photoinduced electron transfer to catalyze a variety of alkylations. —JSY

*Science*, this issue p. 1429

PLANT SCIENCE

## Speeding up stomatal responses

A plant's cellular metabolism rapidly adjusts to changes in light conditions, but its stomata—pores that allow gas exchange in leaves—are slower to respond. Because of the lagging response, photosynthesis is less efficient, and excess water is lost through the open pores. Papanatsiou *et al*. introduced a blue light–responsive ion channel into stomata of the small mustard plant *Arabidopsis*. The channel increased the rate of stomata opening and closing in response to light. The engineered plants produced more biomass, especially in the fluctuating light conditions typical of outdoor growth. —PJH

*Science*, this issue p. 1456

**Stomata on the leaf of an English yew, *Taxus baccata*, seen in a scanning electron micrograph**

RNA SEQUENCING

## Gene expression at fine scale

Mapping gene expression at the single-cell level within tissues remains a technical challenge. Rodriques *et al*. developed a method called Slide-seq, whereby RNA was spatially resolved from tissue sections by transfer onto a surface covered with DNA-barcoded beads. Applying Slide-seq to regions of a mouse brain revealed spatial gene expression patterns in the Purkinje layer of the cerebellum and axes of variation across Purkinje cell compartments. The authors used this method to dissect the temporal evolution of cell type–specific responses in a mouse model of traumatic brain inquiry. —LMZ

*Science*, this issue p. 1463

T CELLS

## Zooming in on the kiss of death

Cytotoxic T lymphocytes (CTLs) engage and kill antigen-specific target cells by injecting toxic proteins. The toxic proteins, including perforin and granzyme, are stored in lytic granules in the CTLs and are delivered via so-called immunological synapses between the CTLs and target cells. Tamzalit *et al*. used an in vitro system to generate and visualize three-dimensional immunological synapses. They examined actin dynamics and lytic granule fusion within these synapses and found that granule fusion was physically separated from regions of actin depletion. Their studies shed light on the microscopic details of CTL-driven killing. —AB

*Sci. Immunol.* **4**, eaav5445 (2019).

COMPUTER SCIENCE

## Heart-function modeling for the masses

Modeling cardiac dynamics allows scientists to understand individual heart behaviors, such as arrhythmia. These models typically require supercomputers to solve an individualized network of differential equations that capture the fluid dynamics within a heart. Kaboudian *et al*. translated popular cardiac models to run on graphics processing units, or GPUs, that normally handle image and video processing. The result is a massively parallel simulation that can run quickly inside a web browser on a standard mobile phone. This technology may be broadly applicable to many other computationally expensive biomedical calculations. —KJP and AC

*Sci. Adv.* 10.1126/sciadv.aav6019 (2019).

# IN OTHER JOURNALS

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

Moving through the 3D world (in this case a brown rat climbing a bird feeder) requires constant readjustment in the brain.

CREDITS (FROM LEFT): EYE OF SCIENCE/SCIENCE SOURCE; ALAN KEITH BEASTALL/ALAMY STOCK PHOTO

NEUROSCIENCE

## The up and down of localization

Grid cells in the entorhinal cortex interact with place cells in the hippocampus to represent the current location of an animal. In the past, experiments were largely performed on rats running across horizontal surfaces. The real world, however, is three-dimensional. It is not known whether the reference plane for the grid cells is horizontal or an animal's locomotor plane. Casali *et al*. recorded from place and grid cells while rats moved across a flat surface or climbed up walls. The firing patterns of grid and place cells changed and constantly readjusted when the rat was climbing. —PRS

*Proc. Natl. Acad. Sci. U.S.A.* 116, 4631 (2019).

PHASE-CHANGE MEMORY

## Memory with a precondition

Materials that can rapidly switch from crystal to glass are appealing for use in computer memory devices. However, the challenge is making that switch rapid enough to compete with current memory options. Loke *et al*. used a one-time electric precursor pulse designed to condition a traditional phase-change material for rapid switching. This method dramatically improved the switching speed, allowing them to create a phase-change memory that is ultrafast and highly stable. —BG

*ACS Appl. Mater. Interfaces* **10**, 41855 (2019).

