

Talking bacteria

[Science](#), [Biology](#)



Scientific American Current Issues in Microbiology Article: “ Talking Bacteria”

Due 11: 59 PM on Monday, February 20th Each question is worth pt.

1. How might the knowledge of quorum sensing allow scientists to develop therapies for infectious disease?

Quorum sensing describes the ways in which bacteria determine how many of them are in the vicinity. If enough are present, (a quorum), bacteria get down to business or play mischief. This communication between the bacteria is imperative, as they arrange themselves according to different functions and to form a complex. Quorum sensing provides a strategy for medicine- muck up the communication system of dangerous bacteria such as antibiotic-resistant enterococcus. Quorum sensing initiates the toxin production such as in case of *V. cholerae*. Scientists can exploit this ability of the bacteria to develop drugs against the toxin as they could understand, the formation of quorum is the right stage when the bacteria produce toxins.

2. Dr. Bassler hopes that AI-2 is used the same way by all cells, in her words, she wants it to be “ bacterial Esperanto.” Explain the importance of this universal language.

Quorum sensing initiates the release of toxins by bacteria for instance, *V. cholerae*. Every bacteria has its own autoinducer, to communicate with its own kind. This is a signalling process which aids in bacterial communication to aggregate, to form a quorum, to perform their function.

3. Basic scientific research that explores the answers to questions with no practical goal in mind. Some politicians and taxpayers are opposed to spending tax dollars on basic research because such research has no obvious practical application. How does the basic research leading to the

discovery of quorum sensing in photobiotic marine bacteria help justify the expenditure of taxpayers' money?

Basic research is the basis of all the advanced research. Quorum sensing enabled one to understand that bacteria do communicate through signalling pathway either to release toxin or to perform some beneficiary role. This signalling resulted in aggregation of bacteria and they bioluminescence only when they are close to each other, indicating that they are going to perform some imperative role. This basis enabled researchers to understand the nature of microbes, production of antibiotic/ toxin and helped researcher to develop drug.

4. Explain the importance to bacteria of having a universal language and their own person autoinducer molecule.

Each bacteria has its own autoinducer molecule, for instance, Gram-negative bacteria such as *Pseudomonas aeruginosa* use different versions of AHL molecules (acylated homoserine lactones) to communicate while *Staphylococcus aureus* use peptides. These autoinducer molecules are signal molecules which help bacteria to aggregate or form quorum, as after forming quorum they produce toxins.

5. Many types of animals that live in the depths of the ocean – where there is no light from the sun – have light-emitting patches. Scientists have discovered that these patches contain glowing bacteria; the marine animals, including the squids mentioned in the article, do not produce light on their own. The bacteria do not produce light when they are alone; they emit light only when they have a quorum. What benefit might the bacteria and the marine organisms get from glowing in the dark?

Millions of bioluminescent bacteria might decide to emit light simultaneously so that their host, a squid, can glow- perhaps to distract predators and escape. Salmonella wait until their hordes have amassed before releasing a toxin to sicken their host.

6. How did Drs. Hastings and Nealson discover quorum sensing?

Two scientists J. Woodland Hasting and Kenneth H. Nealson discovered that marine bacterium, *Vibrio fischeri*, produced light when its population reached a critical size. When fewer were present the bacteria did not bioluminesce.

7. Describe the importance of quorum sensing to pathogens such as *Salmonella* and *Vibrio cholerae*.

Salmonella wait until their hordes have amassed before releasing a toxin to sicken their host, thereby showing its virulence nature. Quorum sensing initiates the release of toxins by bacteria *V. cholerae*. Every bacterium has its own autoinducer, the one it uses to communicate with its own kind