

EDITORS' CHOICE

edited by Gilbert Chin

CELL BIOLOGY

Pulling in the Catch

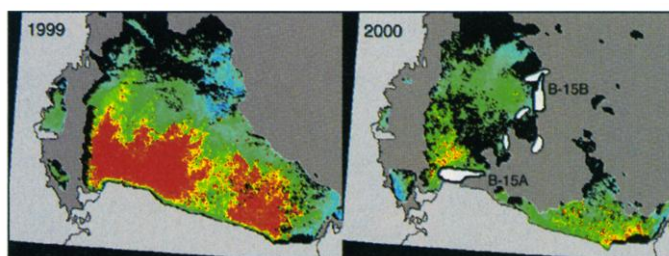
The correct targeting and fusion of vesicles is critical for the establishment and maintenance of organelles in the secretory pathway. In the Golgi complex, the protein p115 helps to target transport vesicles by promoting an interaction between two Golgin proteins: giantin on the transport vesicle and GM130 on the Golgi cisternal membranes. Using a cell-free system to look at Golgi membrane reassembly (as occurs after mitosis), Shorter *et al.* show that, in addition to promoting the long-range targeting activity of the Golgins, p115 also stimulates the subsequent protein interactions (underlying vesicle fusion) between a vesicle SNARE and a Golgi target SNARE. Furthermore, p115 contains a sequence motif that relates it to the SNAREs and that is important in promoting the SNARE interaction. Thus, the p115-induced transfer from long tethers (Golgins) to short tethers (SNAREs) may be critical in maintaining fidelity in membrane traffic. — SMH

J. Cell Biol. 157, 45 (2002).

NEUROSCIENCE

Interacting Drugs of Abuse

Behavioral sensitization—the repeated administration of psychostimulants that produces progressively greater behavioral responses—is an important factor involved in the acquisition and maintenance of compulsive drug-seeking behavior. Schoffelmeier *et al.* found that repeated exposure to nicotine boosted the psychomotor effects of nicotine and amphetamine. Administration of nicotinic receptor antagonists together with amphetamine or cocaine during



Reduction in chlorophyll *a* (phytoplankton) concentrations (red, high; blue, low; gray, pack ice).

to document the potential for large icebergs to alter the dynamics of marine life. The B-15 iceberg restricted the northwestward drift of pack ice in the southwestern Ross Sea, one of the most biologically productive regions in the Antarctic, thereby reducing both the area of open sea available for phytoplankton growth and the length of the growing season. Productivity fell more than 40% below normal, changing the feeding behavior of upper trophic level organisms such as the Adélie penguins that nest at Ross Island. If climate warming were to decrease the stability of Antarctic ice shelves, leading to more frequent calving of large icebergs, the ecology of wide areas of the coastal ecosystem could be affected. — HJS

Geophys. Res. Lett. 29, 10.1029/2001GL014160 (2002).

pretreatment blocked the development of long-term behavioral sensitization. The sensitization induced by nicotine, amphetamine, or cocaine correlated with increased nucleus accumbens dopamine release *in vitro*, and the long-term sensitization of nucleus accumbens neurons could be averted by nicotinic receptor antagonists. Thus, nicotinic receptor blockade prevents the induction of behavioral sensitization as well as the development of neurochemical sensitization of mesolimbic dopamine neurons, suggesting that the development of behavioral sensitization and addiction involves long-term alterations in neuronal function in the mesocorticolimbic system. — PRS

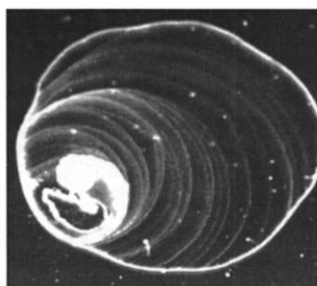
J. Neurosci. 22, 3269 (2002).

CHEMISTRY

Drying Droplets

When a drop of liquid evaporates from a substrate, entrained particles will accumulate at the drying front, a phenomenon observed in coffee spills. In addition to the thick ring at the outer edge, a series

of thinner concentric rings will sometimes form within. Shmuylovich *et al.* studied the evaporation of two sizes of latex particles suspended in wa-



Multiple rings from a drop of 11 mm in diameter, containing 0.88-mm particles.

ter. The larger latex particles required a larger minimum drop volume for inner ring formation to occur, and, for the same drop size, fewer rings were observed. The authors propose that these rings are produced by slip-stick motion of the evaporation front as it passes over particles that are pinned to the substrate from the outset and that the process is essentially stochastic, in contrast to previous theories. — MSL

Langmuir, 10.1021/la011484v (2002).

CLIMATE SCIENCE

The Iceberg Cometh

Large icebergs such as B-15 (295 km long and 40 km wide), which calved from the Ross Ice Shelf in March 2000, can change how rapidly pack ice is blown offshore. Not much is known, however, about the effects such events might have on the ecology of the surface waters. Arrigo *et al.* employ satellite imagery

BIOCHEMISTRY

Extracting Copper

In *Enterococcus hirae*, the *cop* operon encodes the copper chaperone CopZ and the transcription factor CopY. At low ambient copper, CopY binds Zn(II) and blocks expression of the entire operon; when copper is present, CopZ delivers Cu(I) to CopY, displacing Zn(II) and relieving transcriptional repression. The CopZ metal-binding domain is similar to those of two human proteins: the copper chaperone CCS and the copper-transporting ATPase MNK (mutation in which gives rise to Menkes' disease).

