set of proteins required for a variety of functions, including chromosome organization and transcriptional control. But when INM proteins misfold, how are they eliminated? Foresti *et al.* addressed this question in yeast and found that a previously elusive branch of the endo–plasmic reticulum–associated degradation system was key (see the Perspective by Shao and Hegde). — SMH

Science, this issue p. 751; see also p. 701

EARLY UNIVERSE

A diffuse cosmic glow is not primordial

A cumulative map of all photons ever emitted by any star or galaxy is a highly desirable historical record of the universe's evolution. For this reason, cosmologists have sought to measure this diffuse distribution of light: the extragalactic background light. Zemcov *et al.* sent up a rocket to measure the fluctuations in this faint background and found large-scale fluctuations greater than known galaxies alone should produce (see the Perspective by Moseley). Stars tidally stripped from their host galaxies are the most likely culprit, rather than unknown primordial galaxies. — MMM

Science, this issue p. 732; see also p. 696

CREDITS: (LEFT TO RIGHT) TOSHIAKI ARAI; MEDICALRF/SCIENCE SOURCE

Rocket launch June 2013

NOROVIRUS

Bacteria help norovirus infect B cells

Stomach ache, nausea, diarrhea—many people know the sort of gastrointestinal havoc norovirus can wreak. Despite this, norovirus biology remains unclear, because human norovirus cannot be grown in culture. Jones *et al*. now report that with the help of bacteria, human norovirus can infect cultured B cells (see the Perspective by Robinson and Pfeiffer). To infect B cells, human norovirus required the presence of gut bacteria that expressed proteins involved in determining blood type. Mouse norovirus also infected B cells, and the treatment of mice with antibiotics protected them from norovirus infection. — KLM

Science, this issue p. 755; see also p. 700

EARLY EARTH

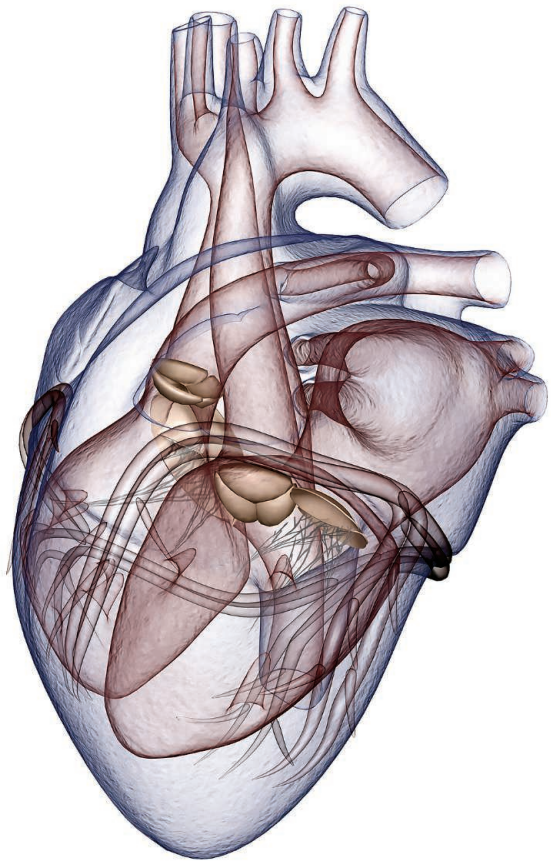
Dissecting ancient microbial sulfur cycling

Before the rise of oxygen, life on Earth depended on the marine sulfur cycle. The fractionation of different sulfur isotopes provides clues to which biogeochemical cycles were active long ago (see the Perspective by Ueno). Zhelezinskaia *et al.* found negative isotope anomalies in Archean rocks from Brazil and posit that metabolic fluxes from sulfate-reducing microorganisms influenced the global sulfur cycle, including sulfur in the atmosphere. In contrast, Paris *et al.* found positive isotope anomalies in Archean sediments from South Africa, implying that the marine sulfate pool was more disconnected from atmospheric sulfur. As an analog for the Archean ocean, Crowe *et al.* measured sulfur isotope signatures in modern Lake Matano, Indonesia, and suggest that low seawater sulfate concentrations restricted early microbial activity. — NW

Science, this issue p. 703, p. 742, p. 739; see also p. 735

IN OTHER JOURNALS

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



BIOMEDICINE

Disease biomarkers: What's the risk?

