and found that they match the heretofore unknown source. The xenon appears to have been trapped in ice within the comet since before the solar system formed. Comets contributed about a quarter of the xenon on Earth, which constrains the amount of other materials (such as water) delivered to our planet by comets. —KTS

Science, this issue p. 1069

TISSUE REPAIR

Local macrophage clean-up

Infection, especially by helminths or bacteria, can cause tissue damage (see the Perspective by Bouchery and Harris). Minutti *et al*. studied mouse models of helminth infection and fibrosis. They expressed surfactant protein A (a member of the complement component C1q family) in the lung, which enhanced interleukin-4 (IL-4)–mediated proliferation and activation of alveolar macrophages. This activation accelerated helminth clearance and reduced lung injury. In the peritoneum, C1q boosted macrophage activation for liver repair after bacterial infection. By a different approach, Bosurgi *et al*. discovered that after wounding caused by migrating helminths in the lung or during inflammation in the gut of mice, IL-4 and IL-13 act only in the presence of apoptotic cells to promote tissue repair by local macrophages. —CA and KLM

Science, this issue p. 1076, p. 1072; see also p. 1014

X INACTIVATION

Polycomb steps to inactivate X

XX females silence one of their X chromosomes. This involves a process whereby a noncoding RNA known as Xist coats one of the X chromosomes and recruits chromatin silencing factors. The Polycomb complexes PRC1 and PRC2 are also known to be involved in X chromosome inactivation. Almeida *et al*. elucidate a key role of a specific complex, PCGF3/5–PRC1, in initiating Polycomb recruitment by Xist RNA. They further demonstrate that Polycomb recruitment is critical for Xist-mediated chromosome silencing and female embryogenesis. —BAP

Science, this issue p. 1081

BIOCHEMISTRY

A clue to a drug's neurotoxicity?

The drug BIA 10-2474 inhibits fatty acid amide hydrolase (FAAH), a lipase that degrades a specific endocannabinoid. On the basis of this activity, BIA 10-2474 was being developed as a potential treatment for anxiety and pain. In a phase 1 trial of the drug, one subject died, and four others suffered brain damage. As an initial step in investigating whether inhibition of off-target proteins by BIA 10-2474 might contribute to its clinical neurotoxicity, van Esbroeck *et al*. used activity-based proteomic assays to identify proteins targeted by the drug. Studying human cells and brain samples from subjects not associated with the trial, they found that BIA 10-2474 targeted several different lipases in addition to FAAH. It also substantially altered lipid metabolism in cultured neurons. —PAK

Science, this issue p. 1084

INFECTIOUS DISEASE

Plasmodium leftovers cause bone loss

Malaria patients sometimes develop long-term consequences of infection, such as bone loss and growth retardation. Lee *et al*. found that the *Plasmodium* byproduct hemozoin can remain in the bone marrow and cause bone loss. Mice infected with a mutant *Plasmodium* that did not produce hemozoin did not undergo bone loss. Hemozoin induced inflammatory responses in osteoclast and osteoblast precursors, resulting in bone resorption. Treating infected animals with alfacalcidol, a vitamin D3 analog, prevented this bone loss. —ACC

Sci. Immunol. **2**, eaam8093 (2017).

IN OTHER JOURNALS

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

Inhibiting a DNA-repair kinase improves physical fitness in old mice.

AGING

DNA damage linked to fitness loss in aging

Loss of metabolic function is associated with physical decline and diseases associated with aging. Park *et al.* provide evidence for a link between accumulated DNA damage and such metabolic dysfunction. Activity of the DNA-dependent protein kinase (DNA-PK), which is activated in response to DNA damage, was increased in skeletal muscle of older mice. DNA-PK phosphorylates HSP90α, a chaperone protein that protects the activity of a key metabolic regulator called adenosine monophosphate–activated protein kinase. A small-molecule inhibitor of DNA-PK improved the physical fitness of young obese mice and older mice. Whether such benefits can be provided without the deleterious effects of inhibited DNA repair, such as cancer, remains to be explored. —LBR

Cell Metab. 10.1016/j.cmet.2017.04.022 (2017).

