IN BRIEF

BACTERIAL TRANSCRIPTION

Transcription factor sliding in live bacteria

The facilitated diffusion theory has been used to describe how transcription factors combine three-dimensional diffusion in the cytoplasm with one-dimensional sliding on the DNA to locate their specific chromosomal binding sites. The physiological relevance of this phenomenon was recently interrogated in live *Escherichia coli* cells using a single-molecule imaging assay that examined the binding of a fluorescent LacI repressor to its target operator sequence. In agreement with theoretical predictions, the repressor required 3–5 minutes to bind the operator. The authors went on to directly examine the DNA-sliding mechanism and found that LacI traverses a distance of 45 ± 10 base pairs and that other DNA-binding proteins in close proximity to the operator can impede this sliding process. Moreover, because LacI was frequently observed to slide over the operator, the authors propose that immediate binding of transcription factors at specific sites is probably constrained by the demand to rapidly diffuse along nonspecific sequences in search of these sites.

ORIGINAL RESEARCH PAPER Hammar, P. *et al.* The *lac* repressor displays facilitated diffusion in living cells. *Science* **336**, 1595–1598 (2012)

BACTERIAL PATHOGENESIS

Sugar-coating *Acinetobacter baumannii* virulence

Despite the increasing global importance of *Acinetobacter baumannii* as a nosocomial pathogen, little is known about the factors responsible for its pathogenesis. However, a recent paper reports the identification of a general *O*-linked protein glycosylation system that is required for full virulence. A glycosylation-deficient *A. baumannii* strain had reduced capacity to form biofilms, attenuated virulence in amoeba and insect models, and lower fitness in a mouse infection model. Because this system seems to be conserved throughout *A. baumannii*, including in clinical isolates, it is an attractive target for new antibiotics.

ORIGINAL RESEARCH PAPER Iwashkiw, J. A. *et al.* Identification of a general *O*-linked protein glycosylation system in *Acinetobacter baumannii* and its role in virulence and biofilm formation. *PLoS Pathog.* **8**, e1002758 (2012)

ENVIRONMENTAL MICROBIOLOGY

Fungi prey on insects to feed plants

Although most plants obtain N from N-fixing bacteria, a recent paper describes how the soil fungi *Metarhizium* spp. act as vectors to shuttle insect-derived N to two common plant species. In addition to forming endophytic associations with many plant species, *Metarhizium* spp. are pathogens of a large number of insects. Because insects are a rich N source, the authors assessed whether *Metarhizium robertsii* delivers N to plants by obtaining this nutrient from its insect prey. The model insects, waxmoth larvae, were injected with a ^{15}N-labelled ammonium sulphate solution and then introduced into soil microcosms containing the roots of either haricot bean or switchgrass. When the insects were infected with *M. robertsii* before introduction into the soil, up to 48% of the plant N was labelled, indicating that it was insect derived. By contrast, significantly less ^{15}N was detected in plants associated with uninfected larvae. It is not yet known how widespread this phenomenon is, but the abundance of *Metarhizium* spp. in the wild would suggest that this is a common mechanism of N cycling in the soil.

ORIGINAL RESEARCH PAPER Behie, S. W. *et al.* Endophytic insect-parasitic fungi translocate nitrogen directly from insects to plants. *Science* **336**, 1576–1577 (2012)