

Lis *et al.* used a microfluidics apparatus and a spectroscopy technique called sum frequency generation to study the effects of flow on aqueous chemistry at silica and fluorite surfaces (see the Perspective by Waychunas). The flow of fresh water along the surfaces disrupts the equilibrium of dissolved ions, substantially changing the surface charge and the molecular orientation of the water at the interface. — JSY

Science, this issue p. 1138; see also p. 1094

MEMBRANE BIOLOGY

How cells haul down their “eat me” flags

Dead and dying cells expose a membrane lipid called phosphatidylserine (PS) on their cell surface as a sort of “eat me” signal. Segawa *et al.* identified the membrane enzyme responsible for flipping any PS that inadvertently makes it way from the inner to the outer leaflet of the plasma membrane lipid bilayer. Without the enzyme, macrophages gobbled up healthy cells. — SMH

Science, this issue p. 1164

LUNAR FORMATION

An analysis of motes of the Moon maker

How did the Moon form? According to the prevailing hypothesis, a Mars-sized body known as Theia smashed into Earth. Herwartz *et al.* analyzed



The Moon shows evidence of past collisions.

PHOTOS: (TOP TO BOTTOM) © IMAGEBROKER/ALAMY; NASA

fresh basalt samples from three Apollo landing sites and compared them with several samples of Earth’s mantle. The oxygen isotope values measured in these lunar rocks differ significantly from the terrestrial material, supporting the giant-impact hypothesis. — MMM

Science, this issue p. 1146

QUANTUM INFORMATION

Electrical control of nuclear spin qubits

Quantum bits of information (qubits) that are based on spins of atomic nuclei are an attractive option for quantum information processing. It can sometimes be tricky to manipulate these qubits using magnetic fields directly. Thiele *et al.* developed a technique for electrically controlling a nuclear spin qubit in the single-molecule magnet TbPc₂. When they hit the qubit with a microwave pulse, the microwave’s electric field generated effective magnetic fields much larger than those available previously. — JS

Science, this issue p. 1135

PLANT BIOLOGY

ABA tells roots to stop and then grow

Plants initially grow a primary vertical root. The primary root then puts out horizontal lateral roots, which help to anchor the plant and take up water and nutrients from the soil. But to make the most of precious resources, plants use the hormone abscisic

acid to stop lateral roots from growing in times of drought. Zhao *et al.* found that after a time, plants resume lateral root growth. This process paradoxically also uses abscisic acid, which binds to a different receptor and triggers changes in the expression of genes involved in resuming lateral root growth. — JDB

Sci. Signal. **7**, ra53 (2014).

IN OTHER JOURNALS

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



Epiphytes like mosses and lichens cover trees in a South American forest.

PLANT ECOLOGY

Lichens provide a protective coat

Lichens help even out temperatures and moisture levels in foggy deserts, according to a pioneering study of epiphytes: plants that grow on the stems and branches of larger plants. Stanton *et al.* studied the ecological role of lichens, mosses, and bromeliads inhabiting host trees in fog-fed desert ecosystems in Peru and Chile. They removed epiphytes from the columnar cacti and trees they were growing on and created artificial cacti at the field site, which they covered with collected epiphytes. Epiphytes affected the microclimatic conditions around the host plant: Their presence reduced both the amount of water that reached the ground and the amount that evaporated from the soil. They also buffered daily temperature fluctuations. Epiphytes are abundant in tropical forest ecosystems and they may play a considerable role in cycling water and nutrients. — AMS

Funct. Ecol. **10.1111/1365-2435.12249** (2014).

ENDOCYTOSIS

Galectin-3 gives cells another way to eat

Like people, cells need to eat. They use a process known as endocytosis to take up materials from their surroundings. In the best-known type of endocytosis, the cell forms a protein coat that actively pinches off small vesicles from the cell surface. However, another type of endocytosis does not use these clathrin coats—so what does it use? Lakshminarayan *et al.* found that a carbohydrate-binding protein, galectin-3, caused the cells to produce a new, morphologically distinct class of endocytic

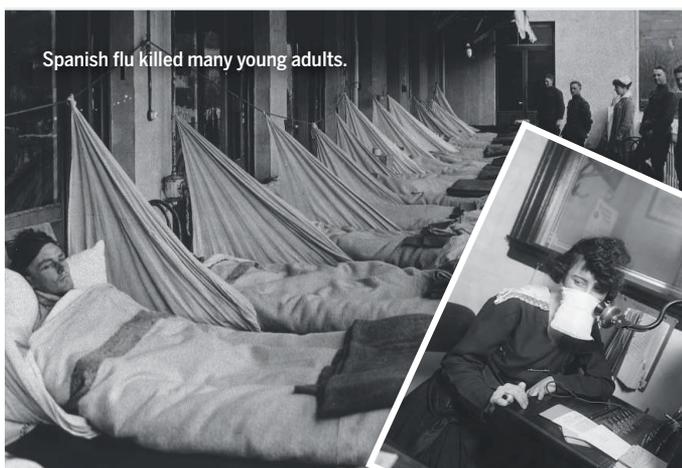
structures, termed clathrin-independent carriers (CLICs). The cell used this CLIC pathway to ingest a variety of cell-surface glycoproteins that help interacting cells to stick together and move around. — SMH

Nat. Cell Biol. **10.1038/ncb2970** (2014).

