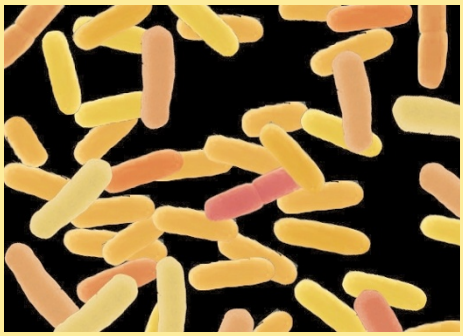
THIS MONTH IN *NATURE BIOTECHNOLOGY*



Two papers in this issue improve on nature by engineering carotenoid biosynthetic pathways. In the first, Albrecht et al. have transformed *Escherichia coli* with carotenoid genes from two other bacteria capable of inducing expression of diverse carotenoid structures. They thus provide *E. coli* with the enzymes necessary to produce phytoene (C_{40}), the universal starting compound for carotenoid synthesis. By introducing additional enzymes involved in the production of carotenoid intermediates, they obtained a diverse range of products, among them several unique acyclic hydroxyl-containing carotenoids. The superior antioxidant activity of these new carotenoids was demonstrated using a liposome–membrane model system (p. 843).

Taking an alternative approach, on p. 888, Mann et al. have engineered the tobacco carotenoid biosynthetic pathway to produce the marine compound astaxanthin, a red pigment of considerable economic and nutritional value because of its antioxidant properties. By introducing a β-carotene ketolase from the alga *Haematococcus pluvialis* into tobacco under the control of a gene promoter for flower petal expression, they succeeded in synthesizing astaxanthin from the endogenous β-carotene in the flower nectary. Astaxanthin and other ketocarotenoids accumulating in the flowers changed their color from yellow to red. (See also p. 825).

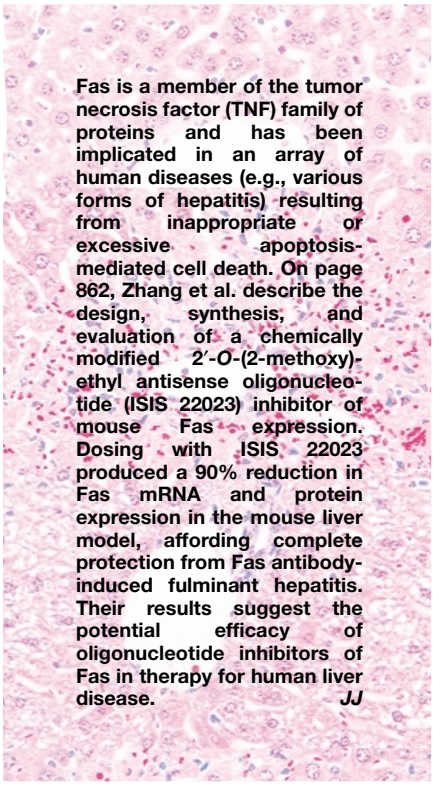
JJ

Cephalosporin biosynthesis

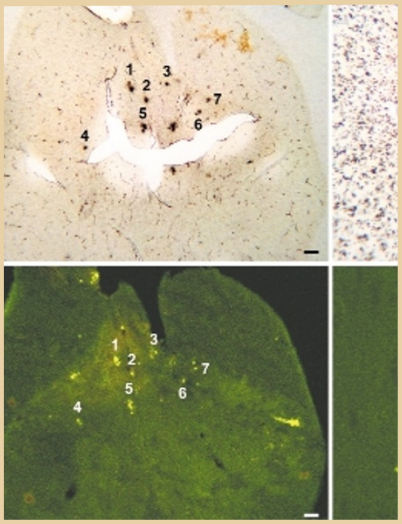
On page 857, Velasco et al. report an environmentally friendly and high-yield bioprocess for production of cephalosporin antibiotics. Currently, this class of antibiotics is produced by an expensive and environmentally harmful semisynthetic method. Previous attempts have failed to efficiently produce by fermentation deacetoxycephalosporin C (DAOC), a crucial intermediate in the production of semisynthetic derivatives of cephalosporins. But Velasco et al. got around these problems by deleting the *cefEF* gene in the industrial fungal strain *Acremonium chrysogenum* and replacing it with the bacterial *cefE* gene that can produce high yields of DAOC, a starting material for production of 7-aminodeacetocephalosporanic acid (7-ADCA), from which all derivatives of cephalosporins are manufacured. *MS*

Peptide vaccine on display

On page 873, De Berardinis et al. show that bacteriophage can be used to display peptide epitopes capable of inducing both cytotoxic T-cell (CTL) and T-helper cell responses. Previous attempts to prime CTL responses using synthetic peptides recognized by CTLs or T-helper cells have been stymied by poor immunogenicity and antigen processing. In their study, De Berardinis et al. display thousands of copies of a peptide derived from HIV-1 reverse transcriptase (RT2) on the surface of bacteriophage fd. The epitope-displaying phage were able to prime a CTL response specific for the peptide in both human cell lines and mice. The ability to stimulate both arms of the immune system suggests the technique may be useful in vaccination strategies. *ND*



Fas is a member of the tumor necrosis factor (TNF) family of proteins and has been implicated in an array of human diseases (e.g., various forms of hepatitis) resulting from inappropriate or excessive apoptosis-mediated cell death. On page 862, Zhang et al. describe the design, synthesis, and evaluation of a chemically modified 2′-*O*-(2-methoxy)-ethyl antisense oligonucleotide (ISIS 22023) inhibitor of mouse Fas expression. Dosing with ISIS 22023 produced a 90% reduction in Fas mRNA and protein expression in the mouse liver model, affording complete protection from Fas antibody-induced fulminant hepatitis. Their results suggest the potential efficacy of oligonucleotide inhibitors of Fas in therapy for human liver disease. *JJ*



Alzheimer's disease (AD) can currently be diagnosed conclusively only after death by observing the characteristic neurofibrillary tangles and plaques in brain sections. Methods that would allow the accurate detection of amyloid β-protein (Aβ) accumulation in the living brain of Alzheimer's patients early in the disease are needed to allow early pharmaceutical interventions that reduce Aβ formation and retard or even prevent the disease. Now, Wengenack et al. report on a promising technique for imaging Aβ in the living brain. They show that ^{125}I-labeled Aβ crosses the blood–brain barrier (BBB) and labels brain Aβ deposits both in living mouse models and in human AD brain sections. Furthermore, they enhance the radiolabel's ability to cross the BBB by linking it to the polyamine putrescine (see pp. 868 and 825). *JJ*

This Month in Nature Biotechnology written by Natalie DeWitt, Judy Jamison, Andrew Marshall, and Meeghan Sinclair.