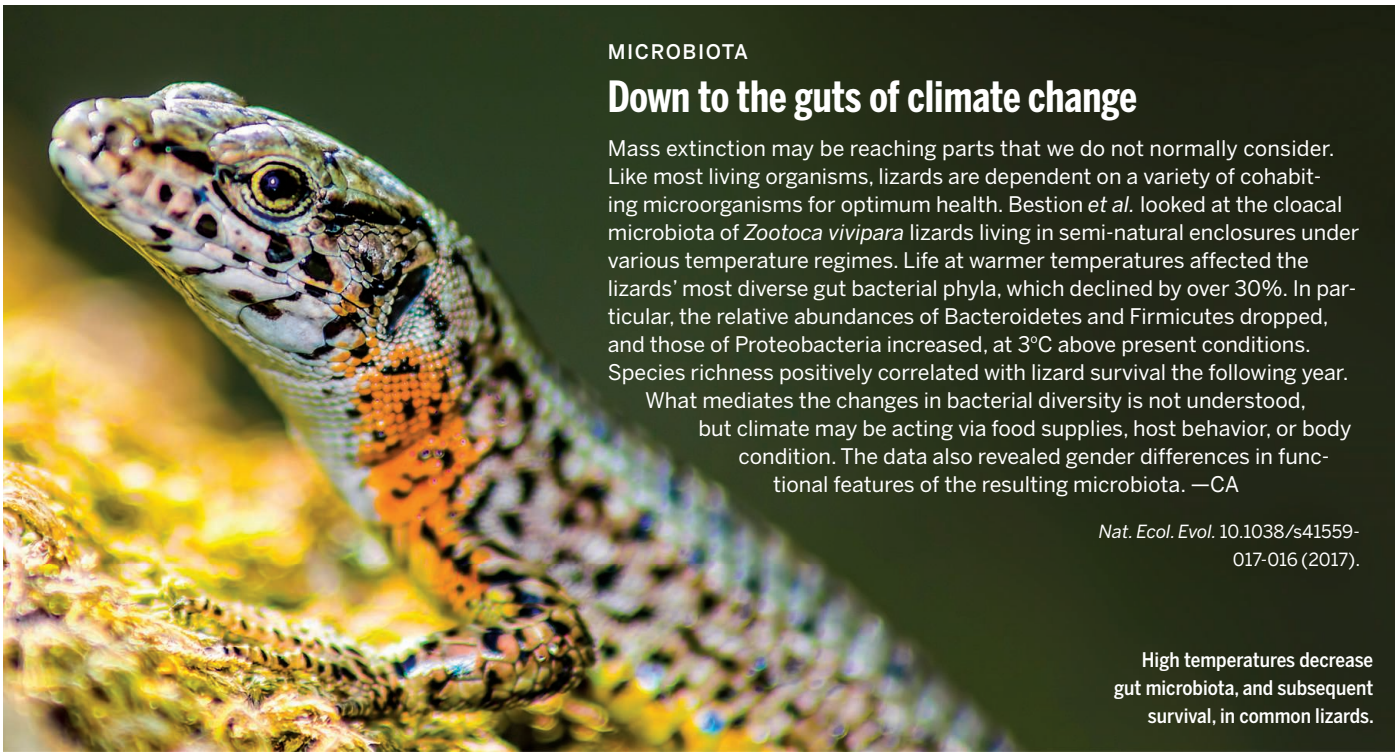
HIV

HIV reprograms progenitor cells

Survival rates of patients with HIV have improved enormously as a result of antiretroviral therapy, but increased life expectancy is now associated with a high risk of comorbidities. HIV-1–associated chronic obstructive pulmonary disease (COPD) often manifests as emphysema, originating around the airways and extending into lung tissue. Chung *et al.* have discovered that this is caused by HIV binding to basal cells in the airway and activating a tissue-destructive phenotype through a mitogen-activated protein kinase signaling cascade. HIV binding triggers up-regulation of matrix metalloproteinase 9, which is known to be elevated in COPD patients and may contribute to the degradation of extracellular matrix seen in emphysema sufferers. —CHG

Cell Rep. **19**, 1091 (2017).