Cobine *et al.* show that CopZ carries Cu(I) in a mix of two- and three-coordinate states, partly exposed to solvent and thus susceptible to displacement by thiolate ligands of CopY. On the other hand, CopY binds its two Cu(I) atoms tightly in a solvent-shielded binuclear trigonal arrangement. Despite their overall structural similarity, the copper-binding domain of the Menkes protein, MNK2, cannot donate its Cu(I) to CopY in the same fashion as

CONTINUED ON PAGE 621

CopZ. Nevertheless, converting four surface residues of MNK2 to lysines enabled it to transfer copper, demonstrating that the key specificity determinant is electrostatic docking. This surface complementarity is reminiscent of the interaction between the chaperone CCS and its target, superoxide dismutase (mutations in which are linked to familial amyotrophic lateral sclerosis), as described by Lamb *et al.* — GJC

Biochemistry 10.1021/bi025515c (2002);
Nature Struct. Biol. 8, 750 (2001).

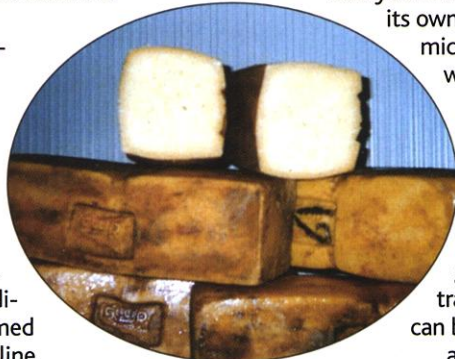
GEOCHEMISTRY

Prospecting for Copper

Porphyry ore deposits consist of valuable ore minerals, usually copper or gold, disseminated in a matrix of both small and large crystals of other minerals, usually quartz or feldspar. These hydrothermal deposits represent the last remnants of magmatic fluid to crystallize from a larger igneous intrusion. The concentration of metals such as copper is thought to be enhanced by the circulation of groundwater that transports these metals from the host rock.

Harris and Golding measured the hydrogen and oxygen isotopic concentrations of fluid inclusions and of quartz and sericite grains in a porphyry copper and gold deposit from the Goonumbla volcanic complex in Australia. The isotopic signatures indicate that the deposits formed from high-temperature, saline magmatic fluids and that no groundwater circulation was involved. Thus, as has been shown at some other porphyry deposits, the gold and copper metals are coming solely from the magma, and their formation temperature is higher than expected. This revised model for porphyry ore formation may help economic geologists recognize new deposits. — LR

Geology 30, 335 (2002).



Ragusano cheese. hazardous, harboring malignant species such as *Listeria monocytogenes*.

Randazzo *et al.* have examined the succession of microbes growing in Sicilian Ragusano cheese (a pasta filata cheese like Italian mozzarella and Romanian cașcaval). The raw milk contained microbes originating from the cows and the local environment; these were largely eliminated by cooking the curd, except for *Streptococcus thermophilus*, which subsequently performed the lactic fermentation. Thermophilic lactobacilli flourished during cheese ripening, with enterococci appearing in increasing numbers. After 15 to 30 days, the cheese community had apparently stabilized. This profile could be used not only for safety and quality assessment, but also for the controlled production of full-bodied products, acceptable to the fussiest of cheese lovers. — CA

Appl. Environ. Microbiol. 68, 1882 (2002).

use in quantum computing. However, the short dwell times of the atoms within cavities (typically fractions of a millisecond) are a serious limitation. Fischer *et al.* show that a feedback mechanism can be used to keep an atom in the cavity about 30% longer than conventional constant-intensity light-trapping potentials permit. As the atom enters the cavity, the interaction between the atom and the light field is monitored. When an atom is detected, the intensity of the light is dynamically adjusted so that the trapping light field momentarily puts the brakes on atom motion in the cavity. In this setup, the same laser detects and manipulates the atom; further improvements are anticipated by splitting these functions between two lasers. — ISO

Phys. Rev. Lett. 88, 163002 (2002).

FOOD SCIENCE

Edible Ecosystems

Many of us know that cheese is the product of microbial fermentation, but few appreciate that we're eating a dynamic ecosystem. Each cheese has its own complex suite of microorganisms, whose industry contributes to the distinctive flavors and textures of artisanal cheeses so beloved by gourmands. But traditional cheeses can be nonuniform and potentially

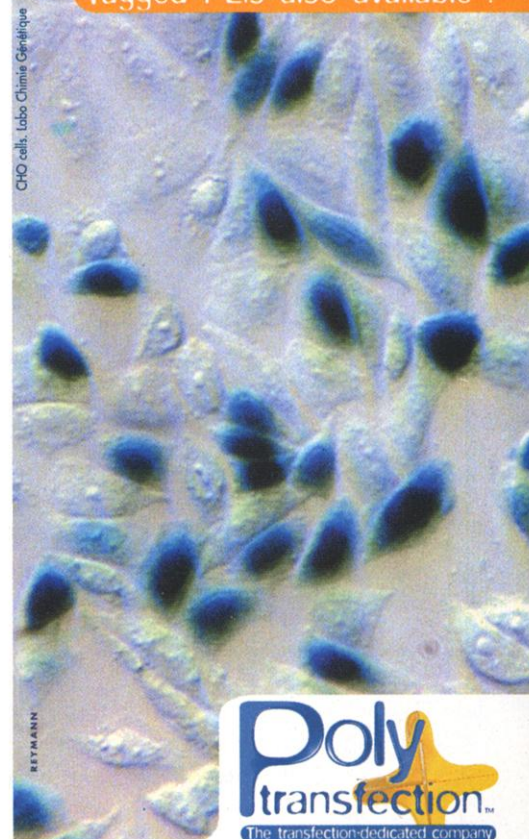


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