

Carneiro *et al.* sequenced a domestic rabbit genome and compared it to that of its wild brethren (see the Perspective by Lohmueller). Domestication did not involve a single gene changing, but rather many gene alleles changing in frequency between tame and domestic rabbits, known as a soft selective sweep. Many of these alleles have changes that may affect brain development, supporting the idea that tameness involves changes at multiple loci. — LMZ

*Science*, this issue p. 1074; see also p. 1000

## IMMUNOLOGY

### Cutting out a kinase for T cell survival

Sufficient numbers of T cells are required in the body to fight pathogens. To survive, T cells need to receive signals through both the T cell receptor and the interleukin-7 receptor. However, constant interleukin-7 receptor activation causes T cells to die, so the T cell receptor intermittently blocks the activity of the interleukin-7 receptor. Signaling through the interleukin-7 receptor requires the kinase Jak1. Katz *et al.* found that T cells contained very little Jak1 protein and that it was unstable. When researchers activated the T cell receptor, they generated increased amounts of microRNA. The microRNA prevented the T cells from producing new Jak1 protein and interfered with the ability of the interleukin-7 receptor to signal. — JFF

*Sci. Signal.* **7**, ra83 (2014).

## CELL MIGRATION IN 3D

### Push me, pull you, that's the way to move

Primary cells, derived directly from human tissue, exhibit different behaviors in shape and signaling within three-dimensional (3D) or 2D spaces. When the pressure within the cell increases, cells display limb-like bumps, which they use to move through their 3D environment. Petrie *et al.* now show that when the complex of actin and myosin

contracts, it controls the pressure within cells and therefore the shape of those protruding structures (see the Perspective by DeSimone and Horwitz). The authors measured internal pressures in migrating mammalian cells. In the 3D matrix, those cells have higher pressure that differs between the front and back of the cell, which creates a piston effect. — SMH

*Science*, this issue p. 1062; see also p. 1002

## PAIN

### An enzyme offers a new path to pain control

Many people suffer from uncontrolled pain, and new drugs are needed. Zambelli *et al.* build on the fact that aldehydes—molecules that occur naturally in the body—can cause pain directly. Specifically, an enzyme that degrades aldehydes is a key regulator of pain. Mice with genetically inactive versions of the enzyme are extra sensitive to a painful stimulus. Conversely, revving up the enzyme with a drug reverses this effect. New drugs that modulate aldehyde levels could benefit patients, possibly without risk of addiction. These results may also explain the greater pain sensitivity in East Asians, many of whom carry a relevant mutation. — KLK

*Sci. Transl. Med.* **6**, 251ra119 (2014).

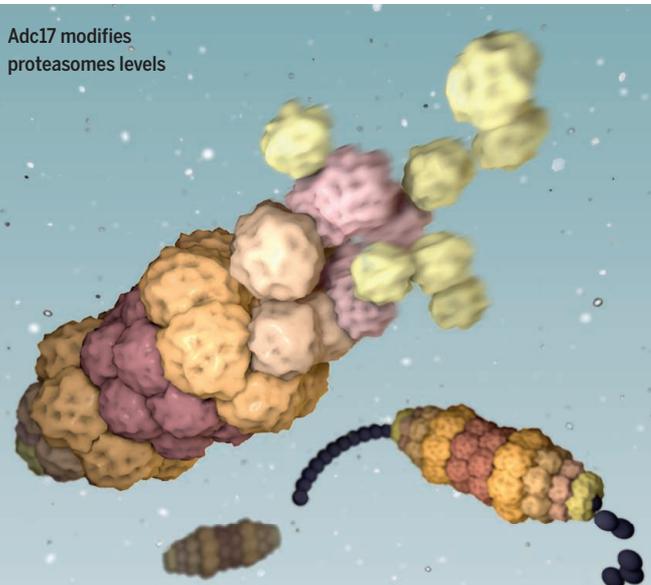
Aldehyde levels influence pain response



## IN OTHER JOURNALS

Edited by **Melissa McCartney** and **Margaret Moerchen**

Adc17 modifies proteasomes levels



## PROTEOSTASIS

### Need proteasomes? Make some!

Cells need to clear out damaged proteins, or they age and become unhealthy. To do this, cells use tiny protein-destroying machines called proteasomes. Building these proteasomes is a complex process, and it's not clear how stressed cells can make sure the proteasome supply meets demand. Working with yeast cells, Hanssum *et al.* discovered a protein that helps cells assemble just enough proteasomes to fit their needs. In a process called chaperoning, the protein, which they called Adc17, helps pair two proteasomal proteins, Rpt6 and Rpt3, during proteasome assembly. — SMH

