

that converts CO₂ into CO, which reacts more readily with hydrogen to make methanol. This result takes a step forward in innovating catalysts for this environmentally friendly process. — PDS

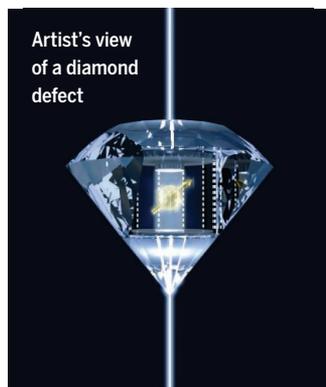
Science, this issue p. 546

QUANTUM INFORMATION

Toward quantum teleportation on demand

Quantum information processing relies on the ability to store, manipulate, and propagate information encoded in quantum states of matter. Doing so, however, may destroy or compromise these delicate quantum states. Pfaff *et al.* present a quantum teleportation protocol that uses two defects in diamond 3 m apart (see the Perspective by Atatüre and Morton). They then map the quantum state of one of the diamond defects onto the other. The work presents a key building block for the successful development of larger quantum networks. — ISO

Science, this issue p. 532; see also p. 510



Artist's view of a diamond defect

CANCER

Preventing drug resistance in breast cancer

Some patients with breast cancer respond to therapy with trastuzumab, but many later develop resistance. Breast tumors often lack SIRT6, which encodes an enzyme that is a tumor suppressor. Thirumurthi *et al.* found that the kinase AKT phosphorylated SIRT6, triggering a chain of events that breaks it down. Patients whose breast tumors had

high SIRT6 levels and low AKT levels had higher survival rates. Preventing SIRT6 from being degraded or phosphorylated made resistant breast cancer cells less resistant to trastuzumab, suggesting that high SIRT6 may improve therapeutic responses in patients. — LKF

Sci. Signal. **7**, ra71 (2014).

CELL BIOLOGY

New tools for sorting good and bad fat cells

There's "good fat" and there's "bad fat." Brown adipose tissue is considered "good" because it burns calories and could thus be harnessed to combat obesity. When brown fat cells develop within "bad" white fat, the tissue is called "beige." Ussar *et al.* developed tools for imaging these cell subtypes or targeting drugs to them. The authors identified three protein markers of white, beige, and brown fat cells—ASC-1, PAT2, and P2RX5—which they selected using computational methods, confirmed in mice, and then verified in human adipose tissue. The proteins sit on the cell surface, making them especially useful for imaging tissue and guiding drugs. — MLF

Sci. Transl. Med. **6**, 247ra103 (2014)

NOVAE

Gamma-ray novas may be garden variety

When astronomers detected gamma rays from the nova V407 Cyg, an explosive mass transfer from a red giant onto a white dwarf, they found it surprising enough. They blamed the rays on strong stellar winds enabling particle acceleration. Now, the Fermi-LAT Collaboration has observed gamma rays from three more novas, all lacking the strong winds. Although the three sources vary slightly in nature, none is particularly unusual. If all novas emit gamma rays, then astronomers would expect to see the same number of novas that they did in fact see within a 5-kpc distance over 5 years. — MMM

Science, this issue p. 554

IN OTHER JOURNALS

Edited by Kristen Mueller and Jesse Smith



Foxtail millet survives in high salt conditions

ABIOTIC STRESS

How plants survive (salt) stress

Foxtail millet, a grain crop cultivated in China since the sixth century BC, tolerates high salt concentrations well. All land plants produce proteins called remorins, several of which help plants respond to abiotic (environmental) stress. To determine whether foxtail millet uses remorins to help protect it from excess salt, Yue *et al.* first identified 11 remorin genes in this plant. When the plants grew in salty soil, they produced a remorin called *SiREM6*. Engineering *Arabidopsis* plants to express *SiREM6* allowed the plants to survive better in salty conditions. Their advantage increased with the salinity: While brackish water killed normal *Arabidopsis* plants, *SiREM6*-expressing plants survived. — PJH

PLOS ONE **9**, e100772 (2014).

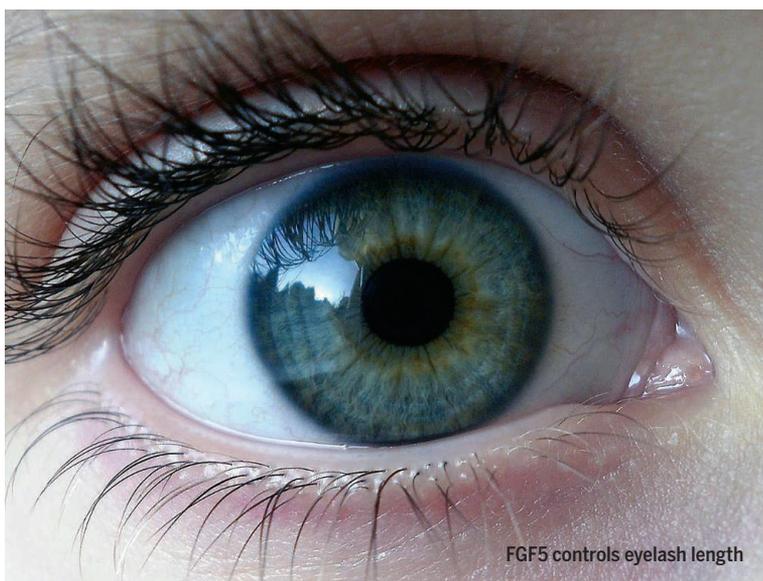
COGNITIVE PSYCHOLOGY

Developing a judgment of confidence

When you place a bet, you need to estimate your chance of winning, and you also need to know the accuracy of your estimate. That is, when the odds appear to be in your favor, but you're not entirely sure, you'll make a smaller wager than when you're rock-solid certain. Adults who are good judges of their own accuracy tend to be better at