PHOTO: JENNIFER L. TORRANCE/THE JACKSON LABORATORY



MICROBIOTA

Down to the guts of climate change

Mass extinction may be reaching parts that we do not normally consider. Like most living organisms, lizards are dependent on a variety of cohabiting microorganisms for optimum health. Bestion *et al.* looked at the cloacal microbiota of *Zootoca vivipara* lizards living in semi-natural enclosures under various temperature regimes. Life at warmer temperatures affected the lizards' most diverse gut bacterial phyla, which declined by over 30%. In particular, the relative abundances of Bacteroidetes and Firmicutes dropped, and those of Proteobacteria increased, at 3°C above present conditions. Species richness positively correlated with lizard survival the following year. What mediates the changes in bacterial diversity is not understood, but climate may be acting via food supplies, host behavior, or body condition. The data also revealed gender differences in functional features of the resulting microbiota. —CA

Nat. Ecol. Evol. 10.1038/s41559-017-016 (2017).

High temperatures decrease gut microbiota, and subsequent survival, in common lizards.

EDUCATION

A learning environment designed for experts

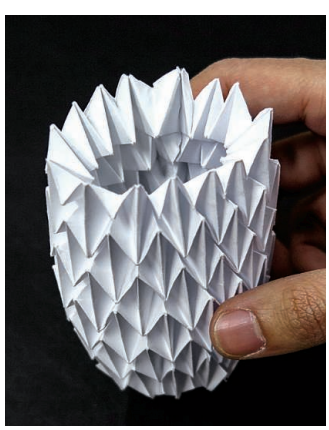
Expert-like thinking is a difficult skill to measure. SLEED-Q, an instrument developed by Elvira *et al*., aims to evaluate expert-like thinking by measuring the extent to which educators create a "supportive learning environment for expertise development." To develop SLEED-Q, the authors conducted a literature review of instructional practices that promote the development of professional expertise. Sixty-five relevant practices were identified, further clustered into 10 main principles, and finally reflected in 10 scales. Ultimately, SLEED-Q was shown to assess seven factors, including epistemological understanding, teaching for understanding, and supporting learning for understanding. SLEED-Q provides a quantitative approach for examining learning environments and begins a dialogue about how to create an environment that is conducive to developing professional expertise. —MM

Learning Environ. Res. 10.1007/s10984-015-9197-y (2016).

ROBOTICS

Wheels do more than go round and round

Travel on stepped, bumpy, or rocky terrain can require oversized wheels and independent power delivery to each wheel, which can necessitate a larger vehicle. Lee *et al.* turned to ideas from origami to design a variable-diameter wheel. By using a folded, patterned sheet, they avoided the need for complex assembly or a large number of parts. The wheels are a combination of a stiff polymer film glued to a flexible mesh, so that the difference in stiffness controls the shape change. The wheel can double in diameter, with a corresponding reduction in thickness that allows a two-wheeled robot to climb steps, pass under a low ledge, and go through narrow gaps. —MSL



A variable-diameter origami wheel in prolate spheroid configuration

Soft Robot. 10.1089/soro.2016.0038 (2017).

CANCER THERAPY

Old cancer drugs with a modern mechanism

Some cancer drugs are rationally designed on the basis of their known interaction with specific target molecules that drive tumorigenesis. Others are mechanistically poorly understood but are developed because they display anticancer activity with low toxicity in preclinical models. Uehara *et al.* have identified the mechanism underlying the anticancer activity of a class of drugs in the latter category—the sulfonamides. They find that three different sulfonamides (E7820, indisulam, and CQS) induce formation of a complex between a specific RNA-splicing factor and a specific E3 ubiquitin ligase. This interaction promotes selective degradation of the splicing factor. Interestingly, selective protein degradation also explains the activity of an unrelated cancer drug called lenalidomide. —PAK

Nat. Chem. Biol. 10.1038/nchembio.2363 (2017).

THEORETICAL CHEMISTRY

A checkup on density functional theory

Density functional theory has extended the reach of computational chemistry to a large range of compounds that were previously intractable to simulation. However, a recent study on a test set of neutral and charged atoms suggested that new functionals have lately been targeting more accurate energy calculations at the expense of the electron densities. Brorsen *et al.* extended this comparison to a set of 14 diatomic molecules of clearer relevance to ambient reaction chemistry. They found once again that improved energy calculations did not always correlate with density improvements, although the weakest-performing class of functionals in the atomic study fared considerably better with molecules. —JSY

J. Phys. Chem. Lett. **8**, 2076 (2017).

A learning environment designed for experts

Melissa McCartney

Science **356** (6342), 1041-1042.
DOI: 10.1126/science.356.6342.1041-d