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Biochemistry

Detaining Bacteria

New tool locks microbes in tiny spaces to study how they communicate

Sarah Everts

Bacteria like to hole up in biofilms, a process that is mediated by chemical signals produced and detected by these microbes. These so-called quorum sensing signals help bacteria coordinate, with millions of their microbial neighbors, the onset of everything from infection to bioluminescence. Now, researchers are reporting that small numbers of bacteria sent to the solitary confinement of a microfluidic droplet can be fooled into initiating quorum sensing behavior all by themselves.

The approach could be used to study quorum sensing in many bacteria that do not like to grow in a lab setting, notes Rustem F. Ismagilov, a chemist at the University of Chicago who published the study along with students James Q. Boedicker and Meghan E. Vincent (*Angew. Chem. Int. Ed.*, DOI: 10.1002/anie.200901550).

The team developed a technique that can isolate one to three bacteria in a small droplet. The tight quarters quicken the buildup of chemical beacons that bacteria release continuously. Quorum sensing behavior is activated when these chemical beacons are in high concentration, which often happens when bacteria are in large groups. In this case, quorum sensing is shown to occur even with a lone microbe, because the droplet's small volume hastens the buildup of the chemical beacon from that single bacterium.

"This study addresses a very important question," comments Matthew Parsek, a microbiologist at the University of Washington. "How does the physical and chemical environment influence what a 'quorum' is? For some time, it's been hypothesized that the microenvironment could influence signal buildup and result in situations where single cells" could induce quorum sensing gene expression in isolation, he says. A future challenge will be to determine whether quorum sensing by a single bacterium happens in the natural environment, and if so, how frequently, Parsek adds.

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