With approximately 60% of cardiac events occurring in patients of low or moderate risk, doctors need new biomarkers to accurately predict which of their patients will develop disease. Antibodies targeting the protein apolipoprotein A-1 (apoA-1), which plays a role in lipid metabolism, are one such candidate. Some of these antibodies may confer more risk than others, depending where on apoA-1 they bind. Using serum samples from cardiac patients, Teixeira *et al.* identified the peptides within apoA-1 where antibodies bound. These finding may point toward new therapeutic opportunities and improved biomarkers for predicting the risk of cardiovascular disease. — MDC

J. Biol. Chem. 10.1074/jbc.M114.589002 (2014).

EDUCATION

One scoring rubric to rule them all

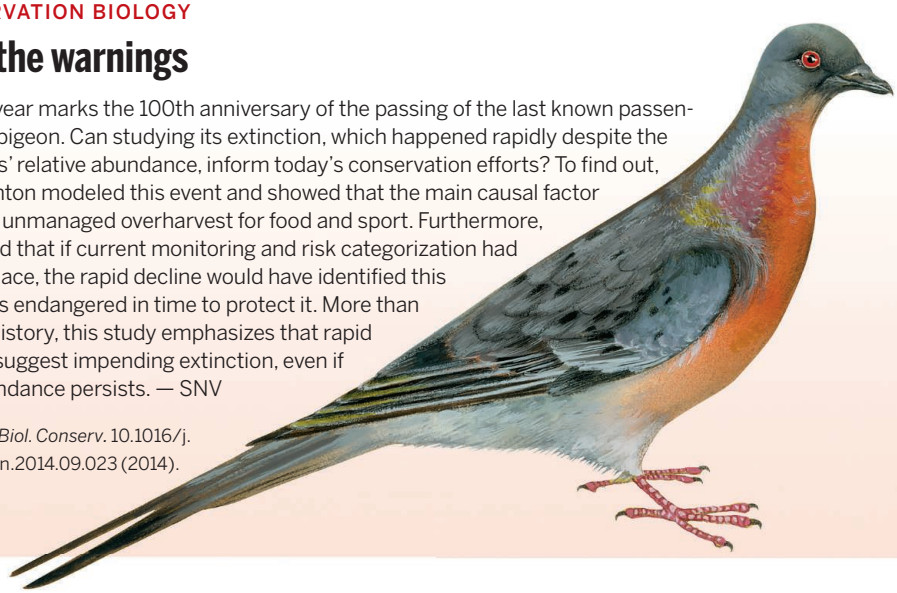
Evaluating the effectiveness of undergraduate STEM (science, technology, engineering, and mathematics) courses requires assessing teaching practices. This is largely done through student course evaluations, which often have not been administered or collected in a consistent manner. To standardize this process, Wieman and Gilbert developed a rubric that assigns points to each teaching practice for which there

CONSERVATION BIOLOGY

Heed the warnings

This year marks the 100th anniversary of the passing of the last known passenger pigeon. Can studying its extinction, which happened rapidly despite the birds' relative abundance, inform today's conservation efforts? To find out, Stanton modeled this event and showed that the main causal factor was unmanaged overharvest for food and sport. Furthermore, they found that if current monitoring and risk categorization had been in place, the rapid decline would have identified this species as endangered in time to protect it. More than just sad history, this study emphasizes that rapid declines suggest impending extinction, even if local abundance persists. — SNV

Biol. Conserv. 10.1016/j.biocon.2014.09.023 (2014).



is research showing that the practice improves learning. Although a potentially valuable tool for improving undergraduate STEM teaching, it will need to be periodically updated in order to incorporate the latest developments in teaching and learning research. — MM

CBE Life Sci. Educ. **13**, 552 (2014).

