BACTERIAL ECOLOGY

Living together

If two similar species are present in an environment and occupy the same niche, competition will eventually produce a winner and a loser, leading to elimination or exclusion of one species. But niche differentiation by similar species can allow communities of similar bacteria to coexist. A report published in *Environmental Microbiology* reveals a new mechanism of ecological coexistence in a community — redox niche differentiation — by sympatric *Achromatium* species in sediments.

Fluorescence *in situ* hybridization (FISH) and microautoradiography are techniques that allow ecologists to correlate functional and phylogenetic information in mixed communities. Niche specialization can occur through a variety of mechanisms; spatial and temporal separation, or cross-feeding between species. Similar *Achromatium* species were thought to coexist owing to differences in carbon metabolism or redox chemistry. Previously, FISH studies of a natural sediment population showed that carbon metabolism was unlikely to be important, since the species studied were all mixotrophs.

Using microcosms, Gray *et al.* now show that altering redox conditions by using aerated or anoxic water overlaid on the sediment changed the abundance of different *Achromatium* species. Nitrate addition, either in one batch or by sustained additions, can mimic a wide range of redox conditions and altered the *Achromatium* community structure.

Redox conditions in sediments are likely to vary with sediment depth owing to diffusion of chemicals such as nitrates, so that different *Achromatium* strains could specialize owing to redox sensitivity and avoid competing with each other. Clearly the genetic diversity observed correlates to functional diversity, and provides a new mechanism for structuring microbial communities.

Susan Jones

References and links

ORIGINAL RESEARCH PAPER Gray, N. D. *et al.* Adaptation of sympatric *Achromatium* spp. to different redox conditions as a mechanism for coexistence of functionally similar sulphur bacteria. *Environmental Microbiology* (March 2004) doi:10.1111/j.1462-2920.00607.x

WEB SITE

Ian Head's laboratory:
http://nrg.ncl.ac.uk/research/resareas/microbial.html

IN BRIEF

ANTI-INFECTIVES

Neutralizing antibodies to hepatitis C virus (HCV) in immune globulins derived from anti-HCV positive plasma

Yu, M. W. *et al. Proc. Natl Acad. Sci. USA* **101**, 7705–7710 (2004)

In 1993, a commercial intravenous immune globulin (IGIV) preparation ('Gammagard') that was screened to remove samples containing anti-Hepatitis C virus (HCV) antibodies was found to transmit HCV to recipients. Yu and co-workers detected anti-HCV-neutralizing antibodies in IGIV preparations from anti-HCV-positive donors that were absent from Gammagard incident samples. IGIV might be useful for HCV prophylaxis.

PARASITOLOGY

Surface sialic acids taken from the host allow trypanosome survival in tsetse fly vectors

Nagamune, K. *et al. J. Exp. Med.* **199**, 1445–1450 (2004)

The procyclic form of *Trypanosoma brucei* (found in the tsetse fly vector) has more than 3 million molecules of glycophosphatidylinositol (GPI)-anchored cell-surface proteins, called procyclins, that are required for infectivity in the insect. This report identifies a *T. brucei trans*-sialidase that transfers host sialic acids onto the procyclins and is essential for parasite infectivity. The sialylated procyclin glycocalyx protects the parasite against host defences.

ENVIRONMENTAL MICROBIOLOGY

Transfer of plastid DNA from tobacco to the soil bacterium *Acinetobacter* sp. by natural transformation

De Vries, J. *et al. Mol. Microbiol.* (14 May 2004) doi: 10.1111/j.1365-2958.04132.x

Plant transgenes that are tagged with bacterial antibiotic resistance genes (to select transgenic plants) are often located on the plastid genome. In bacteria a single homologous sequence can 'anchor' incoming DNA and enable homology-facilitated illegitimate recombination (HFIR) during transformation. This report shows that plastid DNA can be acquired by *Acinetobacter* (a naturally competent bacterium) by HFIR if the DNA is tagged with a homologous antibiotic resistance gene. This process could contribute to genome evolution and transgene spread.

PLANT PATHOGENS

Suppression of pathogen-inducible NO synthase (iNOS) activity in tomato increases susceptibility to *Pseudomonas syringae*

Chandok, M. R. *et al. Proc. Natl Acad. Sci. USA* **101**, 8239–8244 (2004)

In plants nitric oxide (NO) induces hypersensitive-response genes, antimicrobial compounds and defence genes. Chandok *et.al.* used reverse genetics to knock out the tomato *LevarP* gene — a putative orthologue of the gene that encodes the *Arabidopsis* P protein, which synthesizes NO. *LevarP*-silenced plants had increased susceptibility to *Pseudomonas syringae.* This is the first report to link plant NO synthesis to pathogen resistance.