

## IN SCIENCE JOURNALS

Edited by Stella Hurtley



*Xanthomonas oryzae* disease  
lesions on rice plants

### PLANT PATHOGENS

## Rice is on the lookout for bugs

**X***anthomonas oryzae* (Xoo) is a serious bacterial pathogen that severely limits rice yields in Africa and Asia. Rice defends itself against Xoo and other bacterial pathogens by expressing a particular cell-surface immune receptor protein. Pruitt *et al.* identified a Xoo protein that is the target of the rice immune evasion machinery. Xoo lacking this protein can attack rice unimpeded. This insight could help crop scientists help rice win the rice-Xoo arms race. — BJP

*Sci. Adv.* 10.1126/sciadv.1500245 (2015).

### STRETCHY ELECTRONICS

## Composite stretchable conducting wires

Think how useful a stretchable electronic “skin” could be. For example you could place it over an aircraft fuselage or a body to create a network of sensors, processors, energy stores, or artificial muscles. But it is difficult to make electronic interconnects and strain sensors that can stretch over such surfaces. Liu *et al.* created superelastic conducting fibers by depositing carbon nanotube sheets onto a prestretched rubber core (see the Perspective by Ghosh). The nanotubes buckled on relaxation of the core, but continued to coat it fully and could stretch enormously, with relatively little change in resistance. — MSL

*Science*, this issue p. 400;  
see also p. 382

### NEURODEVELOPMENT

## Keeping synaptic plasticity plastic

Neuronal synapses in the brain adjust according to shifting demands as we experience the world. This synaptic plasticity forms the basis for critical periods in the visual and somatosensory systems. Greenhill *et al.* have now found, in mice, a critical period for the development of plasticity itself. At the core is a protein that in its mutant form is associated with schizophrenia. Disrupting this protein’s function temporarily during early development caused a failure in brain plasticity in adult mice. — PJH

*Science*, this issue p. 424

### AUTOIMMUNE DISEASE

## Trafficking from bedside to bench

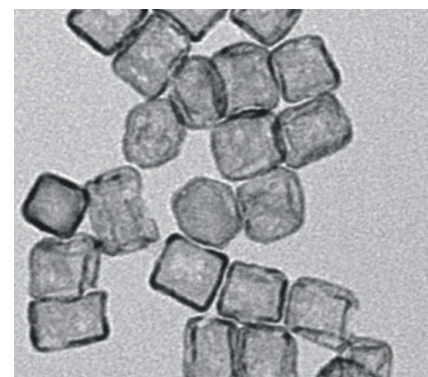
Typically in translational research, a discovery in cell or molecular biology is later exploited to improve patient care. Occasionally, information flows in the opposite direction. Lo *et al.* found that patients with an autoimmune disorder caused by deficiency of a protein called LRBA responded dramatically to the drug abatacept (see the Perspective by Sansom). Abatacept contains a segment of a potent inhibitory immune receptor, CTLA4. Experiments prompted by this observation revealed the relationship between the two proteins: LRBA controls the intracellular trafficking and degradation of CTLA4. This information may further improve patient care, because other clinically approved drugs have the desired mechanism of action with potentially fewer side effects. — PAK

*Science*, this issue p. 436;  
see also p. 377

### NANOCATALYSTS

## Etching platinum nanocage catalysts

Although platinum is an excellent catalyst for the oxygen reduction



PHOTOS: (TOP TO BOTTOM) CHEN ET AL.; NIGEL CATTIN/SCIENCE SOURCE; XIA LABORATORY

reaction that occurs in fuel cells, its scarcity continues to drive efforts to improve its utilization. Zhang *et al.* made nanocages of platinum by coating palladium nanocrystals with only a few layers of platinum and then etching away the palladium core (see the Perspective by Strasser). Platinum nanocages made using nanoscale octahedra and cubes of palladium displayed different oxygen catalytic activity for the oxygen reduction reaction. — PDS

