

tuft cells, carrying the CD300lf receptor were the virus's specific target. Tuft cells proliferate in response to the type 2 cytokines interleukin-4 and interleukin-25, which thereby amplify norovirus infection. Moreover, infected tuft cells are resistant to immune clearance. This effect may explain the associated persistent disease symptoms that humans can suffer. —CA

Science, this issue p. 204

METROLOGY

Refining the fine-structure constant

The fine-structure constant, α , is a dimensionless constant that characterizes the strength of the electromagnetic interaction between charged elementary particles. Related by four fundamental constants, a precise determination of α allows for a test of the Standard Model of particle physics. Parker *et al.* used matter-wave interferometry with a cloud of cesium atoms to make the most accurate measurement of α to date. Determining the value of α to an accuracy of better than 1 part per billion provides an independent method for testing the accuracy of quantum electrodynamics and the Standard Model. It may also enable searches of the so-called “dark sector” for explanations of dark matter. —ISO

Science, this issue p. 191

STRUCTURAL BIOLOGY

The RNA exosome captured in action

The RNA exosome, a major RNA degradation machine, processes ribosomal RNA (rRNA) precursors and is directly coupled to the protein synthesis machine, the ribosome. Using cryo-electron microscopy, Schuller *et al.* investigated the structure of the precursor large ribosomal subunit from yeast with unprocessed rRNA in complex with the RNA exosome. The structure captures a snapshot of two molecular machines

transiently interacting and explains how the RNA exosome acts on an authentic physiological substrate and remodels the large subunit during ribosome maturation. —SYM

Science, this issue p. 219

PALEONTOLOGY

Early evolution of insect scales

Organisms use tiny structures on their surfaces to produce striking optical effects. The wing scales of butterflies and moths exhibit some of the most diverse physical colors produced by insects, but whether they have always been equipped with photonic structures is unknown. Zhang *et al.* used fossil evidence to establish that these insects possessed color-eliciting structures at least 130 million years earlier than previously thought. They determined the ultrastructure of wing scales from Jurassic Lepidoptera and mid-Cretaceous Tarachoptera. They then used optical modeling to reconstruct the colors that these features would produce. —PJB

Sci. Adv. 10.1126/sciadv.1700988 (2018).

HIV

Zooming in on human lymph nodes

Follicular helper T cells (T_{FH}) play an essential role in shaping B cell-mediated antibody responses. Wendel *et al.* used mass cytometry and T cell receptor sequencing to examine the T_{FH} response in lymph node tissue collected from HIV⁺ individuals. HIV infection altered the clonality of T_{FH} cells, with severe infections associating with pronounced oligoclonal T_{FH} responses. T_{FH} cells in the lymph nodes of HIV⁺ individuals secreted interleukin-21 but were less polyfunctional than T_{FH} cells from healthy individuals. The lack of polyfunctionality correlated with impaired isotype switching of B cells in the lymph nodes. —AB

Sci. Immunol. 3, eaan8884 (2018).

IN OTHER JOURNALS

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

Bill color in waxbills changes with external temperature.



SOCIAL SIGNALS

Sexual signals not so strict

Sexual signals in animals, such as bright plumage, are thought to be predetermined or to be badges of quality that can reflect an animal's current condition. Direct and immediate effects of the environment in which an animal lives are rarely considered to shape these phenotypes. Funghi *et al.*, however, found that in waxbills, bill color—a trait that can change quickly—is not the result of predetermined sexual differences, aggression, or sexual selection, but rather appears to be influenced by changes in the abiotic environment. Bill brightness was reduced in females after a series of lower-temperature nights. The authors suggest that this indicates that environmental conditions place constraints on these types of traits, limiting the degree to which they can reflect quality or be used for social interaction. —SNV

Behav. Ecol. Sociobiol. 10.1007/s00265-018-2486-6 (2018).

MATERIALS SCIENCE

Silicon sheds its harmonicity

The widespread technological uses for silicon make understanding this element's physical properties very important. Kim *et al.* performed inelastic neutron

scattering experiments on single crystals of silicon to measure the vibrational properties up to 1500 K. Silicon has some odd thermal properties at certain temperatures, and these experiments show the need to account for a number of factors to explain the unusual thermal expansion

Exposure to pesticide-contaminated wildflowers harms common blue butterflies.