*Mol. Cell* **10**, 1016/j.molcel.2014.06.017 (2014).

## HUMAN BEHAVIOR

### Incentives work on economists, too!

Editors treasure prompt and informative referees. Chetty *et al.* show that modest psychological and economic nudges can speed up how rapidly referees return their reviews without degrading their quality. In a randomized experiment involving 1500 referees at the *Journal of Public Economics*, they offered some referees \$100 for turning in their reviews by the 4-week deadline, whereas they told others, who had agreed to a 6-week deadline, that their delivery dates would be posted publicly. From a

comparison across these groups and the non-incentivized controls, they conclude that 4 weeks is enough and that both social pressure and money work. — GJC

*J. Econ. Perspect.* **28**, 169 (2014).

## PHYSICS

### Eliminating the effects of the pesky bulk

A material's imperfections can greatly influence how well it conducts electricity. Theoretical physicists have, however, come up with the concept of topological insulators (TIs): materials that conduct only at their surface in a way that makes them

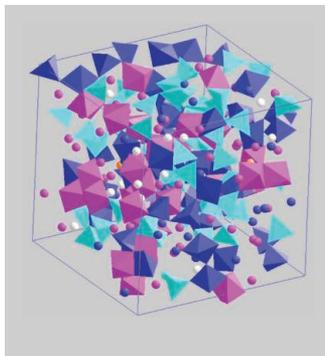
“immune” to certain kinds of disorder. The compounds that have been identified as TIs, such as  $\text{Bi}_2\text{Se}_3$ , fall short of this ideal because they conduct electricity both through the “immune” surface states and the bulk of the material, which is still affected by disorder. Brahlek *et al.* made thin samples of  $\text{Bi}_2\text{Se}_3$ , adding copper atoms in precise quantities. When the samples were thick enough and had just the right concentrations of copper, the authors found that the samples were conducting only at their surfaces. This work is a step forward toward making useful TI devices. — JS

*Phys. Rev. Lett.* **113**, 026801 (2014).

## GEOPHYSICS

### Making mantle melt analogs more accurate

Glasses, which can be thought of as “frozen” liquids, often are used as a proxy to study the properties of silicate melts in Earth’s mantle. Glasses can be



#### Hot-compressed glass structure

studied at temperatures and pressures lower than those found deep underground, which are impossible to achieve in the lab. Ghosh *et al.* conduct computational analyses to show that temperature is important in determining the properties of glass. Glass compressed at high temperature can change its structure and become denser than glass compressed at room temperature, making it a better analog for liquid melts generated deep in the mantle. — BG

*Am. Mineral.* **10.2138/am.2014.4631** (2014).

## INNATE IMMUNITY

### Cleaving RNA dials down inflammation

The immune system detects viruses when viral nucleic acids bind protein receptors in immune cells. But what keeps these receptors from reacting to the host cells’ own nucleic acids in the cytoplasm and causing unwanted inflammation? Eckard *et al.* examined the case of RIG-I-like receptors (RLRs), which bind to viral RNA. They found that host RNAs generated during cellular stress could induce an RLR-dependent inflammatory response. In normal cells, the protein SKIV2L, which is part of a large protein complex that chews up RNA, prevented such inflammation by degrading the RNAs. The authors observed an inflammatory response in two patients who had mutated versions of SKIV2L, suggesting that SKIV2L keeps inflammation in check in human cells, too. — KLM

