

*al.* and Frey-Jakobs *et al.* have studied patients with an autosomal recessive form of HIES and identified mutations in the zinc finger transcription factor ZNF341 as the culprit. Loss-of-function mutations encoding truncated forms of ZNF341 interfered with its ability to recognize a bipartite binding site located in the promoter of STAT3, the transcription factor mutated in most cases of autosomal dominant HIES. ZNF341-supported transcription of STAT3 is a key upstream regulatory step needed to trigger the  $T_H17$  differentiation pathway. These findings reveal a previously unappreciated layer of transcriptional regulation controlling JAK-STAT signaling. —IW

*Sci. Immunol.* **3**, eaat4956, eaat4941 (2018).

## QUANTUM CRITICALITY

### A nanostructure quantum simulator

Phase transitions occurring at absolute zero temperature, or quantum phase transitions (QPTs), can be grouped into broad categories called universality classes. The classification is based on the properties of the transition rather than the microscopic details of the underlying system. Iftikhar *et al.* exploited this fact to study QPTs in clean, tunable nanostructures, rather than in complex materials, where they most often occur. Within a single nanostructure, two different classes of QPTs with profoundly different characters were studied and comprehensively characterized. —JS

*Science*, this issue p. 1315

## GEOPHYSICS

### A quick rebound for Antarctic crust

Earth's crust deforms under the load of glaciers and ice sheets. When these masses are removed, the crust rebounds at a time scale determined by the viscosity of the upper mantle. Using GPS, Barletta *et al.* found that the viscosity of the mantle

under the West Antarctic Ice Sheet is much lower than expected. This means that as ice is lost, the crust rebounds much faster than previously expected. Although estimates of total ice loss have to be revised upward, the surprising finding indicates that the ice sheet may stabilize against catastrophic collapse. —BG

*Science*, this issue p. 1335

## GRAVITATION

### Testing General Relativity on galaxy scales

Einstein's theory of gravity, General Relativity (GR), has been tested precisely within the Solar System. However, it has been difficult to test GR on the scale of an individual galaxy. Collett *et al.* exploited a nearby gravitational lens system, in which light from a distant galaxy (the source) is bent by a foreground galaxy (the lens). Mass distribution in the lens was compared with the curvature of space-time around the lens, independently determined from the distorted image of the source. The result supports GR and eliminates some alternative theories of gravity. —KTS

*Science*, this issue p. 1342

## NEUROSCIENCE

### Rebalancing strength between synapses

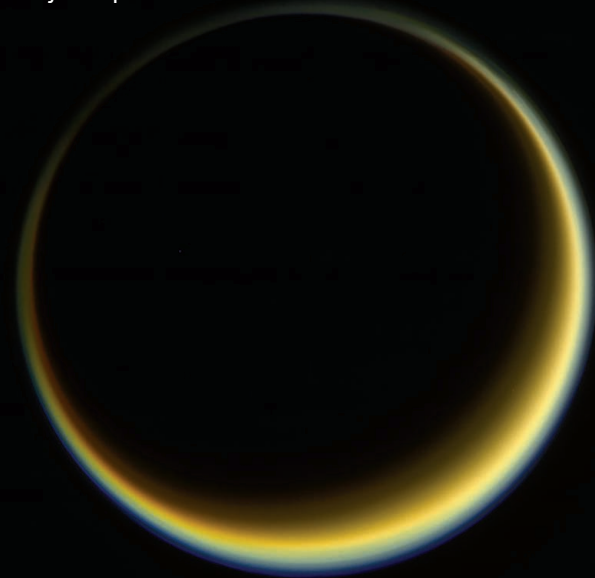
Activation of a neuronal pathway is often associated with inhibition of surrounding pathways. How locally coordinated synaptic plasticity occurs *in vivo* is not known, nor is its role in shaping neuronal responses. El-Boustani *et al.* paired optogenetic stimulation of single neurons with a visual input and were able to shift the neuron's receptive field toward the target location. Spines that expressed structural long-term potentiation had receptive fields overlapping the target stimulus but were surrounded by spines that expressed receptive fields away from the target. —PRS

*Science*, this issue p. 1349

## IN OTHER JOURNALS

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

Night-side view  
of Saturn's moon  
Titan, showing  
its hazy atmosphere



## PLANETARY SCIENCE

### Benzene ice clouds in Titan's atmosphere

**T**itan, the largest moon of Saturn, has a thick atmosphere composed mostly of nitrogen, with smaller amounts of organic molecules such as methane and benzene. Vinatier *et al.* have analyzed infrared spectra of Titan obtained by the Cassini spacecraft during flybys of the moon. In addition to the expected gas-phase species, colder regions show a spectral signature consistent with solid benzene. After eliminating alternative explanations, the authors conclude that stratospheric clouds of benzene ice are present, particularly over Titan's south pole. The clouds are analogous to high-altitude cirrus clouds on Earth, which are composed of solid water-ice crystals. —KTS

*Icarus* **310**, 89 (2018).

