

regulate translation of a particular target mRNA? Sambandan *et al.* used high-resolution in situ hybridization to detect precursor miRNA in rat neuronal dendrites. They introduced a fluorescent miRNA maturation reporter into hippocampal neurons and detected activity-dependent maturation of the probe in both the soma and dendrites. This local maturation of the miRNA was indeed associated with a local reduction in protein synthesis. Thus, localized miRNA maturation can modulate target gene expression with local and temporal precision. —SMH

Science, this issue p. 634

VASCULAR BIOLOGY

A target for intracranial aneurysms

Surgery is the only therapeutic option currently available for intracranial aneurysms. Aoki *et al.* delineated a self-amplifying signaling pathway in macrophages that could be pharmacologically targeted to limit the inflammation that initiates intracranial aneurysms and causes them to enlarge. Stimulation of EP2 (prostaglandin E receptor subtype 2) in macrophages increased the levels of COX-2, the enzyme that synthesizes the ligand for EP2, and MCP-1, an attractant for macrophages. Administering an EP2 antagonist to rats prevented the formation and progression of intracranial aneurysms. —WW

Sci. Signal. **10**, eaah6037 (2017).

INFECTIOUS DISEASE

Starving the pathogen

Actively killing pathogens is an important function of the immune response; equally important is limiting nutrient availability to the pathogen, a process known as nutritional immunity. Interleukin-22 (IL-22) plays an essential role in the resolution of infections at epithelial barrier sites, including the skin, lungs, and intestines. Using a systemic model of *Citrobacter rodentium*

infection, Sakamoto *et al.* uncovered an unexpected role for IL-22 in limiting availability of iron to the pathogen by promoting increased production of heme scavengers from the liver. Thus, beyond barrier immunity, IL-22 plays an additional role in regulating nutritional immunity in systemic bacterial infections. —AB

Sci. Immunol. **2**, eaai8371 (2017).

QUANTUM ENTANGLEMENT

Transitional approach to entanglement

In an entangled many-particle system, changing the state of one constituent affects the rest of the system. This property can be used as a resource in quantum information processing, but getting many particles to participate in entanglement is tricky. Luo *et al.* used another collective phenomenon, a quantum phase transition, to entangle more than 900 atoms in a Bose-Einstein condensate. The size of the entangled ensemble remained stable, making the approach practical for precision measurements. —JS

Science, this issue p. 620

TELOMERES

A protein to trim too-long telomeres

Telomeres cap the ends of linear eukaryotic chromosomes. They consist of multiple copies of short DNA repeats. The length of telomeres is important to genome stability; if they become too short, individuals can become prone to cancer and premature aging. Li *et al.* discovered a protein, TZAP (telomeric zinc finger-associated protein), which instead prevents telomeres from becoming too long (see the Perspective by Lossaint and Lingner). TZAP binds directly to the telomeric DNA repeats, competing with the shelterin complex. It stimulates telomere trimming, preventing aberrantly long telomeres. —GR and SMH

Science, this issue p. 638; see also p. 578

IN OTHER JOURNALS

Edited by **Caroline Ash** and **Jesse Smith**

REGENERATION

Regrow like an axolotl

Unlike starfish or fictional superheroes, most vertebrates cannot regrow their limbs. Axolotls are an exception. Owing to the large size of their genomes (32 Gb), Bryant *et al.* turned to RNA sequencing, de novo transcriptome assembly, and experimental validation to probe regeneration in these salamanders. First, *cirbp*, a gene encoding an RNA-binding protein, was identified and found to play a role in protecting progenitor cells from cell death. Further, *kazald1* was important for temporal and spatial aspects of limb regeneration, similar to prior findings in hydra, suggesting an ancient evolutionary origin. Aspects of limb regeneration share some features with mechanisms of cancer and the wound response; hence, the axolotl data could be a valuable resource. —BAP

Cell Rep. **18**, 762 (2017).



Axolotls regenerate limbs by using a mechanism with ancient origins.

HEART DISEASE

Interfering with bad cholesterol

Over the past few decades, the number of deaths from cardiovascular disease has declined substantially in developed countries. Statins, drugs that lower serum levels of low-density lipoprotein cholesterol (LDL-C), have been instrumental in this

trend. Not everyone responds to statins, however, and new types of cholesterol-lowering drugs are attracting great interest. Fitzgerald *et al.* tested inclisiran, a drug based on small interfering RNA technology, in a small phase 1 trial. Inclisiran induces degradation of the mRNA encoding PCSK9, a liver-derived protease whose activity increases serum LDL-C levels.

Subcutaneous injection of inclisiran durably reduced PCSK9 levels by as much as 83% and LDL-C levels by as much as 59% without serious toxicities. —PAK

New Engl. J. Med. **376**, 41 (2017).

INFLUENZA

Gluing up hemagglutinin

The morbidity and economic tolls of influenza virus are huge, regardless of its capacity to kill. Vaccines and therapies to control this persistent threat are limited. In structural studies, Kadam and Wilson show how the broad-spectrum antiviral arbidol inactivates viral hemagglutinin (HA). HA is a surface glycoprotein that recognizes the host and mediates virus fusion and disgorgement of nucleic acids into the cell. Arbidol binds in hydrophobic cavities in the upper region of the HA stem, creating a network of interactions that makes the molecule rigid and prevents cell fusion. Resolving the molecular details of the arbidol-HA interactions is essential for

the optimization and global deployment of this potential new influenza drug. —CA

Proc. Natl. Acad. Sci. U.S.A. **114**, 206 (2017).

