

a palladium catalyst activates one carbon fragment and then links it to a second fragment pulled from boron. Zhang *et al.* now demonstrate a twist on the conventional pathway (see the Perspective by Fyfe and Watson). In their system, the palladium initially coaxes together two carbon fragments on one boron center. Then the catalyst stitches a second C-C bond to a third, external fragment. A chiral ligand renders the reaction highly enantioselective. — JSY

Science, this issue p. 70;
see also p. 26

PHOTOVOLTAICS

Efficient luminescent solar cells

Shine on! Bi *et al.* fabricated a perovskite-based solar cell that can create extraordinarily high solar-to-electric power conversion and intense electroluminescence. The new-fangled cells should help to produce solar technologies that approach the upper limit for open-circuit voltage. These devices are likely to be competitive with “state-of-the-art” conventional solar technologies and may be used in tandem with more traditional solar cells. — ZHK

Sci. Adv. 10.1126/sciadv.01170 (2016).

CARDIOLOGY

Disruptive technology

Healthy hearts beat synchronously; failing hearts often lose this coordination. Normally, pacemakers are used to reset the heart's rhythm. Kirk *et al.* used pacemakers to restore synchrony by inducing periods of abnormal rhythm—called pacemaker-induced transient asynchrony (PITA). In dogs with heart failure, PITA halted heart chamber dilation and negative remodeling of heart tissue. It also improved cell signaling and force generation, and supported normal muscle fiber structure and function. Some people with pacemakers do not respond to

standard resynchronization protocols; PITA could offer them the possibility of restoring rhythm. — MLF

Sci. Transl. Med. 7, 319ra207 (2015).

BLACK HOLE PHYSICS

Transient radio jet from a black hole

When a star passes too close to a supermassive black hole, it gets ripped apart by the gravitational forces. This causes a tidal disruption flare as the material falls into the black hole. van Velzen *et al.* monitored one such flare with radio telescopes and found evidence for a transient relativistic jet launched by the black hole (see the Perspective by Bower). Larger jets are a feature of active galactic nuclei and have a profound effect on their host galaxy, but are poorly understood. The results will aid our understanding of how black holes “feed” and of the processes governing jet formation. — KTS

Science, this issue p. 62;
see also p. 30

MICROBIAL ENGINEERING

Using light in the darkness

Solid-state devices can efficiently capture solar energy to produce chemicals and fuels from carbon dioxide. Yet biology has already developed a high-specificity, low-cost system to do just that through photosynthesis. Sakimoto *et al.* developed a biological-inorganic hybrid that combines the best of both worlds (see the Perspective by Müller). They precipitated semiconductor nanoparticles on the surface of a nonphotosynthetic bacterium to serve as a light harvester. The captured energy sustained cellular metabolism, producing acetic acid: a natural waste product of respiration. — NW

Science, this issue p. 74;
see also p. 34

IN OTHER JOURNALS

Edited by **Kristen Mueller**
and **Jesse Smith**

NEUROSCIENCE

How brains get the full picture

The visual system helps organisms make sense of their world. A network of brain areas called face patches helps monkeys identify other individuals and interpret their behavior. Fisher and Freiwald wanted to determine whether these regions only interpret face information or if they integrate body information, too. They scanned the brains of monkeys that were shown faces, bodies, faces on bodies, or faces on nonbody objects. Posterior face patches and adjacent body patches recognized faces and bodies, respectively. However, these networks could integrate face and body information to represent whole monkeys in the anterior face patches. Thus, the brain combines visual information from distinct but related objects to help organisms understand their social world. — PRS

Proc. Natl. Acad. Sci. U.S.A. 112, 14717 (2015).

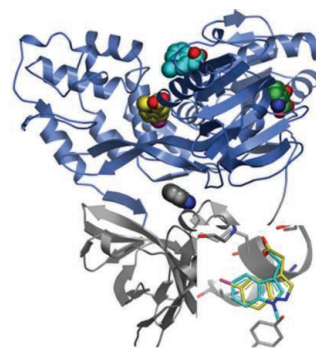
BIOCHEMISTRY

More than one way to target a protein

The primary function of many proteins involves binding to another protein or small molecule. In some cases, however, a second molecule interacting with a distinct site on the protein regulates this primary binding. To identify such functional secondary sites, Ludlow *et al.* used x-ray crystallography to screen a library of

molecules to detect binding to 24 protein targets. Two-thirds of the proteins had at least two binding sites. Sequence analysis of secondary sites showed that most were evolutionarily conserved, suggesting biological function. Moreover, their physicochemical properties indicated that secondary sites may be druggable. Targeting these sites could provide a way to increase protein activity in a therapeutically advantageous manner. — VV

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1518946112 (2015).