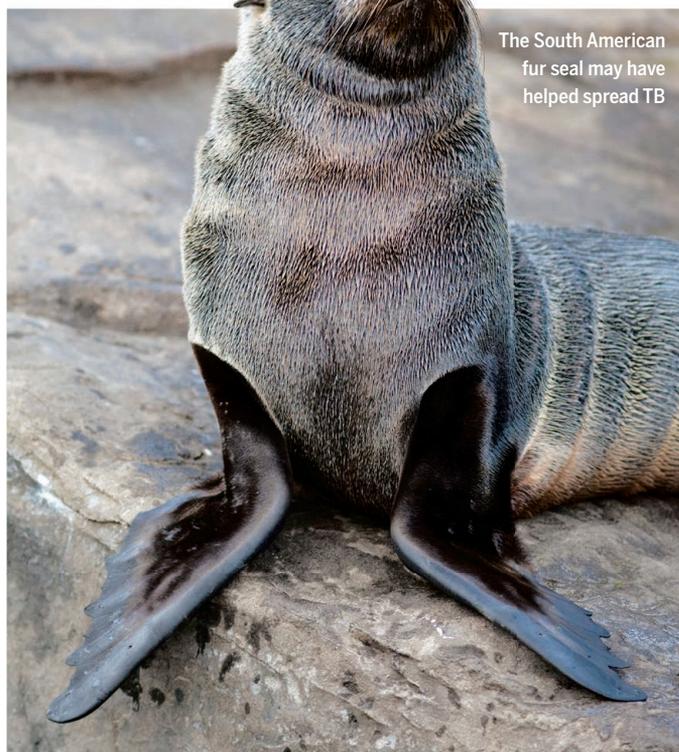
*Nat. Immunol.* **10.1038/ni.2948** (2014).

## SOCIAL SCIENCE

### Moving from one novelty to the next

Life would be boring if things were always the same. Tria and colleagues explore whether novelties—discoveries of things new to us—are independent of each other or whether one novelty leads to another. They analyzed selected text, online music, Wikipedia, and a social tagging site and measured how the number of different elements grew with time. Although two of the data sets contained innovations (items new to everyone) and two contained novelties (items new to individual users), they all showed the same kinetics and probability distributions. Modeling analyses suggested that novelties are not independent of each other. As the authors state, each novelty “comes with a cloud of other potentially new ideas that are thematically adjacent to it and hence can be triggered by it.” — BJ

*Sci. Rep.* **10.1038/srep05890** (2014).



The South American fur seal may have helped spread TB

## INFECTIOUS DISEASE

### Seals infected early Americans with TB

How did *Mycobacterium tuberculosis*, which causes tuberculosis (TB), first infect humans? Microbial DNA from 1000-year-old Peruvian mummies suggests that seals may have spread the disease to South American humans long before European settlers arrived. Bos *et al.* used DNA sequencing to solve the mystery. After finding the TB bacteria’s DNA in three of the mummies, the team determined that the bacterial genomes were closest in sequence to a TB strain that infects marine mammals, suggesting that the ancient humans got TB from eating seal or sea lion meat, the researchers say. — EP

*Nature* **10.1038/nature13591** (2014).

## CATALYSIS

### Interior design with nanoparticles

Catalysts made from metal nanoparticles (NPs) absorbed on oxide surfaces often are used in many industrial reactions and in automotive catalysts. These usually work best at high temperatures. High temperatures, however, promote surface diffusion and the subsequent formation of larger particles with less surface area, which become less active over time. Qiao *et al.* synthesized thermally stable NPs of palladium (Pd)

and platinum within a hollow shell of microporous silica that allowed small molecules to enter and leave the interior. Polymer nanodots synthesized with the shell-bound metal ions formed NPs with average sizes under 2 nm and high thermal stability upon reduction and heating. The micropores also controlled catalytic product formation. Oxidative reduction of cyclohexene with trapped Pd NPs yielded almost pure benzene, versus a host of larger oxygenated rings for exposed Pd NPs. — PDS

*J. Am. Chem. Soc.* **10.1021/ja505903r** (2014).

# Science

## Need proteasomes? Make some!

Stella M. Hurtley

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