

IN BRIEF

PLANT DISEASE RESISTANCE

Metal hyperaccumulation armors plants against disease

Fones, H. *et al.* *PLoS Pathog.* **6**, e1001093 (2010)

Around 450 plant species exhibit metal hyperaccumulation, in which the aerial parts of a plant accumulate high concentrations of metallic elements. The 'elemental defence hypothesis' suggests that metal hyperaccumulation provides a defence against pathogens. Indeed, when *Thlaspi caerulescens* plants were grown in the presence of increasing concentrations of zinc, nickel and cadmium and subsequently inoculated with the bacterial pathogen *Pseudomonas syringae*, growth of the bacterium was increasingly inhibited as the concentration of each metal rose. Furthermore, *P. syringae* mutants with increased zinc tolerance could grow on plants at zinc concentrations that inhibited growth of the wild-type bacterium. In addition, endophytic bacteria collected from the leaves of plants growing at the site of a former zinc mine exhibited a higher level of zinc tolerance than even the most tolerant *P. syringae* mutant tested.

BACTERIAL PHYSIOLOGY

A bacterial mRNA leader that employs different mechanisms to sense disparate intracellular signals

Park, S.Y. *et al.* *Cell* **142**, 737–748 (2010)

In many bacterial mRNAs, secondary structures that form in the leader region in response to the binding of certain metabolites can determine whether transcription will continue into the coding region. The leader region of the *Salmonella enterica* subsp. *enterica* serovar Typhimurium Mg^{2+} transporter gene *mgtA* contains a riboswitch that responds to low Mg^{2+} levels by allowing transcription to proceed into the *mgtA* coding region. Now a second regulatory element in the *mgtA* leader region has been identified: an 18-codon proline-rich ORF termed *mgtL*. When *mgtL* was disrupted by a stop codon, transcription of the *mgtA* coding region increased. Translation of the *mgtL* ORF was sensitive to levels of proline and to hyperosmotic stress (which sequesters cytosolic proline) but was not sensitive to Mg^{2+} levels. Therefore, expression of *mgtA* is under the control of two regulatory elements in the leader region that respond to two distinct signals.

GENOMICSTwenty-eight divergent polysaccharide loci specifying within and amongst strain capsule diversity in three strains of *Bacteroides fragilis*

Patrick, S. *et al.* *Microbiology* 9 Sep 2010 (doi: 10.1099/mic.0.042978-0)

The Gram-negative bacterium *Bacteroides fragilis* is an obligate anaerobic member of the gastrointestinal microbiota. Comparison of the genome sequence of *B. fragilis* str. 638R (originally isolated in the United States) with the genomes of two previously sequenced strains isolated in the United Kingdom (NCTC 9343) and in Japan (YCH46) showed that the diversity among polysaccharide biosynthesis loci is unprecedented. Each genome contained ten loci encoding genes involved in polysaccharide biosynthesis. Although some aspects were conserved between loci (for instance, the presence of invertible promoters), there was a striking lack of DNA sequence identity in the remainder of each locus. Indeed, cross-strain similarity was only detected for two loci in strain YCH46, one corresponding to a locus in strain 638R, and the other, to a locus in strain NCTC 9343, giving a total of 28 divergent loci among the three strains.