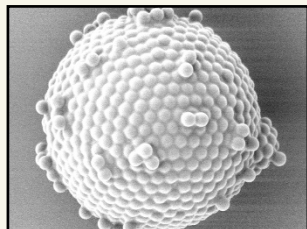


## Designer coatings



Mix oil, water, and colloidal particles to taste, shake well, then process using a special recipe. The result is not mayonnaise, but colloidosomes—a new type of microscopic capsule that may be able to deliver therapeutic proteins and cells as well as food flavorings and nutrients, according to new work reported in the November 1 issue of *Science* (298, 1006–1009, 2002). In the new process, researchers forced colloidal particles in an oil solution to self-assemble on the interfaces of microscopic water droplets, creating hollow,

elastic shells that could then be separated into an aqueous solution. Compared with other encapsulation systems, such as liposomes, “an advantage of this technique is that you can use any sort of [colloidal] particle you like,” says Anthony Dinsmore, assistant professor of physics at the University of Massachusetts (Amherst, MA) and first author on the new study. By modifying the chemistry of the particles, the researchers were able to generate colloidosomes with a variety of pore sizes and elasticities. As both the inside and outside of a colloidosome can be chemically engineered, the researchers hope the system will be useful for isolating cell-based therapies from the immune system, or allowing the slow release of therapeutic proteins in the bloodstream. Meanwhile, food scientists are hoping to encapsulate nutritional supplements in colloidosomes to make enriched foods tastier. AD

## Making tracks

Bacteria can be trained to deposit polymer tracks on cellulose chips, using a new technique invented by Japanese and American microbiologists. These researchers exploited the ability of *Acetobacter xylinum* to propel itself along a surface by synthesizing cellulose, which it expels behind it as it moves. In nature, the bacterium follows a random path, often in spirals, leaving a narrow cellulose ribbon in its wake. But the microbiologists—at the Forestry and Forest Products Research Institute (Tokyo, Japan) and the University of Texas (Austin, TX)—placed *A. xylinum* on a so-called “nematic ordered cellulose” (NOC) surface, which consists of glucan molecules oriented in a specific direction. Interaction between the glucan’s hydroxyl groups and the cellulose fiber synthesized by the bacterium causes the organism to travel in a straight line parallel to the glucan chains. The result is a long, straight cellulose ribbon, about 600 nm wide, formed of 3.5-nm-wide microfibrils epitaxially laid on the surface (*Proc. Natl. Acad. Sci. USA* 99, 14008–14013, 2002). The researchers say that, by setting the bacteria to work on a suitable surface template, they could make functional biopolymers with purpose-designed nanostructures. Ultimately, genetically modified bacterial strains might be developed to lay down other species of polymer ribbons, such as sugar polymers. PM

Research News Briefs written by Alan Dove, Andrew Marshall, and Peter Mitchell.

## Reforming neural connections

Once brain neurons of the visual system have matured (typically at age seven in humans), they become unresponsive to changes in visual experience. Defects corrected after this critical threshold age generally do not result in restoration of sight because neurons cannot form the requisite connections. Now, a collaboration of Italian and UK researchers led by Tommaso Pizzorusso of the Scuola Normale Superiore in Pisa, Italy, have found a way of restoring the plasticity of neurons by breaking down the chondroitin sulfate proteoglycan (CSPG) that surrounds neurons in the cortex of the brain (*Science* 298, 1248–1251, 2002). Seven days after the injection of the bacterial enzyme chondroitinase ABC, rats that had one eye occluded exhibited a pronounced restoration in neuron plasticity; in contrast, control animals with occluded eyes showed no change in neuronal plasticity. The authors propose that the enzyme may dissolve CSPG in the visual cortex, allowing neurons to grow into the resulting spaces and create new connections as they do in young brains. Although preliminary, the approach shows promise for the development of therapeutics for sight defects that develop in adults. Kevin Fox and Bruce Caterson of Cardiff University, UK, caution, however, that “chondroitinase treatment [may] facilitate invasion of the cerebral cortex by glial tumor cells, a possible detrimental side effect.” AM

## Algal chloroplast sequence

In the November issue of *Plant Cell* (14, 2657–2658, 2002), a collaboration between researchers at the Boyce Thompson Institute (Ithaca, NY), Pennsylvania State University (University Park, PA), and Duke University (Durham, NC) reports the chloroplast genome sequence of the single-celled algae *Chlamydomonas reinhardtii* (<http://bti.cornell.edu/bti2/chlamyweb/>). Availability of the chloroplast genome for the alga, which is an important model for studying photosynthesis, should provide insights into carbon fixation and metabolism in crop plants. A companion paper (*Plant Cell* 14, 2681–2706, 2002) analyzing global gene expression of the alga’s chloroplast and mitochondrial transcriptomes shows that transcriptional changes in genes involved in RNA processing and translation initiation occur in response to phosphate and sulfur limitation. Compared with other chloroplast lineages, the *Chlamydomonas* sequence exhibits a relatively high rate of gene loss and numerous short, dispersed repeat sequences. Work on the organism’s nuclear genome is underway at the Department of Energy’s Joint Genome Institute (Walnut Creek, CA) and Stanford University, CA. AM

## HSV tackles cancer pain

Herpes simplex virus (HSV) gene therapy vectors could provide a new means of delivering therapies targeting chronic pain associated with cancer. A team headed by Joseph Glorioso and David Fink of the University of Pittsburgh School of Medicine (Pittsburgh, PA) has succeeded in significantly reducing pain associated with bone tumors in mice (*Ann. Neurol.* 52, 662–665, 2002). HSV vectors have been used previously to modify peripheral neuron responses to acute nociceptive pain, but their efficacy in models of cancer pain was unknown. The Pittsburgh team created an inactivated HSV that carried the human gene for proenkephalin, an inhibitory peptide neurotransmitter that blocks the transmission of pain impulses when released from nerve terminals in the spinal cord. Injection of HSV carrying the proenkephalin gene into the footpad of mice with tumors in a leg bone resulted in a significant pain reduction according to the authors. Although many established small-molecule analgesics are available, Fink believes the experimental therapy is worth further development in human trials: “Although we have many powerful medications to treat pain, unwelcome side effects of these drugs limit our ability to relieve the most severe painful conditions,” he says. AM