IN BRIEF

SYMBIOSIS

The complexities of 'living' together

During symbiosis with the legume *Medicago truncatula*, the bacterium *Sinorhizobium meliloti* differentiates into nitrogen-fixing bacteroides in nodules formed on the plant roots. This occurs through a process that requires the bacterial protein BacA and the plant NCR AMPs (nodule-specific Cys-rich antimicrobial peptides), although the precise role of each in establishing this symbiotic relationship was unclear. In this study, the authors observed that BacA was crucial for protecting *S. meliloti* from NCR AMPs. *In vitro*, BacA-deficient bacteria were more sensitive to the activity of NCR AMPs, which induce loss of membrane integrity. Furthermore, BacA-deficient bacteria showed reduced viability *in vivo* compared with wild-type *S. meliloti*. Interestingly, the mutant bacteria could survive in the *M. truncatula dnf1* mutant, which lacks the signal peptidase required for NCR AMP trafficking. Together, these findings suggest that *S. meliloti* BacA protects the bacterium from membrane damage caused by the host NRC AMPs.

ORIGINAL RESEARCH PAPER Haag, A. F. *et al.* Protection of *Sinorhizobium* against host cysteine-rich antimicrobial peptides is critical for symbiosis. *PLoS Biol.* **9**, e1001169 (2011)

BACTERIAL PATHOGENESIS

How *Wolbachia* ensures its spread

Bacteria from the genus *Wolbachia* ensure their transmission to the offspring of their insect hosts by influencing the hosts in many ways, including altering their reproduction. This study reveals the mechanism by which the bacteria achieve this. Using the *Wolbachia* strain that infects *Drosophila mauritiana* (*Wolbachia* wMau), the authors found that the bacteria preferentially accumulated at the germline stem cell niche (GSCN). The presence of *Wolbachia* wMau was found to affect GSC function, resulting in the production of significantly higher numbers of eggs than were produced by non-infected flies. The resultant enhanced egg production was due to an increase in GSC proliferation caused by *Wolbachia* wMau, as well as a decrease in developmentally regulated apoptotic events in the fly germarium (the egg-producing portion of the ovary).

ORIGINAL RESEARCH PAPER Fast, E. M. *et al. Wolbachia* enhance *Drosophila* stem cell proliferation and target the germline stem cell niche. *Science* 20 Oct 2011 (doi:10.1126/science.1209609)

ENVIRONMENTAL MICROBIOLOGY

Deciphering anammox

Anaerobic ammonium oxidation (anammox) is a bacterium-mediated process that is responsible for the release of dinitrogen gas (N_2) into the atmosphere; however, the molecular mechanism underlying this process was unknown. *In silico* studies of the bacterium '*Candidatus* Kuenenia stuttgartiensis' had proposed that anammox occurs through three redox reactions that involve the conversion of nitrite (NO_2) to nitric oxide (NO), of NO to hydrazine (N_2H_4) and of N_2H_4 to N_2. This model has now been confirmed experimentally by this study, which also identified the key enzymes involved in each step. The authors found that this bacterium could produce NO from NO_2 in culture, potentially mediated by its nitrite:nitride oxide reductase. Furthermore, incubation of NO with ammonium (NH_4) gave rise to N_2H_4 in a reaction catalysed by a hydrazine synthase encoded in the kuste2859–kuste2861 gene cluster. Finally, N_2H_4 was oxidized to N_2, and this reaction was found to be mediated by the hydrazine dehydrogenase kustc0694 (also known as Hao).

ORIGINAL RESEARCH PAPER Kartal, B. *et al.* Molecular mechanism of anaerobic ammonium oxidation. *Nature* **479**, 127–130 (2011)