

scrub jays are also able to make such plans. However, these studies—especially those in the birds—have been questioned. It has been argued that planning in foraging and natural tasks is not the same as planning in a more general way. Kabadayi *et al.* tested ravens with tasks designed to specifically assess their general planning abilities (see the Perspective by Boeckle and Clayton). Confirming their forward-planning abilities, the birds performed at least as well as apes and small children in this complex cognitive task. —SNV

*Science*, this issue p. 202;  
see also p. 126

### HEPATITIS C VIRUS

## New York City rats provide a gift to virologists

Despite the development of curative drugs for hepatitis C virus (HCV) infection, global eradication of HCV will likely require a prophylactic vaccine. Progress toward a vaccine has been impeded by the absence of mouse models suitable for studying the immune response to HCV. Billerbeck *et al.* found that a HCV-related virus isolated from New York City rats produces an infection in laboratory mice that shares several immunological features with human infections (see the Perspective by Klenerman and Barnes). Their initial analyses of the infected mice revealed that acute clearance of the virus was dependent on T cells but not on natural killer cells. —PAK

*Science*, this issue p. 204;  
see also p. 129

### CHEMISTRY

## A triple search for coupling reactions

Coupling reactions are, in principle, good candidates for high-throughput discovery: Simply mix a diverse set of reagents and then look for products that combine two or three of their masses. In practice, however, numerous

different products might have masses that are too similar to distinguish quickly. Troshin and Hartwig circumvented this problem by screening three pools of reagents in parallel that shared the same reactive functionality but differed in mass by carefully chosen increments. Specific products could then be identified in a noisy distribution by their distinctive expected mass differences across the three pools. —JSY

*Science*, this issue p. 175

### DEVELOPMENTAL BIOLOGY

## Intergenerational transcription taming

Parents provide genetic information that guides the development of the offspring. Zenk *et al.* show that epigenetic information, in the form of the repressive mark H3K27me3, is also propagated to the offspring and regulates proper gene expression in the embryo. Preventing the propagation of maternally inherited H3K27me3 led to precocious gene activation and, ultimately, embryo lethality. —BAP

*Science*, this issue p. 212

### DENDRITIC CELLS

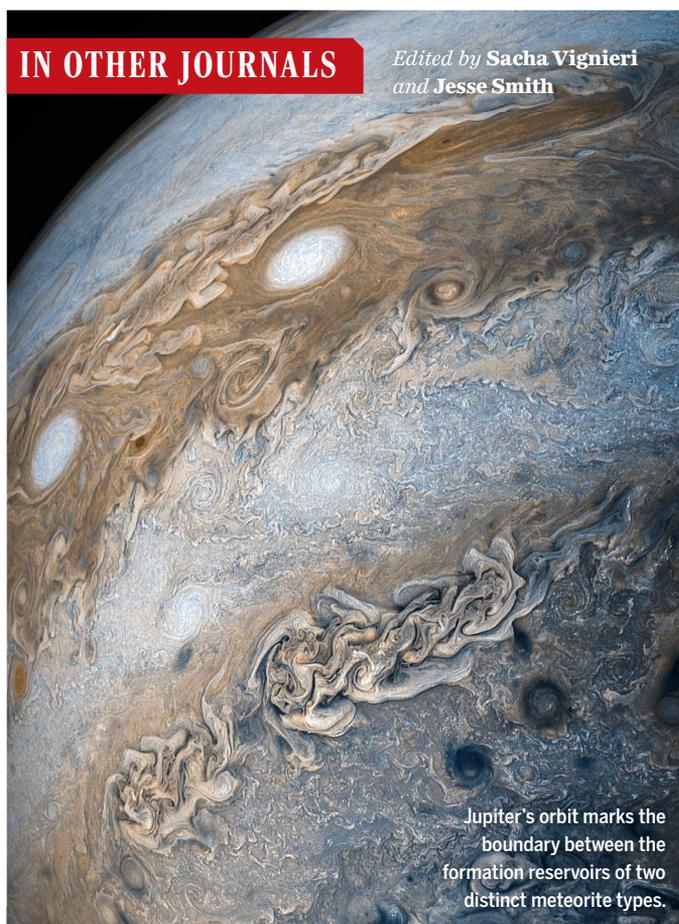
## Divided, they conquer

Dendritic cells (DCs) play a crucial role in priming T cell–driven antiviral responses. Silvin *et al.* examined the paradox of how virus-infected DCs retain the ability to drive adaptive immune responses. In response to endocytic viruses, they found CD1c<sup>+</sup> DCs to be susceptible to infection and death, whereas CD141<sup>+</sup> DCs were not. Viral resistance of CD141<sup>+</sup> DCs was conferred by expression of the endocytic guanosine triphosphatase RAB15. Transfer of antigen from infected CD1c<sup>+</sup> DCs by CD141<sup>+</sup> DCs allowed the latter to prime T cell responses. This division of labor between DC subsets that separates antigen acquisition from antigen presentation provides a solution to this long-standing puzzle. —AB

*Sci. Immunol.* **2**, eaai8071 (2017).

## IN OTHER JOURNALS

Edited by Sacha Vignieri  
and Jesse Smith



Jupiter's orbit marks the boundary between the formation reservoirs of two distinct meteorite types.

