

exchange between the Americas need to be reconsidered. — HJS  
*Science*, this issue p. 226;  
see also p. 186

## DRUG DISCOVERY

### Allergy drug inhibits viral infection

A drug used to dry up a runny nose and itchy eyes may be repurposed for treating hepatitis C virus (HCV). This viral infection often goes undetected, but it can exacerbate liver diseases, including cancer. The fact that allergy-relieving antihistamines can treat HCV was uncovered by He *et al.* in a screen of a library of approved drugs. Among these, the first-generation antihistamine chlorcyclizine showed highly specific anti-HCV activity in vitro and in mice with “humanized” livers, without evidence of drug resistance, a common problem with antivirals. Moreover, chlorcyclizine synergized with other anti-HCV drugs such as ribavirin, sofosbuvir, and interferon- $\alpha$ . Antihistamines are widely available, safe, and inexpensive: ideal candidates for use in HCV-endemic countries. — MLF  
*Sci. Transl. Med.* **7**, 282ra49 (2015).

## MARS ATMOSPHERE

### Mapping Mars' water history

We know the water cycle on Earth is complex. Neither is it simple on Mars. Infrared maps of water isotopes made by Villanueva *et al.* show the distribution of H<sub>2</sub>O and “semiheavy” water (HDO: deuterated water

containing a mixture of hydrogen isotopes) across Mars. HDO enrichment varies with time and location; for example, irregular isotopic signals associate with different terrain features. The measurements also allow seasonal sublimation levels of the northern ice cap to be estimated and thus could be used to reveal past climate behavior. — MMM  
*Science*, this issue p. 218

## BIOANALYSIS

### Imaging lipid composition

Chemical imaging of cell membranes can be performed with matrix-assisted laser desorption/ionization mass spectrometry (MALDI), but low ionization efficiency often leads to a signal dominated by the main lipid components, such as abundant phosphatidylcholine species. Soltwisch *et al.* used a tunable laser for post-ionization of neutral species to boost the signal for other membrane components, such as cholesterol and phospho- and glycolipids. Imaging of cells and tissues with these methods allows differentiation based on a more extensive chemical signature. — PDS  
*Science*, this issue p. 211

## HUMAN GENETICS

### Chromosome number varies in humans

Pregnancy loss is often associated with a loss of chromosome number, a condition known as aneuploidy. When examining aneuploid embryos during in vitro fertilization cycles, McCoy *et al.* found a large genomic region associated with defects in maternal chromosome number (see the Perspective by Vohr and Green). This region contains a gene, *Polo-like Kinase 4* (*PLK4*), that is known to affect chromosome segregation and has variants that correlate with an increased rate of maternal aneuploidy. Surprisingly, such variants occur at relatively high levels in human populations and may be under positive selection. — LMZ  
*Science*, this issue p. 235;  
see also p. 180

## IN OTHER JOURNALS

Edited by **Sacha Vignieri**  
and **Jesse Smith**

Smoking increases inflammation and worsens infection



## INFLAMMATION

### How smoking makes infection worse

Smoking not only increases your risk of cancer but also increases inflammation and slows down recovery from infections, especially in people who have chronic obstructive pulmonary disorder (COPD). People with severe COPD have elevated levels of the cytokine interleukin-33 (IL-33), a secreted protein that promotes airway inflammation. To determine whether IL-33 triggers exaggerated inflammatory responses in COPD, Kearley *et al.* exposed mice lacking IL-33 to cigarette smoke and then infected them with influenza. A deficiency in IL-33 protected mice from excessive inflammation and weight loss. Cigarette smoke led to elevated production of IL-33 and altered expression of its receptor in exposed mice, causing lung inflammation to amplify. — KLM  
*Immunity* **42**, 566 (2015).

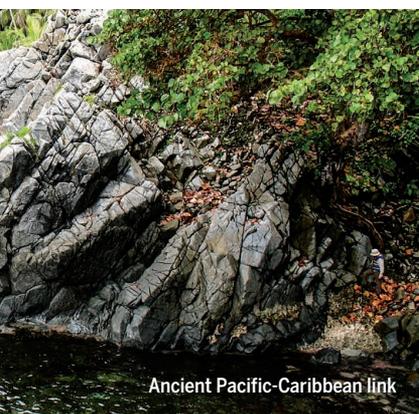
## CELLULAR MECHANICS

### The mechanics of cellular left and right

Cells need to distinguish between left and right to interact during collective movement or embryonic development. To reveal the underlying cellular mechanics, Tee *et al.* studied the organization of actin in

human cells using fluorescence, electron microscopy, and computational simulations. Actin fibers forming the cellular skeleton rearranged themselves from a symmetric to an asymmetric pattern through interplay between two types of fibers. The unidirectional tilting of the radial fibers and swirling of the transverse fibers were driven by

