

chimpanzees exhibited approximately one extra mutation. This finding will inform future studies of primate evolution. — LMZ
Science, this issue p. 1272

QUANTUM GASES

Tilting just right makes atoms tunnel

One of the most fascinating phenomena in the quantum world is the ability of particles to go through an energy barrier — a process called quantum tunneling. Meinert *et al.* studied the dynamics of quantum tunneling in an optical lattice of strongly interacting atoms. When the lattice was suddenly tilted, the atoms, originally each in their own lattice site, tunneled to non-neighboring sites. — JS

Science, this issue p. 1259

CANCER IMAGING

Taking a broader view of cancer imaging

Many people think the best way to visualize tumors is to target imaging agents to specific cancers at the molecular level. Kuo *et al.* feel differently: They developed a new class of small molecules, called alkylphosphocholine (APC) analogs, which are broadly taken up by nearly all cancers, without such molecular specificity. Compared to normal cells, cancer cells have a strong taste for APC analogs. By attaching fluorescent

labels or radiolabels to the APC analogs, the researchers could image more than 50 different human cancers in animal models, as well as brain, lung, and liver tumors in human patients. These broadly applicable APC-based agents for imaging—and possibly for treatment—are now poised for further translation to clinical trials. — MLF

Sci. Transl. Med. **6**, 240ra75 (2014).

EARTH'S INTERIOR

Cycling water through the transition zone

The water cycle involves more than just the water that circulates between the atmosphere, oceans, and surface waters. It extends deep into Earth's interior as the oceanic crust subducts, or slides, under adjoining plates of crust and sinks into the mantle, carrying water with it. Schmandt *et al.* combined seismological observations beneath North America with geodynamical modeling and high-pressure and -temperature melting experiments. They conclude that the mantle transition zone—410 to 660 km below Earth's surface—acts as a large reservoir of water. — NW

Science, this issue p. 1265

CANCER METASTASIS

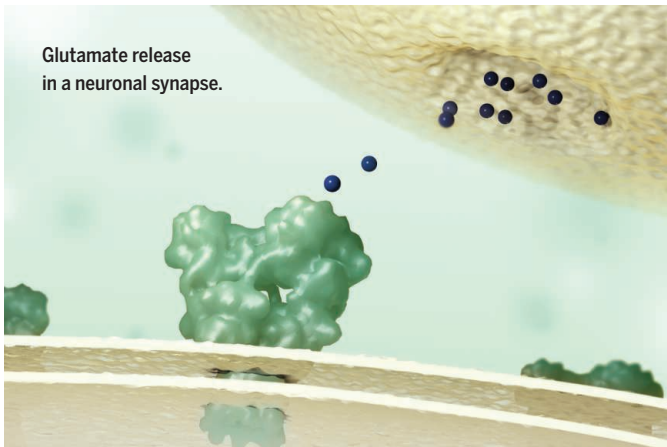
Copper for breast cancer metastasis

Many patients with breast cancer die from metastases, when cancer cells spread from the primary tumor to other sites. Some of the intracellular proteins that help cells move from one location to another can be activated by a chemical modification called oxidation. MacDonald *et al.* found that the enzyme Memo bound copper, enhancing the oxidation of proteins involved in cell movement. Mice with tumors formed from breast cancer cells that lacked Memo had fewer lung metastases, and human patients with breast cancers that had high levels of Memo were more likely to develop metastases. — WW

Sci. Signal. **7**, ra56 (2014).

IN OTHER JOURNALS

Edited by **Kristen Mueller**
and **Jesse Smith**



NEUROSCIENCE

Making excitatory synapses slow (or fast)

Glutamate is the most widely used neurotransmitter in the brain. Glutamate receptors in the mammalian brain are macromolecular complexes assembled from a pool of different proteins. Several proteins in these complexes, including cornichon homolog 2 (CNIH2), are known to influence the workings of certain glutamate receptors of the AMPA type, but their precise roles are unknown. Boudkazi *et al.* recorded synaptic transmission between hippocampal neurons and inhibited CNIH2 expression with small interfering RNAs to investigate the role CNIH2 plays at different synapses. They found that CNIH2 profoundly affected the timing of synaptic transmission—CNIH2 slowed things down, whereas its absence sped things up. Such careful kinetic regulation is necessary because speed is more important for some tasks, whereas reliability, the successful transmission of a signal across the synapse, is more important for others. — PRS

Neuron **82**, 848 (2014).

NEUROLOGICAL DISEASE

Skin may hold the key for Parkinson's

In Parkinson's disease, a degenerative movement disorder of the central nervous system, a protein called phosphorylated alpha-synuclein builds up in neurons, damaging the brain. The disease is hard to diagnose early or monitor over time because the protein builds up so slowly and so deep inside the brain. Doppler *et al.* now report that patient skin samples hold key insights. The authors detected phosphorylated alpha-synuclein in autonomic and sensory nerves found in the skin

samples in 16 out of 31 people diagnosed with Parkinson's disease and in 0 out of 35 healthy volunteers. Because skin is far more accessible than brain tissue, these observations could lead to diagnostic tests to identify and follow the progression of Parkinson's disease. — PJH

Acta Neuropathol. 10.1007/s00401-014-1284-0 (2014).