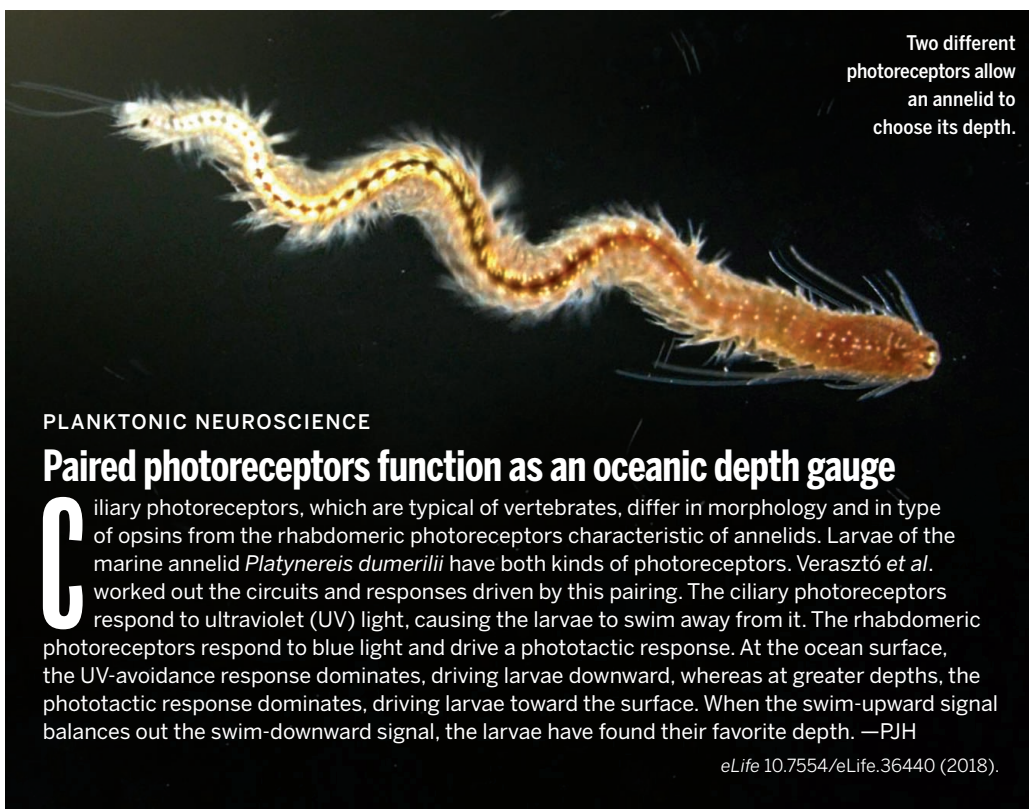
## ORGANIC CHEMISTRY

### Making a triple negative

The trifluoromethanesulfonyl (Tf) group is remarkably adept at stabilizing negative charge: It boasts highly withdrawing fluorines and sulfur-oxygen bonds that can delocalize electrons through resonance. Höfler *et al.* took full advantage of these properties in generating a

molecule with three independent anionic carbon centers. The synthetic reaction coupled trimethylmethane with three equivalents of  $Tf_2CH_2$ , after which a base deprotonated all three Tf-substituted carbon centers. The compound was characterized by crystallography and showed trigonal-planar geometries at each charged carbon. —JSY

*Angew. Chem. Int. Ed.* **10.1002/anie.201803647** (2018).



Two different photoreceptors allow an annelid to choose its depth.

## PLANKTONIC NEUROSCIENCE

### Paired photoreceptors function as an oceanic depth gauge

**C**iliary photoreceptors, which are typical of vertebrates, differ in morphology and in type of opsins from the rhabdomeric photoreceptors characteristic of annelids. Larvae of the marine annelid *Platynereis dumerillii* have both kinds of photoreceptors. Verasztó *et al.* worked out the circuits and responses driven by this pairing. The ciliary photoreceptors respond to ultraviolet (UV) light, causing the larvae to swim away from it. The rhabdomeric photoreceptors respond to blue light and drive a phototactic response. At the ocean surface, the UV-avoidance response dominates, driving larvae downward, whereas at greater depths, the phototactic response dominates, driving larvae toward the surface. When the swim-upward signal balances out the swim-downward signal, the larvae have found their favorite depth. —PJH

*eLife* 10.7554/eLife.36440 (2018).