ENVIRONMENT

Wildflower contamination with neonicotinoids

Neonicotinoid pesticides are the most widely used type of insecticides, but there are concerns that they are toxic to nontarget species such as bees and butterflies. Basley and Goulson report on a combined field and laboratory experiment aimed at assessing the impact of neonicotinoids on the common blue butterfly (*Polyommatus icarus*). Wildflowers planted along the margins of fields of neonicotinoid-treated wheat were contaminated with the pesticide at levels similar to those in the treated crops. Common blue butterfly larvae exposed to neonicotinoid-contaminated plants showed increased mortality and reduced growth in the early stages of development. Wildflower margins that specifically aim to boost pollinator populations may chronically expose these species to harmful levels of neonicotinoids. —JFU

Environ. Sci. Technol. **52**, 3990 (2018).

behavior. This in-depth look at silicon helps refine theoretical models and provides a better understanding of this technologically important material. —BG

Proc. Natl. Acad. Sci. U.S.A. **10.1073/pnas.1707745115** (2018).

GENOMICS

Denisovans shaped our genomes, twice

Studies of “molecular relics” from archaic humans in modern human genomes have shown that independent interbreeding events occurred between the ancestors of Eurasians and the Neandertals and Denisovans. Because these archaic admixtures happened after the out-of-Africa migration of the modern human ancestors, comparing present-day non-African and African genomes can reveal introgression events without the need for an archaic reference genome. Using this approach, Browning *et al.* found evidence for two pulses of gene flow from distinct Denisovan populations into modern humans in

East Asian and Papuan genomes. These findings point to at least two populations of Denisovans that contributed genes to modern humans. —SYM

Cell **173**, 53(2018).

CARBON SEQUESTRATION Reforestation to enhance the soil carbon sink

Soil is a major pool of carbon and hence can play a key role as a carbon sink in strategies to mitigate climate change. For the United States, Nave *et al.* quantified the carbon stocks in forest topsoils, focusing on the potential of reforestation to enhance carbon sequestration. Their estimates indicate that managed reforestation of >500,000 km² would increase the topsoil sink by 1.3 to 2.1 petagrams of carbon within a century, enhancing the forest carbon sink in the United States by 10% annually. Their results also indicate that this enhanced sink would persist for decades, contributing to the offsetting

of greenhouse gas emissions and reversing a decline in the strength of the carbon sink in U.S. forests. —AMS

Proc. Natl. Acad. Sci. U.S.A. **115**, 2776 (2018).

STRUCTURAL BIOLOGY Seeing the clasps that stabilize prion fibrils

A cryo-electron microscopy method called MicroED (micro-electron diffraction) has been used to reveal the core structures of several amyloid fibrils. With this technique, Gallagher-Jones *et al.* determined a 0.72-Å-resolution structure of fibrils formed by a peptide at the core of the infectious scrapie form of mammalian prion protein (proto-PrP^{Sc}). Like the full PrP^{Sc}, the fibril is characterized by unusually high stability. The high-resolution structure shows β -strands that stack into β -sheets, with sheets pairing front-to-back to form fibrils. A network of hydrogen bonds within and between β -strands

forms “polar clasps,” which are shielded by aromatic residues that stack in the fibrils. —VV

Nat. Struct. Mol. Biol. **25**, 131 (2018).

TECHNOLOGY ADOPTION Superstars drive regional drug use

A recent study finds that early adoption of new cancer drugs was geographically influenced by high-profile investigators (“superstars”) on the key clinical trials supporting the drugs. Agha and Molitor combed treatment records and clinical trial publications for 21 newly approved drugs in the United States. Patients in the same region as the lead investigator on the key trial were 36% more likely to use the drug during the first 2 years after it was approved and showed better rates of survival. These findings suggest that policies to promote the adoption of technology may blunt the potential impact if they do not include improved local information. —BW

Rev. Econ. Stat. **100**, 29 (2018).