CHEMISTRY

A thinner window for shining light on shale gas

A light-powered chemical reaction ultimately could help turn shale gas into plastic. When hydrocarbons such as butane come out of the ground, the carbon atoms in each molecule are connected



Spanish flu killed many young adults.

VIRAL EVOLUTION

What made Spanish flu so deadly

The deadly pandemic Spanish flu of 1918 killed many millions, but unlike most flu strains, it targeted young adults rather than infants and the elderly. The reason remains a mystery. Worobey *et al.* used genetic and evolutionary approaches to infer that for much of the 19th century, a flu virus strain containing the same subtype of the hemagglutinin protein (H1) as the Spanish flu infected children. This gave them good immune protection from subsequent infections with H1-containing viruses. But from 1880 to 1900, the H3 subtype replaced H1 in circulating flu strains, and so people born between these times were less immune to H1. Around 1907, a novel H1-containing flu emerged, eventually becoming the deadly 1918 pandemic. With little protective immunity to H1, young adults exposed only to H3 subtypes during childhood suffered the greatest mortality. — CA

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1324197111 (2014).

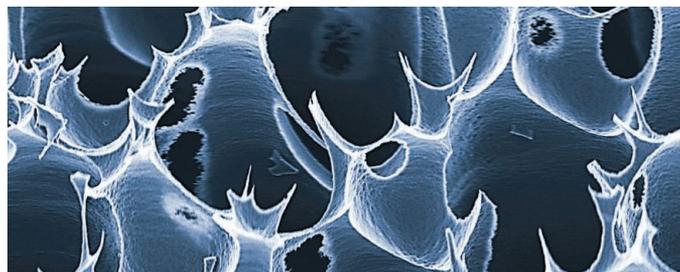
by single bonds. Chowdhury *et al.* show at small scale that a soluble rhodium carbonyl catalyst, activated by light, efficiently snips hydrogen atoms off the molecules to create the more reactive carbon-carbon double bonds needed to make products such as plastics. Past efforts to remove hydrogen photochemically without creating by-products tended to be inefficient, but the authors suspected that flask walls might have been partly responsible by blocking some of the light. Using thin-walled glass flasks and an additive that activated the catalyst, the authors achieved on the order of 100 turnover cycles per hour for a range of different hydrocarbons. — JSY

Angew. Chem. Int. Ed. 53, 10.1002/anie.201402287 (2014).

MATERIALS SCIENCE

Rupturing cells gently with a spiky membrane

Researchers need to rupture cells before they can analyze the proteins and nucleic acids inside, but they should do it as gently as possible. So *et al.* decorated silicon membranes with hierarchical layers of pointy spikes,



Ultrasharp silicon nanopikes for efficiently shredding cells.

using a single-step etching process. When they attached the membrane to the end of a syringe as part of a filter holder, the cells ruptured as the syringe pushed them past the membrane.

Compared to other techniques for breaking cells open, such as those based on chemical or acoustic methods, the spiky-membrane method provides higher concentrations of proteins and nucleic acids in a shorter time. Another plus: The membrane collects the debris from the cell, giving a cleaner solution. — MSL

ACS Appl. Mater. Interfaces 10.1021/am501221b (2014).

ECONOMICS

Public health insurance costs jobs?

What is the relationship between employment rates and access to public health insurance? Garthwaite *et al.* analyzed what happened in 2005, when the state of Tennessee discontinued Medicare health insurance coverage for about 4% of its non-elderly adult population, many of them nondisabled low-income adults without children at home. With a new need for private health insurance, which is often provided by employers, many of these people found new jobs. State employment rose by 6 percentage points from 2004 to 2006. This change mirrors the Congressional Budget Office projections of the decline in employment due to the expansion of public health insurance mandated in the U.S. Affordable Care Act. — GJC

Q. J. Econ. 129, 653 (2014).

GEOPHYSICS

An anti-earthquake cloak for buildings?

Scientists studying how to shield vulnerable buildings from destructive seismic waves are getting ideas from optics. Drawing on techniques for controlling the flow of light and electromagnetic radiation, Finnochio *et al.* show how to arrange resonators into mechanical metamaterials that could deflect seismic waves. In a large-scale field experiment, Brule *et al.* used a similar approach and placed engineered resonators in the ground. Their arrangement worked: When they generated seismic activity nearby, the resonators modified the energy's distribution, making it less destructive. — ISO

Appl. Phys. Lett. 104, 191903 (2014).
Phys. Rev. Lett. 112, 174302 (2014).

NEUROLOGY

Parenting Rewires the Male Brain

Women aren't the only gender hardwired for parenthood: Caring for children awakens similar brain circuits in men. Abraham *et al.* investigated two family types: mother-father couples with the mother as primary caregiver, and homosexual male couples sharing caregiving. The team videotaped parents and children together, then the parents underwent functional magnetic resonance imaging brain scanning. All showed activation of a "parenting network," including an amygdala-centered network that handles strong emotions and reward, and regions handling learning and experience. In the traditional couples, mothers showed stronger activation in the amygdala network and fathers in experience-dependent regions (amygdala activation was proportional to time spent with the baby). But activity in the homosexual fathers' brains mirrored the mothers' brain activity. — EN

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1402569111 (2014).

Science

Parenting Rewires the Male Brain

Elizabeth Norton

Science **344** (6188), 1129.

DOI: 10.1126/science.344.6188.1129-h

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