## ONCOLOGY

### A ray of hope for advanced breast cancer

Immunotherapies are revolutionizing cancer treatment. Yet certain common cancer types, such as breast cancer, are often missing from the immunotherapy conversation. One reason is that breast cancers express relatively few neoantigens, or mutant tumor-associated proteins that are targeted by the immune system. A case study now shows that in the setting of adoptive T cell therapy, this problem can be circumvented, resulting in a dramatic clinical response. Zacharakis *et al.* report that a patient with metastatic breast cancer showed complete durable remission of her disease after being treated with autologous tumor-infiltrating lymphocytes that had been enriched *ex vivo* for reactivity to just four neoantigens. This study lays the groundwork for studies of other cancers assumed to be refractory to immunotherapy. —PAK

*Nat. Med.* 10.1038/s41591-018-0040-8 (2018).

## SLEEP

### A good excuse to sleep in

Most of us don't get as much sleep as we should, which is often due to hectic weekday schedules. Akerstedt *et al.* reveal that all is not lost—sleeping in on the weekends may have beneficial effects on our health. In a 13-year study of more than 43,000 subjects, the researchers compared the duration of sleep on weekdays versus weekends with overall mortality. Individuals (<65 years old) who caught less

than 5 hours of sleep a night had a higher death rate than those that regularly had 7 hours of sleep. But when the weekday short sleepers compensated with long sleep on weekends, no difference in mortality was observed. —PNK

*J. Sleep Res.* 10.1111/jsr.12712 (2018).

## CLIMATE CHANGE

### Warming in Greenland's past

To project how much sea level

will rise in response to ongoing climate warming, one of the things we need to know is how sensitive the rate of Greenland Ice Sheet melting is to rising temperatures. McFarlin *et al.* present results from a set of sediment cores from a small nonglacial lake in the highlands of northwest Greenland, which contain deposits from the Holocene and the Last Interglacial (LIG). They found midge assemblages indicating peak July temperatures that were 4.0° to 7.0°C warmer than modern temperatures during the early Holocene and at least 5.5° to 8.5°C warmer during the LIG. This perspective of extreme warming suggests that even larger changes than predicted for this region over the coming century may be in store. —HJS

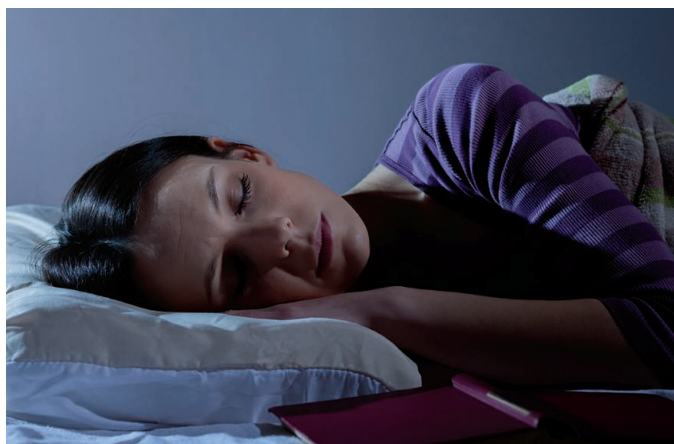
*Proc. Natl. Acad. Sci. U.S.A.* 10.1073/pnas.1720420115 (2018).

## NEUROSCIENCE

### The human prefrontal cortex is special

The size and surface area of the cerebral cortex varies dramatically across mammals. It is well known that the human cortex is by far the largest among primates. However, there is no agreement about whether the human prefrontal cortex is larger, in relative terms, than those of other primates. Donahue *et al.* compared structural brain scan datasets from humans, chimpanzees, and macaques. They found a greater proportion of prefrontal cortex gray matter volume in humans than in the two nonhuman primate species, and they observed an even greater difference between species for white matter volume in the prefrontal cortex. This part of the association cortex, which is implicated in higher cognition and affect, is thus disproportionately large in humans relative to other primates. —PRS

*Proc. Natl. Acad. Sci. U.S.A.* 115, E5183 (2018).



Sleeping in on the weekend may make up for less sleep during the week.

PHOTOS: (FROM TOP) MARTIN GÜHMANN (CC BY-SA 4.0); MLADEN MITRINOVIC/SHUTTERSTOCK