PHOTO: © ROSEMARY ROBERTS/ALAMY



Ancient Pacific-Caribbean link

## COMMUNITY ECOLOGY

### Measuring effective dispersal

**D**ispersal fundamentally shapes ecological communities and maintains biodiversity, yet it is extremely difficult to quantify. Estimating seed dispersal effectiveness (SDE) requires measurement of both the number of seeds dispersed and the probability of successful germination. González-Castro *et al.* laboriously measured the SDE of frugivorous lizards and birds as dispersers of seeds over 6 years in plant communities on the oceanic island of Tenerife. Their results allowed for comparisons between the SDE of the two main frugivore groups for different plant species and different communities (such as woodland and shrubland), revealing the networks of mutualistic interactions that underpin community persistence. — AMS  
*Ecology* **96**, 808 (2015).

*Gallotia galloti* is an important seed disperser on Tenerife



contractile stress and rotational growth. The actin-crosslinking protein controlled the clockwise or anticlockwise dynamics of the actin network, establishing the left-right asymmetry of the cell. — MSM  
*Nat. Cell Biol.* 10.1038/ncb3137 (2015).

## CRIME AND PUNISHMENT

### Rethink jail for juvenile justice

The U.S. criminal justice system is strikingly punitive: The incarcerations-to-convictions ratio is 70% larger than that of the next highest country. The U.S. juvenile incarceration rate is five times larger than that of any other country. But we don't randomly assign juveniles to jail, and thus it's difficult to isolate the impacts of incarceration on later-life outcomes, versus the impacts of underlying socioeconomic, cognitive, and other factors that influence juvenile criminal behavior as well as education, employment, and other outcomes. Studying 10 years of data on over 35,000 Chicago juvenile offenders, Aizer and Doyle noticed that judges were randomly assigned to juvenile cases, and judges had

different tendencies to sentence incarceration versus probation. Assignment to a high-incarceration-rate judge decreased the likelihood of juveniles completing high school and increased the likelihood of adult incarceration. — BW  
*Quart. J. Econ.* 10.1093/qje/qjv003 (2015).

## NEURODEGENERATION

### Deconstructing cell death in MS

Oligodendrocytes are often referred to as "support" cells for neurons, but in fact they play a critical role in the transmission of nerve impulses. These cells produce the myelin sheath that surrounds and protects axons in the central nervous system. In multiple sclerosis (MS), this myelin sheath erodes because of an inflammatory reaction that triggers the death of oligodendrocytes. Several distinct mechanisms of cell death exist, and understanding which one underlies oligodendrocyte death could lead to new therapies. Studying mouse models of MS, Ofengeim *et al.* find that

oligodendrocytes die by a regulated process called necroptosis. A small-molecule inhibitor of a protein kinase that mediates necroptosis prevented oligodendrocyte death in the mouse models. — PAK  
*Cell Rep.* **10**, 1836 (2015).

## SURFACE IMAGING

### Submolecular resolution in 3D

Surface probe microscopy has recently achieved submolecular resolution with metal tips made atomically sharp by decorating them with adsorbed molecules such as carbon monoxide. This method works well with adsorbed molecules that are small or flat. Moreno *et al.* now show how to achieve subatomic resolution in atomic force microscopy with commercial silicon tips, for three-dimensional structures such as adsorbed fullerene molecules or the step edges of oxide surfaces.

The van der Waals interaction is mapped with the tip a few nanometers above the surface in a closed

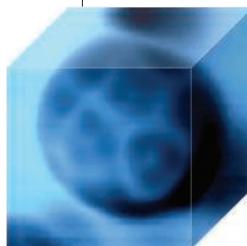
feedback loop. A second higher-resolution scan with an open feedback loop follows this map with a constant offset distance that is adjusted to provide high resolution. — PDS.  
*Nano Lett.* 10.1021/nl504182w (2015).

## PHYSICS

### Pairing in an off-kilter atomic gas

In a process called Cooper pairing, two electrons of opposite spin and momentum form a pair and join a larger "condensate" to flow effortlessly through a superconducting material. In cold atomic gases, the atomic state plays the role of the spin. But what happens if there is a different number of atoms in the two spin states, so that pairing cannot be perfect? Ong *et al.* tackled that question for  ${}^6\text{Li}$  atoms trapped in a weakly coupled array of pancake-shaped clouds. As they cranked up the interaction between the atoms and increased the relative number of minority spins, the gas in each pancake separated into a core of paired spins surrounded by the majority atoms. — JS

*Phys. Rev. Lett.* **114**, 110403 (2015).



# Science

## Pairing in an off-kilter atomic gas

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