NEUROBIOLOGY

Diversity generates complexity in the brain

Complexity in the brain derives not only from having a lot of neurons but also from the different ways neurons connect. Neurexin proteins help to establish these connections, but they themselves complicate the picture. Alternative splicing adds diversity to neurexins' protein coding regions by creating mRNAs with different combinations of exons. This diversity broadens the range of molecules bound by neurexins and modulates when and where neurons express them. To get a complete picture of neurexin diversity, Schreiner *et al*. sequenced the many neurexin transcripts produced adult mouse brains. Although two types of neurexins made good use of the diversity available to them, a third neurexin barely scratched the surface of its options. — PJH

Neuron **84**, 386 (2014).

SURFACE CHEMISTRY

Charge control of silicon chemistry

A site on an organic molecule often can be made more or less reactive by changing its neighboring functional groups so that they add or withdraw electronic charge from the site. Piva *et al.* show a similar effect for the reaction of dangling bond states on a hydrogen-terminated silicon surface with unsaturated organic molecules such as styrene. They modified the electronic properties of the surface by changing the surface concentration of arsenic dopants and used scanning tunneling microscopy to monitor product formation. Negatively charged doubly occupied dangling bonds, which were more prevalent on the highly doped surfaces, were less reactive than neutral singly occupied dangling bonds. These results are consistent with density functional theory calculations and help explain the heterogeneous reactivity of dangling bonds on silicon surfaces. — PDS

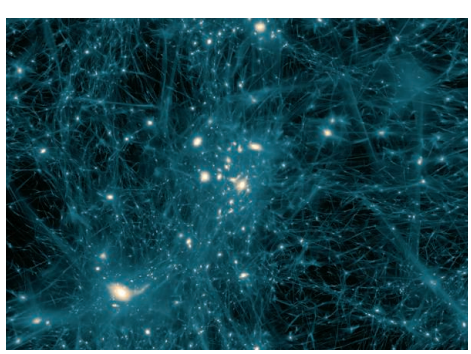
Phys. Rev. B **90**, 155422 (2014).

COSMOLOGY

Out with the WIMPs, in with the SIMPs?

Physicists seeking to identify dark matter—the stuff whose gravity may bind the galaxies—may have been stalking the wrong particle. The favorite candidate is the weakly interacting massive particle (WIMP), thought to have a mass between 1 and 1000 times that of a proton and interacting with each other and ordinary matter only through the weak nuclear force. But hypothetical strongly interacting massive particles (SIMPs) would do just as good a job at explaining the stuff, report Hochberg *et al*. They argue that dark matter could also consist of lighter particles that have a mass around one-10th of the proton and interact with one another very strongly, but with ordinary matter much more weakly than WIMPs. Strongly interacting dark matter would help resolve some differences between dark matter simulations and observed properties of galaxies. — AC

Phys. Rev. Lett. 10.1103/PhysRevLett.113.171301 (2014).



SIMPs would help reconcile observed properties of galaxies and models of dark matter distribution (shown).

GEOCHEMISTRY

Constructing geochemical geometry

Lavas erupted from oceanic hot spots have diverse chemistries that provide clues to the evolution of Earth's mantle. Jackson *et al.* develop a conceptual model of chemical variations within the mantle plume supplying the Samoan hot spot, by correlating geographic and geochemical variations in the erupted volcanic products. Lead and helium isotopes identify four distinct geochemical groups, all embedded in a common component that defines the mantle plume. The lens-like embedded materials appear to be isolated from one another, mixing only with the common component and creating compositionally distinct lavas in different spots along the Samoan hot spot track. — BG

Nature 10.1038/nature13794 (2014).

KIDNEY DISEASE

The dark side of protective genes

Aberrant antibody deposits in the kidney characterize immunoglobulin A nephropathy (IgAN), a disease most prevalent in East Asians. Kiryluk *et al*. studied the underlying genetics of IgAN and found that variants of genes with roles in maintaining the intestinal epithelial barrier or in the immune response to mucosal pathogens conferred an elevated risk of IgAN. People living in areas with the greatest diversity of helminthes showed the highest genetic risk for developing IgAN. This intriguing correlation suggests that the high incidence of IgAN in certain regions might be a consequence of protective adaptation to mucosal pathogens. — PAK

Nat. Genet. 10.1038/ng.3118 (2014).

Constructing geochemical geometry

Brent Grocholski

Science **346** (6210), 713-714.
DOI: 10.1126/science.346.6210.713-g