

IN BRIEF

TECHNIQUES AND APPLICATIONS**Single-molecule force spectroscopy and imaging of the vancomycin/D-Ala-D-Ala interaction**

Gilbert, Y. *et al. Nano. Lett.* 23 Feb 2007 (doi:10.1021/nl0700853)

Reporting in *Nanotechnology Letters*, Yves Dufrene and colleagues describe a method that uses atomic force microscopy (AFM) to measure the dynamics of antibiotic–ligand interactions on the surfaces of live bacteria. AFM measures the forces within and between single molecules with nanometre accuracy. Vancomycin, which blocks bacterial cell-wall synthesis by binding to peptidoglycan molecules terminating in D-Ala-D-Ala, was covalently bonded to gold AFM tips and used to pinpoint peptidoglycan ligands on *Lactococcus lactis* cells. Vancomycin binding sites mapped to the *L. lactis* septum, indicating that this is the main site of peptidoglycan insertion. Results were consistent with those obtained using fluorescently labelled vancomycin but the AFM technique can reveal single molecule distributions, which could be useful for elucidating the architecture and assembly of the bacterial cell wall.

CELL BIOLOGY**Retroviruses can establish filopodial bridges for efficient cell-to-cell transmission**

Sherer, N. M. *et al. Nature Cell Biol.* 9, 310–315 (2007)

HIV-1 and HTLV can move by virological synapses between immune cells, an efficient mode of infection. Using a suite of fluorescently labelled viral and cellular proteins and a labelled cell receptor, Sherer *et al.* show that fully formed murine leukaemia virus (a retrovirus) moves from cell-to-cell using filopodial bridges named viral cytonemes. These bridges are formed by the membrane of the target cell but only when target-cell filopodial projections contact a host cell expressing viral envelope proteins. The presence of caveolin and dynamin at cytoneme tips indicates that cytonemes enter target cells by endocytosis. HIV and the avian leukosis virus were also shown to move from cell-to-cell using viral cytoneme bridges. Morphology of virus transmission indicates that viral cytonemes and synapses are distinct mechanisms of virus cell-to-cell spread. Virus movement can be seen in the excellent movies that accompany the paper.

MICROBIAL ECOLOGY**Quantitative phylogenetic assessment of microbial communities in diverse environments**

von Mering, C. *et al. Science* 315, 1126–1130 (2007)

Metagenomics identifies the organisms that are present in a community by directly sequencing DNA isolated from the environment, and can provide valuable information about community functions. In a new twist on the metagenomics theme, researchers in Peer Bork's laboratory extracted a set of 31 protein-encoding marker genes from four metagenomics datasets. They used these genes to determine the taxonomy of community bacteria by referring to a reference tree of completely sequenced organisms. This method proved more accurate than sampling rRNA sequences alone, and the main outcomes of this labour-intensive approach to taxonomic profiling are that organisms are only distantly related to laboratory-cultivated organisms, that some communities evolve faster than others and that many organisms remain associated with a specific habitat for long periods of time.