problem-solving, regulating their emotions, and thinking critically, among other skills. Vo *et al.* wondered whether this also holds true for children. The authors found that 5- to 8-year-old children are pretty good at making judgments about their accuracy when it comes to estimating quantities, but they don't evaluate themselves as well when comparing facial emotions. — GJC

Psychol. Sci. **25**, 10.1177/0956797614538458 (2014).



FGF5 controls eyelash length

DEVELOPMENT

The long and short of hair growth

The length of your eyelashes probably differs from the length of the hair on your head—and unlike your hair, your eyelashes can never reach your shoulders. What controls how long hair can get? To find out, Higgins *et al.* studied people with a rare disorder called familial trichomegaly, who have very long eyelashes and longer hair on the arms. They found that these people had a mutation in the gene that encodes fibroblast growth factor 5 (FGF5). When human hair follicles produce FGF5, they stop growing hair. Targeting FGF5 could potentially control the growth and rest phases of hair follicles, preventing unwanted hair from sprouting or growing longer lashes and locks. — LC

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1402862111 (2014).

EDUCATION

Promoting evidence-based teaching

Empirical studies of science educational methods illuminate the best practices for getting students to learn. But why don't more science educators use such evidence-based teaching methods in their classrooms? They might not have access to the studies, DeChenne *et al.* report. The authors examined the role of practitioner-focused, discipline-based education research (DBER) journals in promoting and encouraging postsecondary teachers to adopt laboratory exercises supported by education research. Results showed a missed opportunity: DBER journals publish only a limited number of evidence-based instructional practices. — MM

J. Coll. Sci. Teach. **43**, 89 (2014).

ELECTRON TRANSFER

Electron tunneling or flickering resonance?

When electrons move from one site to another in biological molecules and the transfer drops off exponentially with distance, physicists usually assume they're seeing the electrons quantum-tunneling through energy barriers. A theoretical study by Zhang *et al.* provides

a different interpretation. Molecules with the right combination of sites, with energy levels that align fleetingly during structural fluctuations, can produce the same decay signature. These "flickering resonances" temporarily create a band-like state for the electron, and as more sites are involved (corresponding to longer distances), the probability of creating the resonance drops exponentially. This mechanism operates over scale lengths of up to about 15 angstroms and could explain the short-distance electron transfer between bases in DNA. — PDS

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1316519111 (2014).

MARINE BIOLOGY

Ship strikes threaten blue whale numbers

Whale-ship collisions may be behind low blue whale population counts despite international

protections. Irvine *et al.* used satellites to track 171 blue whales off California over 15 years. The whales, part of the eastern North Pacific population, returned each summer to krill-rich upwelling zones off Santa Barbara and San Francisco—areas also crossed by major shipping lanes. At least three blue whales were killed by ship strike during 2 weeks in 2007. But a similar problem in Canada's Bay of Fundy offers hope: Eleven years ago, its maritime industry moved a shipping lane and reduced speed limits, reducing the likelihood of vessels striking right whales by 80%. — VM

PLOS ONE 10.1371/journal.pone.0102959 (2014).

MICROBIAL PATHOGENS

How to make a not-so-painful ulcer

Buruli ulcer disease causes extensive skin lesions and can be deadly, but the lesions themselves don't hurt, which can stop patients from seeking the appropriate care. The pathogen *Mycobacterium ulcerans* causes Buruli ulcers and also alleviates the pain. Although many scientists studying

this disease thought the pathogen caused nerve damage that blocked the pain, Marion *et al.* now show that the mycobacteria produce the mycolactone toxin, which causes analgesia by blocking the function of pain-responsive nerves. The findings could potentially help researchers develop a whole new class of painkillers. — SMH

Cell **157**, 1565 (2014).

GEOPHYSICS

Ample explanation for seismic variation

Geophysicists use seismic waves to make images of Earth's interior, but how they interpret those pictures depends on the properties of the minerals that make up the mantle. Wu and Wentzcovitch show that when the electron configuration of the iron in one of the most abundant minerals in the mantle, ferroperrichite, changes at depths of 1000 km and greater, so does the way seismic waves propagate. The authors discuss several seismic features of the mantle previously thought to reflect different arrangements of minerals, such as compressional wave speed variations at depths of around 1750 km. Such features could be due not to mineralogy but to this electronic spin effect. — BG

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1322427111 (2014).



A blue whale killed by a ship strike