IN BRIEF

QUORUM SENSING

A new class of homoserine lactone quorum-sensing signals

Schaefer, A. L. *et al. Nature* 18 June 2008 (doi: 10.1038/nature07088)

Most quorum-sensing systems in Gram-negative bacteria use fatty-acid-based acyl homoserine lactones (AHLs) as signalling molecules. AHLs are typically synthesized by AHL synthases that incorporate a fatty acyl group from the metabolic pools that are used for fatty-acid biosynthesis. Now, a new class of non-fatty-acid-based AHLs has been discovered, and is reported in *Nature* by Caroline Harwood and colleagues. AHL-based signalling involves two main proteins, the LuxI-type AHL synthase, which generates the signal, and the LuxR-type transcriptional regulator, which responds. The phototrophic soil bacterium *Rhodopseudomonas palustris* possesses a pair of *luxIR*-type genes (*rpaI* and *rpaR*). However, Harwood *et al.* had noticed that *rpaI* expression was specifically induced by growth on *p*-coumarate and that in bioassays designed to detect AHLs, the RpaR receptor failed to respond to culture supernatant from *R. palustris* that had been grown on p-coumarate. Further investigations of the quorum-sensing signal in *R. palustris* revealed that rather than using an AHL, *R. palustris* uses *p*-coumaroyl homoserine lactone, which is an aryl homoserine lactone, and that this signal is synthesized by RpaI from exogenous *p*-coumaric acid, which is thought to be obtained from the plant host. Screening for *p*-coumaroyl homoserine lactone activity in culture extracts from other bacteria that are known to use *p*-coumarate as a carbon source revealed that this signal is also synthesized by *Bradyrhizhobium* sp. BTAi1 and *Silicibacter pomeroyi* DSS-3.

TECHNIQUES AND APPLICATIONS

Real-time high resolution 3D imaging of the lyme disease spirochete adhering to and escaping from the vasculature of a living host

Moriarty, T. J. *et al. PLoS Pathog.* **6**, e1000090 (2008)

Pathogenic spirochaetes are responsible for several emerging and re-emerging diseases, including Lyme disease. In a recent paper in *PLoS Pathogens*, Tara Moriarty, Ursula Norman and colleagues report the development of a new system to allow real-time, high-resolution 3D and 4D visualization of the *in vivo* dissemination of the causative agent of Lyme disease, *Borrelia burgdorferi*. Intravital imaging of spirochaetes has previously been extremely difficult owing to their small size. Moreover, it is technically challenging to modify *B. burgdorferi* genetically. Moriarty, Norman *et al.* began by developing a system to engineer infectious and non-infectious *B. burgdorferi* to express green fluorescent protein under the control of the *B. burgdorferi flaB* promoter. They then used conventional and spinning-disc confocal intravital microscopy to follow the haematogenous dissemination of *B. burgdorferi* in mice. It is known that *B. burgdorferi* is transmitted from host to host through the bite of an infected tick, but the mechanism of dissemination within a host was unknown. Using their labelled *B. burgdorferi*, the authors were able to follow the progress of the pathogen through the mouse microvasculature and characterize the dissemination process. The authors comment that the methodology they describe could be applied to other bacterial pathogens.