shrimp and other microbes. At the other end of the tank they put in another bag of the same kind of bacteria that had been genetically altered to prevent their being able to glow. The team found that the shrimp and other organisms gathered around the glowing bag, but not around the dark one.

After that, they allowed a group of shrimp to swim around in water with the glowing bacteria in it, and found that after just a few hours, the

shrimp's bellies soon glowed with bacteria as well.

Then, lastly, the shrimp that had glowing bellies were put into a flume alongside shrimp that had not eaten the glowing bacteria and all were sent past a quantity of shrimp eating fish. There it was observed that the fish ate only the [shrimp](#) that had glowing bellies. Afterwards, the team tested the feces from the fish and found that the glowing bacteria had come through the digestive process unscathed. And because fish, being [fish](#) tended to swim around, the bacteria had been transported to a new locale.

From these simple experiments it appears clear that the bioluminescent abilities of the ocean bacteria tested help it to move more easily around in the ocean - using other organisms as a transport vehicle. In so doing the [bacteria](#) not only get a free ride, but get a meal along the way as they feast on other material inside the bellies of those that have eaten them.

More information: Bacterial bioluminescence as a lure for marine zooplankton and fish, *PNAS*, Published online before print December 27, 2011, [doi: 10.1073/pnas.1116683109](https://doi.org/10.1073/pnas.1116683109)

Abstract

The benefits of bioluminescence for nonsymbiotic marine bacteria have not been elucidated fully. One of the most commonly cited explanations, proposed more than 30 y ago, is that bioluminescence augments the propagation and dispersal of bacteria by attracting fish to consume the luminous material. This hypothesis, based mostly on the prevalence of luminous bacteria in fish guts, has not been tested experimentally. Here we show that zooplankton that contacts and feeds on the luminescent bacterium *Photobacterium leiognathi* starts to glow, and demonstrate by video recordings that glowing individuals are highly vulnerable to predation by nocturnal fish. Glowing bacteria thereby are transferred to the nutritious guts of fish and zooplankton, where they survive digestion

and gain effective means for growth and dispersal. Using bioluminescence as bait appears to be highly beneficial for marine bacteria, especially in food-deprived environments of the deep sea.

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