

Online links

Escherichia coli
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=genomeprj&cmd=Retrieve&dopt=Overview&list_uids=12319

Vibrio cholerae
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=genomeprj&cmd=Retrieve&dopt=Overview&list_uids=15707

BACTERIAL PHYSIOLOGY

Signal interference

Bacteria use chemical signals called autoinducers to communicate with one another — a phenomenon known as quorum sensing. By producing and importing autoinducers, bacterial cells establish the density of their own and other species and synchronize the expression of fundamental genes. Now, a new report published in *Nature* shows that certain bacteria can interfere with autoinducer-mediated signals, disrupting quorum-sensing behaviour in competing microorganisms.

Previous work by Karina Xavier and Bonnie Bassler had characterized the quorum-sensing mechanisms of *Escherichia coli* and *Vibrio harveyi*: both species communicate using the autoinducer AI-2. A posi-

tive feedback loop operates in *E. coli* — consumption of AI-2 induces the expression of the *lsr* operon, which encodes the transporter that imports AI-2. In *V. harveyi*, detection of AI-2 by extracytoplasmic receptors modulates the expression of genes that are involved in bioluminescence and type three secretion.

In this study, the authors first confirmed that *E. coli* and *V. harveyi* communicated using AI-2. Co-culture experiments showed that AI-2 production by either *E. coli* or *V. harveyi* induced the expression of the *E. coli* *lsr* operon. Similarly, in *V. harveyi*, AI-2 from either species activated the bioluminescence genes and repressed type-three-secretion genes. This cross-species commu-

nication is especially interesting as *E. coli* and *V. harveyi* detect AI-2 signals with different chemical structures, and chemical interconversion presumably takes place in the surrounding media.

In mixed consortia, the induction of quorum-sensing genes by AI-2 is not equivalent in different species. In model *V. harveyi*-*E. coli* cultures, the consumption of AI-2 by *E. coli* interfered with the expression of the *V. harveyi* quorum-sensing regulon, reducing light production and derepressing a type-three-secretion locus.

Furthermore, *E. coli* AI-2 consumption interfered with the quorum-sensing behaviour of *Vibrio cholerae*, extending these observations to communities that could colonize the human enteric system.

The authors conclude with an intriguing proposal — perhaps eukaryotes have developed specific associations with microorganisms that communicate using AI-2. The manipulation of AI-2 signals by these bacteria would maintain normal eukaryotic microflora and protect the host against pathogenic bacteria.

Shannon Amoils

References and links

ORIGINAL RESEARCH PAPER Xavier, K. B. & Bassler, B. L. Interference with AI-2 mediated bacterial cell-cell communication. *Nature* **437**, 750–753 (2005)

FURTHER READING Veneville, A. *et al.* Making 'sense' of metabolism: autoinducer-2, LuxS and pathogenic bacteria. *Nature Rev. Microbiol.* **5**, 361–446 (2005)

