IN BRIEF

MICROBIAL ECOLOGY

High local substrate availability stabilizes a cooperative trait

Bachmann, H. *et al. ISME J.* 9 Dec 2010 (doi:10.1038/ ISMEJ.2010.179)

Lactococcus lactis breaks down milk proteins using an extracellular protease to generate peptides. However, invasion by 'cheaters' (bacteria that do not produce the protease and instead rely on the protease activity of their neighbours) can drive the protease producers in a population to extinction, resulting in a poorly growing culture, which is a problem in the dairy industry. To understand how the peptides affect the protease producers/cheaters balance, the authors generated strains that produce luciferase when intracellular peptide levels are low. Only when the protease producers were reduced to 10% of the population did the level of peptides in the cheaters become lower than that in the protease producers, indicating an advantage for the protease producers. Thus, the concentration (determined by the diffusion) of nutrients produced locally by a differential extracellular trait plays a key part in the dynamics of a mixed population.

SYMBIOSIS

Symbiotic bacterium modifies aphid body color

Tsuchida, T. *et al. Science* **330**, 1102–1104 (2010)

The pea aphid *Acyrthosiphon pisum* can be red or green. As red and green aphids are preferentially eaten by different predators, body colour is important for the survival of these insects. Tsuchida *et al.* now find that endosymbionts also play a part in body colour determination. They noticed that some young red aphids slowly turned green and became green adults. These aphids turned out to contain a previously unknown endosymbiont of the genus *Rickettsiella*. When they transferred these endosymbionts to *Rickettsiella*-free aphids, offspring with and without the endosymbiont were produced. Remarkably, red offspring harbouring the endosymbionts slowly turned green, whereas red offspring without the endosymbionts and all green offspring did not change colour. Furthermore, the intensity of the green coloration correlated with the amount of *Rickettsiella*-specific PCR product amplified from the aphid. Several natural isolates harbouring the *Rickettsiella* endosymbiont also carried other symbionts, some of which are known to protect against predators that attack green aphids. Thus, by changing the host body colour from red to green, these *Rickettsiella* endosymbionts could help the aphid take advantage of that protection.

BACTERIAL PHYSIOLOGY

YeeV is an *Escherichia coli* toxin that inhibits cell division by targeting the cytoskeletal proteins, FtsZ and MreB

Tan, Q., Awano, N., & Inouye, M. *Mol. Microbiol.* 5 Nov 2010 (doi:10.1111/j.1365-2958.2010.07433.x)

The toxins of the toxin–antitoxin (TA) systems of free-living bacteria generally target cellular metabolism. For example, the RelE, MazF and MqsR toxins promote mRNA cleavage, resulting in inhibition of protein synthesis and cell growth. *Escherichia coli* YeeU and YeeV form a TA system that was identified on the basis of its characteristic TA operon arrangement. The toxin, YeeV, is now shown to inhibit cell division, leading to changes in cellular morphology and eventual cell lysis. YeeV interacts directly with two cytoskeletal proteins, FtsZ and MreB, *in vivo* and *in vitro*. Interaction with YeeV inhibits the GTPase activity and GTP-dependent polymerization of FtsZ, and the ATP-dependent polymerization of MreB.