*Science*, this issue p. 412; see also p. 379

## QUANTUM INFORMATION

### Making hybrid quantum information systems

Different physical implementations of qubits—quantum bits—each have their pros and cons. An appealing idea is to combine them into hybrid architectures, taking advantage of their respective strengths. Tabuchi *et al.* placed a ferromagnetic sphere and a superconducting qubit in a cavity and used an electromagnetic mode of the cavity as the mediator between the two. They achieved strong coupling between a collective magnetic mode of the sphere and the qubit. Viennot *et al.* coupled a single spin in a double quantum dot to photons in a cavity. Both approaches hold promise for future applications. — JS

*Science*, this issue pp. 405 and 408

## EVOLUTION

### Snakes' four-legged missing link

It may surprise you to learn that snakes, like us, are tetrapods derived from an ancient

four-legged ancestor. Martill *et al.* describe a fossil from the Brazilian Cretaceous period that contains a snakelike species that is elongate and serpentine, with both hind- and forelimbs (see the Perspective by Evans). This species appears to have been a burrower and shows clearly the early transitional stages from a lizardlike body plan to the smooth legless snakes we know today. — SNV

*Science*, this issue p. 416; see also p. 374

## METABOLISM

### Counteracting the effects of a bad diet

Obesity is a risk factor for metabolic disorders. These include insulin resistance, which can lead to type 2 diabetes, and hepatic steatosis, in which fat accumulates in the liver. By inhibiting  $\beta$ -adrenergic signaling, the kinase GRK2 decreases adipose tissue function. GRK2 also decreases insulin sensitivity. Vila-Bedmar *et al.* genetically ablated GRK2 in adult mice after they had become obese and developed insulin resistance by eating a high-fat diet. GRK2 deletion prevented these mice from gaining more weight and from developing hepatic steatosis on the high-fat diet. It also improved their sensitivity to insulin. — WW

*Sci. Signal.* **8**, ra73 (2015).

## DEEP BIOSPHERE

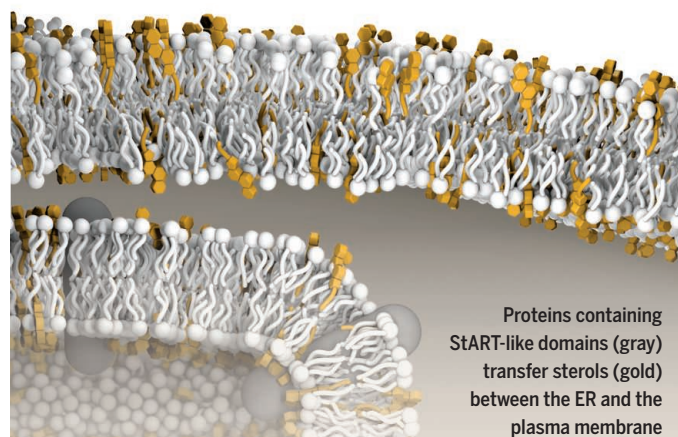
### A deep sleep in coal beds

Deep below the ocean floor, microorganisms from forest soils continue to thrive. Inagaki *et al.* analyzed the microbial communities in several drill cores off the coast of Japan, some sampling more than 2 km below the seafloor (see the Perspective by Huber). Although cell counts decreased with depth, deep coal beds harbored active communities of methanogenic bacteria. These communities were more similar to those found in forest soils than in other deep marine sediments. — NW

*Science*, this issue p. 420; see also p. 376

## IN OTHER JOURNALS

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



Proteins containing StART-like domains (gray) transfer sterols (gold) between the ER and the plasma membrane

## CELL BIOLOGY

### Making a StART on sterol transport

Different organelles and membranes within cells contain different sets of lipids. Sterols are key components of cellular membranes, and their trafficking within cells is poorly understood. Sterols must traffic between the endoplasmic reticulum (ER) and the cell surface, but do so via a nonvesicular route. Gatta *et al.* examined this fundamental process in yeast. They found a class of proteins involved in the transfer of sterols between the ER and the plasma membrane (PM) that contained so-called StART-like (for steroidogenic acute regulatory transfer) domains. These ER membrane proteins localized at specific ER-PM contact sites and bound sterols. Efficient PM-to-ER sterol transport required not only StART-like domain-containing proteins themselves, but also their proper localization at the contact sites. — SMH

*eLife* **4** e07253 (2015).

