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Tapping the potential of brewer's yeast

Sulfite production, which stabilizes beer flavor, is inhibited by the accumulation of methionine intermediates in the yeast sulfur assimilation pathway. Despite the alloploid and polyploid nature of brewer's yeast Hanse and Kielland-Brandt of the Carlsberg Research Laboratory (Copenhagen, Denmark) have been able to knock out all copies of the sulfite-reductase-encoding gene *MET10* without introducing any foreign DNA sequences (see p. 1542 and p. 1587), resulting in increased sulfite accumulation. Beer brewed using this strain had sulfite levels 13–14-fold higher than beer brewed with a standard production yeast strain. This leads to better taste stability in forced aging stability experiments.

IMAGE UNAVAILABLE FOR COPYRIGHT REASONS

Two different approaches to adenovirus-mediated transduction are reported: One to broaden the tissue range (see p. 1538 and p. 1570) by retargeting the vector to ubiquitous heparin-containing receptors; the other to make targeting more specific (see p. 1538 and p. 1574) by engineering cell-type specific vectors that redirect the infectivity to cancer cell lines expressing folate receptors.

Broad-spectrum viral resistance in plants

Potato crops are subject to a variety of viral infections that can severely limit harvest yields. Resistance strategies have not been forthcoming because of the difficulty of introducing foreign genes into the tetraploid genome as well as a lack of genes that confer hypersensitivity. Rohde et al. have adopted a novel strategy (see. p. 1597) using the movement protein from the potato leafroll virus. By introducing a transdominant defective movement protein in transgenic plants, resistance to a variety of viruses resulted from the protein's ability to interfere with systemic spread of the infecting virus.

To enable somatic deletion of a gene whose early loss would result in death during gestation, Herz et al. introduced loxP recombination sites into the low density lipoprotein receptor-related protein by homologous recombination in transgenic mice (see p. 1537 and p. 1562). The gene was specifically removed from the liver by injecting a Cre-recombinase expressing adenoviral vector into adult animals, resulting in long-term gene disruption in phenotypically normal mice.

Mammalian viral resistance genes in plants

Plants have been engineered to carry a mammalian antiviral system that affords broad-spectrum protection against plant viruses. By introducing the two genetic components of the interferon-induced mammalian antiviral 2-5A system into tobacco, Ishida and colleagues engineered resistance to cucumber mosaic virus (see p. 1538 and p.1566). Expression of 2',5' oligoadenylate synthetase (2-5Aase) and 2',5' oligoadenylate-dependent ribonuclease (RNase L) genes is activated by double-stranded RNA viral replication intermediates. Unlike mammalian cells, plant cells die when the 2-5A system is activated by viral infection, thereby preventing the spread of the virus to neighboring cells.

Rapid detection of intact microbes

Identification of microorganisms, particularly slow-growing pathogens like *Mycobacterium tuberculosis*, can require time-consuming culture and extraction steps. A group from Manchester Metropolitan University (Manchester, UK) have adapted MALDI-TOF mass spectrometry for the rapid identification of microorganisms taken directly from culture (see p. 1584), potentially eliminating the need for multiple diagnostic tests. Bacterial cells are either covered or mixed with matrix and dried, and then bombarded with a laser to produce spectra that are sufficiently distinctive, even in mixed culture samples, to serve as fingerprints for single organisms.

Rapid protein identification

Traditional protocols for identifying constituent proteins of purified cells or organelles require separation and sequence analysis of individual proteins, involving the laborious task of chemically sequencing multiple peptides of each protein. Using an integrated method of solid-phase extraction, capillary electrophoresis, and mass spectrometry, Figeys et al. have reduced the time needed for protein identification time to one hour (see p. 1544 and p. 1579). The extraction, electrophoresis, and mass spectrometry devices are physically integrated so that the sample moves directly from collection to analysis.

Antiviral "collision" screen

Antiviral drugs are designed to target any one of a number of points in a viral life cycle, including infection, replication, gene expression, and processing. Until now, inhibitors of viral transcription have been identified using screens that measure a decrease in transcription, but readouts from such assays may reflect nonspecific cytotoxicity, rather than "true" inhibition of transcription. A novel system described by Giese et al. (see p. 1540 and p. 1592) cleverly overcomes this problem using a "collision construct". Under normal conditions, the collision construct causes transcription from the HIV-1 promoter to downregulate expression from a cytomegalovirus promoter-driven reporter gene that is present in the opposite orientation. However, in the presence of a specific inhibitor, HIV-1 promoter-mediated transcription is inhibited and suppression of reporter expression is relaxed, allowing detection in a positive selection system.