INORGANIC CHEMISTRY

Fluorine frolicking with eight friends

Fluorine plays a supporting role in some of the best-known hypervalent compounds, such as PF₅ and SF₆. Goesten *et al.* now suggest that the halogen can also play the lead part in constrained environs. Certain zeolites bind fluoride at the center of a box motif with silicons at each of eight vertices. Using density functional theory, the authors report that all eight engage in stabilizing Si-F orbital interactions. Whereas hypervalency is more often associated with third- and fourth-row elements, in this motif, sterics preclude analogous bonding to the heavier halides. —JSY

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1615742114 (2017).

EDUCATION

Skills to pay the bills?

Circular and pedagogical reform is often occurring in undergraduate science, technology, engineering, and math (STEM) departments. How can institutions measure whether these curriculum changes are successful? The Survey of Teaching Beliefs and Practices for Undergraduates (STEP-U) developed by Marbach-Ad *et al.* measures the value that students attribute to skills needed for the workplace (e.g., the ability to work in groups) and teaching practices intended to promote these skills (e.g., group assignments). Specifically, STEP-U is able to simultaneously assess student experiences and teaching practices, ultimately allowing departments to design curricula that better prepare students for the STEM workforce. STEP-U's potential for driving both departmental and institutional change is high, because it can be used to illustrate student

experiences between cohorts, within subdisciplines, or between majors. —MM

CBE Life Sci. Educ. 10.1187/cbe.16-05-0164 (2016).

ICE SHEETS

Cliff driving

Iceberg calving from ice sheets contributes roughly as much to sea level rise as mass loss from melting, but the dynamics of calving are not well enough understood to allow precise estimates of how it may change in a warmer future. Ma *et al.* investigated how stress within the ice controls the balance between tensile and shear failure of marine-terminating glaciers, as a function of water depth. This allowed them to define an ice cliff stability envelope that can be used as boundary conditions in numerical ice sheet models, thereby facilitating better predictions of the magnitude of ice sheet calving. —HJS

Geophys. Res. Lett. 10.1002/2016GL071560 (2017).

MALNUTRITION

Child growth sensitivity to rainfall variability

Agricultural production and crop diversity are highly sensitive to climate and local weather variables. To assess the sensitivity of child growth and weight gain to precipitation, Shiveley combined data for Uganda and Nepal collected over 30 years from several sources and controlled for multiple covariates. Positive anthropometric outcomes correlate with rainfall before birth, but, in some settings, high and unexpected rainfall can be harmful by damaging harvests or facilitating disease. The impact of increasingly variable weather on faltering agricultural productivity can be buffered by even modest improvements to roads and bridges, thus providing easier access to markets and health facilities. —CA

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1524482114 (2017).

Child growth in Nepal correlates with the weather and crop productivity.

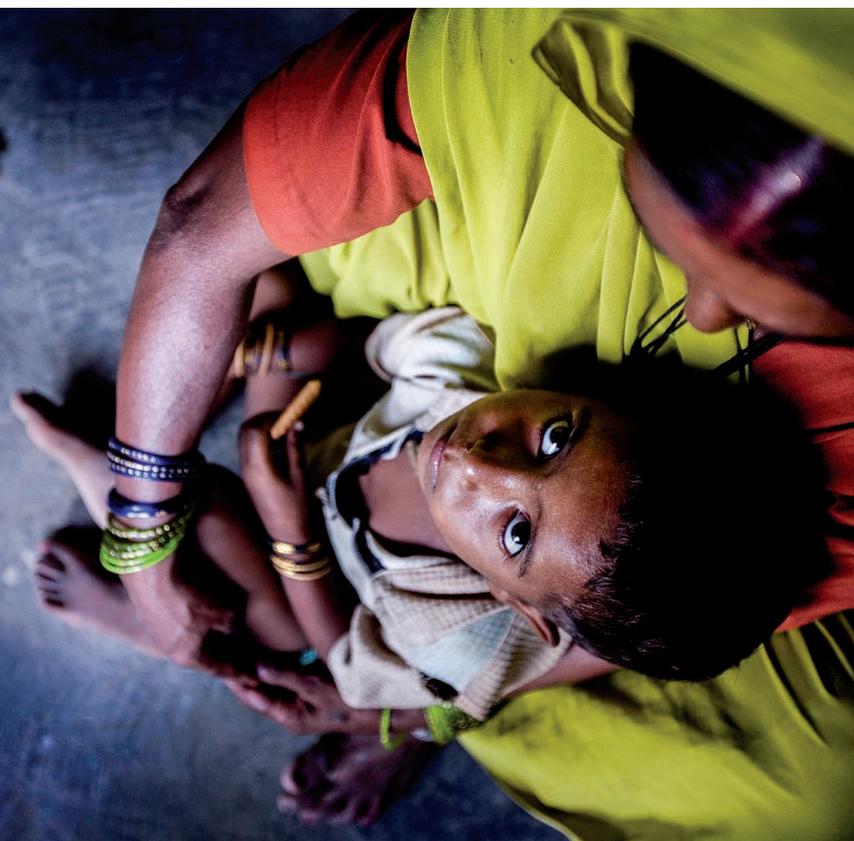


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Science

Regrow like an axolotl

Beverly A. Purnell

Science **355** (6325), 592.

DOI: 10.1126/science.355.6325.592-a

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