

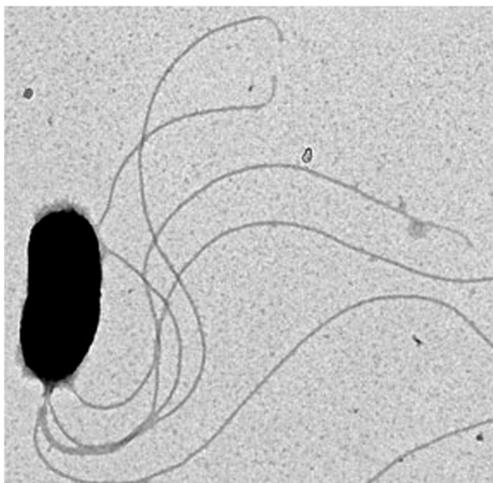
Quorum Sensing and Bioluminescence

What is quorum sensing?

Quorum sensing is a method of communication. It is how bacteria count how many other bacteria are around them. Some marine bacteria, such as *Vibrio harveyi* and *Vibrio fischeri* use quorum sensing to control bioluminescence – GLOWING!

Why use quorum sensing?

A single bacterium is very small. The picture below shows a single bacterium magnified about 50,000-fold. Do you think that if this single bacteria produced light, you would be able to see it?



A single *V. fischeri* bacterium magnified ~50,000 fold

Consider the picture below instead. How many bacteria do you think are needed to create that much light?



Glowing (bioluminescent!) bacteria

How many bacteria are growing and glowing?

In the picture of the glowing bacteria, there are more bacteria than there are people on Earth!

It isn't easy to glow. It takes a lot of energy, which is why bacteria use quorum sensing to control bioluminescence. By only glowing when there are enough other bacteria around for the light to be visible, bacteria are able to work together and conserve energy.

Why would a bacterium glow?

V. fischeri is the symbiont of a squid, *Euprymna scolopes*. A symbiotic relationship is a relationship where both participants help each other, and they both benefit. How do you think a squid and a bacteria could benefit each other?



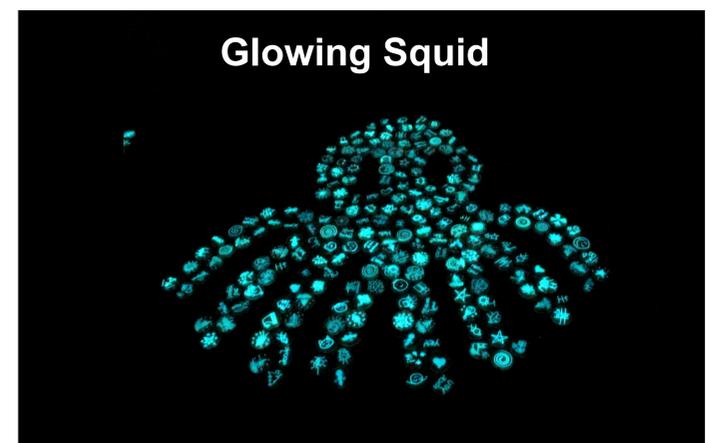
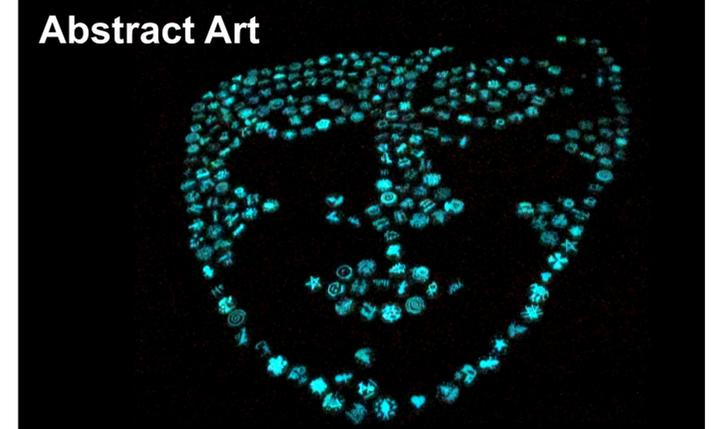
Bobtail Squid

The squid provides nutrients to the bacteria, and, in return, the bacteria provide light to the squid. The bacteria grow in the light organ of the squid. The squid uses the light organ as a cloaking device to hide from predators at night. This makes the squid a more successful hunter of its prey.

Why do we study glowing bacteria?

As scientists, we make use of bacteria that bioluminesce to study quorum sensing. We can also engineer other bacteria to glow under different biological conditions to study different aspects of biology.

We can also use it to make art!



Acknowledgments & References

V. fischeri micrograph: "This Week in PNAS". 2005. PNAS

Bobtail squid image: © Hans Hillewaert

Thanks to Alan Utria for the bacterial art pictures