### COSMOCHEMISTRY

## Meteorites formed in two reservoirs

Meteorites are rocky debris left over from the formation of the solar system, which later fall to Earth. Kruijer *et al.* measured tungsten and molybdenum isotope ratios for a variety of iron meteorite groups and showed that they separate into two sequences—just like stony meteorites are already known to do. Because iron meteorites require parent bodies that grew massive enough to form metal cores, this dichotomy implies two separate regions in the early solar system where planetesimals formed. The authors speculate that the two reservoirs were respectively within and outside the orbit of Jupiter. If that is correct, the giant planet must have formed rapidly, before the meteorite parent bodies did. —KTS

*Proc. Natl. Acad. Sci. U.S.A.* 10.1073/pnas.1704461114 (2017).

### NEUROSCIENCE

## Mechanisms for maintaining mental maps

When an animal runs around, some hippocampal neurons are selectively active in specific locations called their place fields. A maplike representation created

from many such place fields serves as a navigation mechanism. How such hippocampal maps stabilize is still unknown. Roux *et al.* investigated a discrete form of high-frequency neuronal oscillations called sharp wave ripples. In a spatial learning task, they focally silenced a

CREDIT: NASA

subpopulation of hippocampal area CA1 neurons during sharp wave ripple events. The place fields of the silenced neurons were altered, and their spatial information content failed to increase. Control place cells, however, largely kept their spatial correlates and showed increased information after learning. Sharp wave ripple-associated neuronal firing is necessary for stabilizing and refining hippocampal place fields. —PRS

*Nat. Neurosci.* **20**, 845 (2017).

## NEURODEGENERATION

### A microglia type associated with AD

The role of specific subsets of immune cell in the onset and progression of Alzheimer's disease (AD) is poorly understood. Keren-Shaul *et al.* profiled the entire immune cell population in the brains of wild-type and AD-transgenic (Tg-AD) mice. They identified a microglial cell type (DAM) that is associated with neurodegenerative diseases. The DAM cells contained internalized amyloid- $\beta$ —presumably promoting its clearance. One key player was the AD-associated risk factor *Trem2*. Single-cell analysis of DAM in Tg-AD and *Trem2*<sup>-/-</sup> Tg-AD mice suggested that activating the DAM program involved two steps. An initial *Trem2*-independent step involved down-regulation of microglia checkpoints, followed by subsequent activation of a *Trem2*-dependent program. Activating these disease-associated microglia could possibly help in the future treatment of AD and other neurodegenerative diseases. —SMH

*Cell* **169**, 1276 (2017).

## NEURODEVELOPMENT

### Late to the party

Throughout life, new neurons are added to the brain. Just like people arriving late to a cocktail party, the newbies need to figure out how to integrate with those already embroiled in conversations. The zebrafish brain, already capable of complex



Vat of cultured microalgae, such as those used to produce biofuels

visual processing at larval stages, accepts new neurons throughout the fish life span. Boulanger-Weill *et al.* tracked the location, movement, and functional integration of single newborn neurons in developing zebrafish larvae. Following their own developmental trajectories, newborn neurons began with limited dendritic arbors, no neurotransmitter identity, and spontaneous, but not directed, activity. As each neuron matured, its activity began to parallel that of its more mature neighbors. Spatial tuning curves shifted with further maturation, keeping the overall visual response in balance. Bringing new neurons into the fold seems to require synaptic connection with mature neurons already in place. —PJH

*Curr. Biol.* **27**, 1707 (2017).

## BIOTECHNOLOGY

### Bulking up algae for biofuels

In theory, algae could be a workhorse for the production of biofuels. When the industrial microalga *Nannochloropsis gaditana* is starved, it converts carbon to lipid for storage, which can then be extracted and converted to biofuel. However, scientists have been struggling

to sustain growth while optimizing lipid production. Now Ajjawi *et al.* have announced that they can double the lipid content of the algae, without dramatically inhibiting growth. They used CRISPR-Cas9-mediated knockout of transcription factors that could be acting as repressors of lipid production to identify the regulator *ZnCys*. Rather than knocking out *ZnCys* completely (which mimicked starvation in its effects on growth), the investigators attenuated its expression. Although this advance is necessary if biofuel production from *Nannochloropsis* is to become an industrial reality, much more work needs to be done —BJ

*Nat. Biotechnol.* **10.1038/nbt.3865** (2017).

## NANOMATERIALS

### Growing nanosheets off nanowires

Junctions between different nanomaterials sometimes display unusual properties that can have applications in optoelectronics and catalysis. Chen *et al.* used copper sulfide (Cu<sub>2-x</sub>S) nanowires as templates for growing molybdenum sulfide (MoS<sub>2</sub>) and selenide (MoSe<sub>2</sub>) nanosheets, which form at right angles to the nanowire axis. Transmission

electron microscopy revealed an epitaxial nanowire/nanosheet interface. After ion exchange with cadmium (Cd<sup>2+</sup>), the resulting CdS-MoS<sub>2</sub> heterostructures were much more active than CdS for the hydrogen evolution reaction with visible light, because MoS<sub>2</sub> helped slow electron-hole recombination. —PDS

*J. Am. Chem. Soc.* **10.1021/jacs.7b03752** (2017).

## CONSERVATION

### Bumble bees create a buzz

Foraging bees create characteristic vibrations at frequencies of 120 to 400 Hz. Miller-Struttman *et al.* set out to investigate whether the vibrations created by bumble bees can be used to estimate pollination success. They show that physical attributes such as body size and tongue length, which influence pollination success, are correlated with characteristic buzz frequencies. They then used buzz density—that is, the number of buzzes per hour—to estimate pollination services at the landscape scale. Acoustic signatures can thus serve as an inexpensive method to monitor bee populations and assist in their management. —JFU

*PLOS ONE* **10.1371/journal.pone.0179273** (2017).