## PSYCHOLOGY

### Learning while listening to a foreign language

Speech not only conveys information in the form of the words uttered, but it also provides auditory cues that identify the speaker. Orena *et al.* now show that knowledge of the language spoken helped listeners to identify a speaker. The authors compared English-monolingual Montréal residents who could not understand spoken French or speak French themselves, to a similar set of residents of Connecticut, who were not regularly exposed to French. Montréal residents were better than the Connecticut residents at identifying the French-speaker

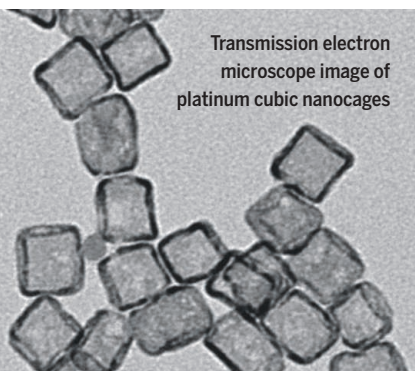
voices, demonstrating that mere exposure improves language skills. — GJC

*Cognition* **143**, 36 (2015).

## GENETIC ENGINEERING

### SLIDE-ing to promote biosecurity

One hurdle facing the widespread use of genetically engineered organisms, such as probiotics or anticancer agents, is controlling their ability to reproduce. Lopez and Anderson developed one technique to do this, called "SLIDE" (synthetic auxotroph based on a ligand-dependent essential gene). Organisms that express SLIDE can only grow when supplied with a particular



## ALSO IN SCIENCE JOURNALS

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## HUMAN MICROBIOTA

**Microbial bioactive molecules**

Human cells are outnumbered by the microbial cells of our commensals by an order of magnitude. All of these organisms are metabolically active and secrete multiple bioactive molecules. Genomics has unveiled a remarkable array of biosynthetic gene clusters in the human microbiota, which encode diverse metabolites. Donia *et al.* review how molecules ranging from lantibiotics and microcins to indoxyl sulfate and immunomodulatory oligosaccharides and lipids could affect the health and physiology of the whole organism, depending on the composition of an individual's microbial community. — CA

*Science*, this issue p. 395

## APPLIED ORIGAMI

**Expanding origami to thicker materials**

A vast array of origami patterns can be applied to the folding of any material of near-zero thickness, such as paper. However,

the folding of thick materials requires adding material and offsets. Chen *et al.* develop a general model in which the standard spherical linkages (creases) are replaced with rigid panels connected via offset folds, so that the folding motion of both near-zero-thickness and thick objects is the same. Furthermore, the hinges are constrained to move in only one direction, which is important for applications such as unfolding solar panels in space or large engineering structures, where you want the folding to occur automatically. — MSL

*Science*, this issue p. 396

## INTRACELLULAR TRANSPORT

**Membrane contact sites promote lipid exchange**

Most membrane lipids are manufactured in the endoplasmic reticulum (ER). Different organelles and the plasma membrane (PM) have distinct phospholipid compositions. Chung *et al.*, working in mammalian cells, and Moser von Filseck *et al.*, working in yeast, both describe how a family of proteins is important in

maintaining the balance of lipids within the cell. These special proteins accumulate at and tether contact sites between the ER and the PM and promote the exchange of specific phospholipids, which helps to maintain the PM's distinct identity. — SMH

*Science*, this issue pp. 428 and 432

## HUMAN IMMUNOLOGY

**The downside of diversity**

The adaptive immune system exemplifies the benefits of diversity, allowing for individual responses to specific pathogens. Natural killer (NK) cells are also diverse at the single-cell level, but the contribution of this diversity to NK cell-mediated immunity has been unclear. Strauss-Albee *et al.* found that unlike adaptive immune cells, human NK cell diversity is lower at birth than in adults. Moreover, the diversification that results from antiviral responses decreases the flexibility of future responses. Indeed, high NK cell diversity was associated with increased risk of HIV-1 acquisition in African women. — ACC

*Sci. Transl. Med.* **7**, 297ra115 (2015).