SKIN CANCER

## Another first for immunotherapy

Merkel cell carcinoma (MCC) is a rare and aggressive form of skin cancer. Nghiem *et al*. report a phase 2 clinical trial in which the immunotherapy drug pembrolizumab was tested as the initial (first-line) treatment for 50 patients with advanced MCC. Pembrolizumab is an inhibitor of programmed cell death protein 1 that works by releasing the brakes from certain immune cells so that they can better attack and destroy tumors. The researchers found that 24% of patients had complete tumor remission after immunotherapy, and more than half of all patients in the trial were observed to have long-lasting responses. Immunotherapy was more effective and produced longer patient survival than that expected from conventional chemotherapy. —PNK

*J. Clin. Oncol.* **37**, 693 (2019).

NEUROSCIENCE

## Get closer or run away?

Animals constantly choose between exploring their environment and avoiding potential threats. A brain area called the medial amygdala has been suggested to play a role in the conflict that arises upon deciding between mutually incompatible behaviors (for example, feeding, reproduction, defense, or flight). By using an array of methods, including optogenetics, viral tracing, and behavioral tests, Miller *et al*. found that a population of dopaminergic neurons within the medial amygdala projects to two other brain areas—the bed nucleus of the stria terminalis and the ventromedial hypothalamus. When these areas are excited or inhibited, mice show opposing explorative or threat-avoiding behaviors. —EACP

*Nat. Neurosci.* **22**, 565 (2019).

POLITICAL SCIENCE

## Affective forecasting and partisanship

Increasing political polarization is driven in part by voters selectively seeking views that support their preexisting beliefs and avoiding opposing views. Across several experiments, Dorison *et al*. found that people overestimate how upset they will be from being exposed to views from the opposing political party. For example, Clinton voters overestimated how upset they would be from watching Donald Trump's inaugural address or reading statements by Trump voters. This bias in affective forecasting occurs because voters underestimate their level of agreement with people from the opposite party. Correcting voters' affective forecasts increased their engagement with opposing views. These results have implications for fostering dialogue and reducing political polarization. —TSR

*Cognition* 10.1016/j.cognition.2019.02.010 (2019).

GENE THERAPY

## Piecing together a therapy for deafness

Cochlear implants have improved the quality of life for many children with congenital deafness. However, hearing recovery with these devices is imperfect. Alternative treatments that target the genetic events underlying hearing loss are under investigation. Both Al-Moyed *et al*. and Akil *et al*. have designed a potential gene therapy strategy for deafness caused by mutations in the gene encoding otoferlin, a large protein required for sound-evoked neurotransmitter release in cochlear sensory cells. Because otoferlin complementary DNA (cDNA) exceeds the packaging capacity of adeno-associated viruses (AAVs), the researchers generated dual vectors, each encoding half of the cDNA. Delivery of the dual AAVs into the cochlea of otoferlin-deficient mice resulted in vector recombination, in turn leading to expression of full-length otoferlin and restoration of hearing. —PAK

*EMBO Mol. Med.* **11**, e9396 (2019); *Proc. Natl. Acad. Sci. U.S.A.* **116**, 4496 (2019).

AIR POLLUTION

## Origins of wintertime pollution

Organic aerosols account for half of the fine particulate air pollution in populated areas of the world. Outside of urban areas, the formation of secondary organic aerosols from precursor molecules during winter was thought to be minor, but new measurements show that this is not true. Shah *et al*. present observations showing that more than half of the wintertime organic aerosol production in the northeastern United States is secondary and originates from air pollution sources. Their results suggest that wintertime organic aerosol pollution can be reduced further by reducing the quantities of their precursors. —HJS

*Geophys. Res. Lett.* 10.1029/2018GL081530 (2019).

PHOTO: EDDIE GERALD/ALAMY STOCK PHOTO

**People tend to be less upset by opposing views than levels of political polarization would suggest, as can be seen in this dialogue circle in Zion Square, West Jerusalem, Israel.**

# Origins of wintertime pollution

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