THIS MONTH IN *NATURE BIOTECHNOLOGY*

Specific plant–bacteria interactions

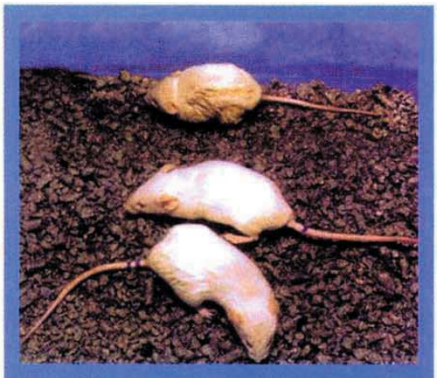
Plant interactions with root-colonizing bacteria are highly specific—different strains induce the plant to produce specific classes of low molecular weight opine, which the bacterium in turn can catabolize. *Lotus corniculatus*, engineered to release opines, such as mannopine and nopaline, had higher numbers of *Pseudomonas* that specifically catabolize these opines in their rhizospheres than control plants (see p. 363). When two near isogenic strains of *Pseudomonas fluorescens* are coinoculated onto transgenic tobacco (which exudes agropine into its rhizosphere) the agropine-utilizing strain accumulates on the roots of the plants at a higher density (see p. 369). These reports support the "opine" concept, which states that the bacterium can use only those opines that are produced by the plant it colonizes.

NO synthase binding peptides

Various protein modules, such as the Src homology domains, are responsible for specific intracellular protein–protein interactions. The PDZ domain has been implicated in intracellular targeting of a variety of proteins, including neuronal nitric oxide synthase, which produces the signaling molecule nitric oxide (NO). The nature of the specificity of binding mediated by the PDZ domain has been examined using a powerful combinatorial approach (see pp. 319 and 336) that allowed the authors' to screen 13 billion peptides by fusing them to the carboxyl terminus of the Lac repressor. A peptide was identified that binds specifically with nanomolar affinity and differs from other known PDZ-binding motifs. The binding sequence was used to identify potential binding partners present in a sequence database.

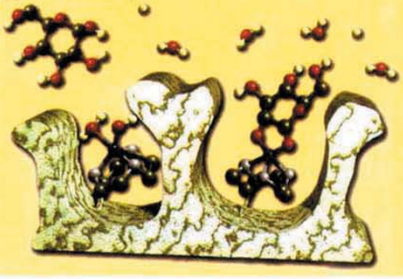
Multiple fluorescence labeling

Traditional methods for distinguishing markers used in fluorescence microscopy are limited by the overlap of emission spectra of the more useful fluorophores. A method for measuring fluorescence lifetimes based on a fluorophore's relaxing properties may allow resolution of multiple fluorescent labels simultaneously (see p. 373). Confocal microscopy using combinations of antisera conjugated with various fluorophores, which were measured by their lifetimes, demonstrated that the calcitonin gene related peptide and galanin are co-localized to the axon terminals of the dorsal horn in rats.



Of the three genetically identical mice, one is healthy, one has induced diabetes and one has diabetes but has been treated with encapsulated pancreatic islets using novel alignate polymers (see p. 358).

Commercially available enzyme-based sensors for diabetes have the disadvantages of being expensive and subject to interference from inhibitors present in the sample being assayed. A new sensor for diabetes has now been designed. Molecular imprinting was been used to produce a polymer whose optimized binding sites release protons in response to the concentration of glucose (see pp 322 and 354).



Fusion-stage inhibitor of HIV

With the identification of coreceptors required for HIV cell targeting (fusin, CKR-5), there has been renewed interest in identifying compounds that will block the fusion of HIV to its target cell. By screening a small molecule library for compounds that block this specific phase of the viral life cycle and expanding upon the lead compound, a novel bis(disulfonaphthalene) dimethoxybenzene, FP-21399, which blocked fusion of HIV-1 with CD4+cells and viral entry, was identified (see p 343). In a SCID mouse model, reconstituted with a human immune system, the mice were spared infection relative to the control group. Furthermore, like HIV, FP-21399 accumulates in the lymph nodes, enhancing its therapeutic potential.

Antibiotic synthesis in *Streptomyces prisinaespiralis* follows a complex biosynthetic pathway, which produces unwanted by-products. By using a stable integrative vector, a strain has been engineered that converts the unwanted precursor molecule into the fully active antibiotic species. (see pp. 321 and 349).

Discriminating probes

One of the limitations to hybridization-related DNA assays is identifying single mismatches, as these do not always produce a quantifiable difference in the stability of the DNA duplex. By introducing artificial mismatches, using the 3-nitropyrrole base analog, into the probes at a specific site, a threefold difference between T_m measurements for a perfect match and for a one-base mismatch could be obtained (see pp. 318 and 331). This modification is adaptable to high-throughput chip technology, making the identification of single-base mismatches present in large gene sets feasible.

Protective GEMs

Although microorganisms can be isolated that collectively have the ability to clean up polluted environments, genetically engineered microorganisms (GEM) are often more effective than these consortia. Using a laboratory-scale sewage plant, genetically engineered pollution degrading microbes were shown, not only to increase the rate and extent of introduced toxic phenol mixtures, but also to protect the endogenous eukaryotic microbial population (see p 378).

Research Briefs written by Emma Johnson.