Proteins have multiple binding sites that may contribute to their regulation

MITOCHONDRIA

The Drp, Drp, Drp of mitochondrial fission

Mitochondria are very dynamic organelles and undergo regular fusion and fission reactions. Fission involves the dynamin GTPase Drp1, a cytosolic enzyme that is recruited to mitochondria, where it oligomerizes and contracts to cause



The brains of monkeys integrate face and body information to interpret social situations

majority-configuration siblings. But their brains were not simply flipped. Within the epithalamus, neuronal axons projected in unusual patterns. The results suggest that asymmetries in how the brain processes rewards and aversions may favor neuronal circuits to organize in one way over another. — PJH

J. Neurosci. **35**, 15847 (2015).

EDUCATION

Peer + peer = increased learning

In math education, the definition of “cooperative learning” is greater than the sum of these two words. Reinholz describes peer-assisted reflection (PAR) in an introductory calculus class, where students work together to attempt to solve a problem, reflect on their work, conference with a peer, and revise and submit a final solution. PAR emphasizes problem-solving processes, including explanation and justification, similar to an inquiry-based science class. The PAR model stresses peer interaction, with students analyzing their peers’ work in order to develop analytic skills that they can then apply to their own learning. Student success through PAR was significant and comparable to similar active learning interventions in STEM (science, technology, engineering, and mathematics) courses.

Most importantly, PAR resulted in students being less likely to drop introductory calculus. — MM
Int. J. Res. Undergrad. Math. Ed. 10.1007/s40753-015-0005-y (2015).

BIOMATERIALS

Biogenic tools for single-cell surgery

Miniaturization has created a world of new medical tools, from pill-cams that can be swallowed and used to photograph the digestive tract, to tiny robots used for minimally invasive surgery. Srivastava *et al.* pursued this to the level of operating on single cells through the creation of microdaggers. They started with microneedles extracted from plants that are composed of porous calcium oxalate and calcium carbonate. Coating the microneedles with a layer of iron and titanium allowed their manipulation by means of a magnetic field. The tip of the microdagger could drill into a cell, and the porous nature of the needles should make it possible to preload them to deliver drugs to individual cells. — MS�

Adv. Mat. 10.1002/adma.201504327 (2015).

ORGANIC CHEMISTRY

An asymmetric route to amino alcohols

Amines and alcohols are among the most common and versatile functional groups in organic chemistry. The nitroso variant of the Diels-Alder reaction is a convenient means of introducing both to the same molecule. Both ends of the N=O group form a bridge between the outer carbons in a C=C–C=C diene motif, after which the lingering N–O bond can be severed. Maji and Yamamoto present a highly selective asymmetric variant of this reaction, catalyzed by a copper complex bearing a chiral diphosphine ligand. The reaction couples a range of cyclic dienes with nitroso pyrimidines and pyridazines. — JSY

J. Am. Chem. Soc. 10.1021/jacs.5b11273 (2015).

the mitochondrial membrane to constrict. Ji *et al.* studied Drp1 dynamics in live cells. Contrary to current models, fission sites did not directly recruit Drp1 from the cytoplasm. Instead, mitochondria progressively added Drp1 molecules to form oligomers. Most mature Drp1 oligomers did not mediate fission. When the authors experimentally induced mitochondrial fission, actin and Drp1 accumulated sequentially at specific mitochondrial fission sites. Thus, the assembly of fission-productive Drp1 oligomers involves recruitment, maturation, and actin-dependent conversion. — SMH

eLife 10.7554/eLife.11553 (2015).

NEURODEVELOPMENT

Asymmetrical circuits reduce anxiety

Although fish are overall bilaterally symmetrical, the devil is in the details. For instance, in zebrafish, a part

of the forebrain called the epithalamus exhibits asymmetry. However, this orientation is reversed in the brains of a small percentage of zebrafish. Facchin *et al.* asked whether this matters to the fish. They found that fish with brains of the minority configuration showed signs of increased anxiety when compared to their



Brain asymmetry regulates anxiety in zebrafish