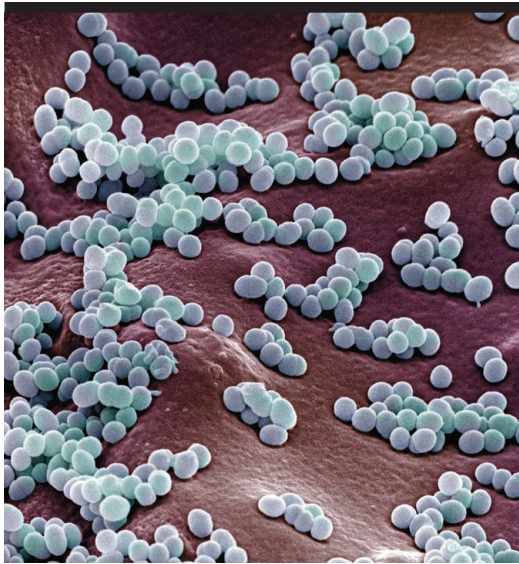
EDUCATION

Active learning: The twilight of Chem 101?

Should professors continue to use traditional lectures in



ILLUSTRATION: V. ALTOUNIAN/SCIENCE



BIOFILMS

Broad-spectrum bug biofilm buster

Imagine slime growing on your heart valves. Such infections, which happen all too often and are often deadly, can be eradicated by blocking stress responses in biofilm-producing bacteria—that is, fighting the bacteria's defenses. Unfortunately, however, there are no approved biofilm-busting drugs yet, so Fuente-Núñez *et al.* went looking for one. They knew that small positively charged synthetic peptides can stop biofilm formation in many antibiotic-resistant bacterial pathogens, such as *Staphylococcus aureus*, *Escherichia coli*, and *Salmonella*. When they performed a screening assay of small peptides, they found a candidate that acts on an important stress pathway. Bacteria use the pathway to synthesize the signaling nucleotide ppGpp. Without ppGpp, the bacteria have trouble forming biofilms and even staying alive. The candidate, peptide 1018, binds directly to ppGpp and degrades it, stopping deadly pathogens in their tracks. — CA

PLoS Biol. 10, e1004152 (2014).

The deadly pathogen *Staphylococcus aureus*.

undergraduate STEM (science, technology, engineering, and mathematics) classrooms? Freeman *et al.* performed a meta-analysis of 225 studies that evaluated how students performed in traditional lecture classes as compared to in courses with at least some active learning. Traditional lecturing led to a 55% increase in student failure rates, they found, whereas active learning increased examination performance by approximately half a letter grade. Besides supporting active learning as the preferred teaching format in science classrooms, these results call into question the practice of using traditional lecture courses as control groups in research studies that evaluate new teaching methods. — MM

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1319030111 (2014).

CELL METABOLISM

“Tricking” the body to burn calories

Activating immune cells in fat can convert tissue from white fat, which stores energy, to something resembling brown fat, which burns it. Until now, the only way known to “brown” white fat was with exposure to cold. In one of two new studies in mice, Qiu *et al.* found that activating macrophages, a type of immune cell, helps brown white fat. Meanwhile, Rao *et al.* found that

boosting levels of a hormone induced in muscle or after cold exposure helps activate the macrophages, brown fat, and improve glucose tolerance. The research opens up potential new strategies for tackling obesity and diabetes, because it could lead to ways of increasing energy expenditure. — JCF

Cell 10.1016/j.cell.2014.03.065 (2014).

Cell 10.1016/j.cell.2014.03.066 (2014).

RARE GENETIC DISEASES

A role for Mom's genes in Prader-Willi syndrome

Prader-Willi syndrome, a genetic disorder characterized by intellectual impairment, behavioral and learning disabilities, and other features, occurs in about 1 in 15,000 to 25,000 births. In most cases, the syndrome results when cells fail to express a part of chromosome 15 inherited from the father, but Steltzer *et al.* now show a maternal contribution as well. Cells taken from patients, they found, expressed higher amounts of genes from a specific section of chromosome 14, but only those genes inherited from the mother. The cells turned on those maternal genes by suppressing a long non-coding RNA and by modifying histones—proteins that regulate gene expression. Understanding what makes genes turn on and off inappropriately in individuals with

Prader-Willi syndrome may help illuminate the causes of this disease and point the way toward treatments. —BAP

Nat Genet. 10.1038/ng.2968 (2014).

ECONOMICS

Expertise: Sometimes blinding and costly

Experts trying to solve global challenges often call for new technologies and access to information, but they might do better to take a harder look at what they've been doing all along, to see whether they've missed some simple solution that could make a dramatic difference. Building on literature in economics and learning sciences, Hanna *et al.* studied Indonesian seaweed farmers and found that, despite years of experience that showed the importance of factors such as the spacing of pods during planting, the farmers hadn't noticed that adjusting pod size might be

useful as well. This work may help improve the way technologies and training are deployed, in agriculture and beyond. — BW

Q. J. Econ. 10.1093/qje/qju015 (2014)

ASTROPHYSICS

One shot for stardom and a clean sweep

In galactic regions experiencing lively bouts of star formation, we sometimes find tidy spheres of massive stars without residual gas. These young star associations offer astronomers an enhanced, dense environment in which to study star formation, quite unlike our own more sedate solar neighborhood. How these clusters formed has been a longstanding puzzle. Previous observational evidence suggested that a parent gas cloud could fragment into many cores, forming stars that energize and sweep away the remaining gas. Banerjee and Kroupa have now reproduced

the central young cluster in NGC 3603 with a simulation involving just one episode of star birth, supporting that hypothesis. According to the authors, this scenario can explain the formation of clusters such as the Pleiades and Orion as well. — MMM

Astrophys. J. 787, 158 (2014).



Underwater Indonesian seaweed farmer.