A central control center allows octopuses to move their heads and eight arms independently

NEUROSCIENCE

Managing eight arms

How does the octopus control its long and flexible arms? Levy *et al.* used kinematic analysis, filming animals as they maneuvered, and found that octopuses evolved a unique way of efficiently generating and controlling crawling. They can crawl in any direction relative to their body orientation, a feature found only in animals with radial organization, such as starfish. However, in contrast to those animals, octopuses control the direction in which the body faces, independently of the crawling direction. Octopuses can thus change the crawling direction while maintaining a fixed gaze direction, or rotate their body while continuing to crawl in the same direction. This indicates the existence of a sophisticated central command generator in the motor centers of the octopus brain. — PRS

Curr. Biol. **25**, 10.1016/j.cub.2015.02.064 (2015).

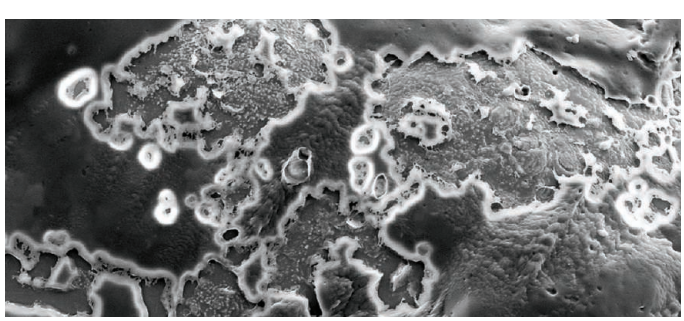
T cells results in up-regulation of the RNA binding protein CELF2 (CUGBP, Elav-like family member 2). This gene is associated with posttranscriptional modifications of RNAs, including alternative splicing. Mallory *et al*. show that in response to T cell stimulation, expression of CELF2 is up-regulated and its transcripts are stabilized, ensuring an increase in the availability of this RNA. Furthermore, this up-regulation of CELF2 is associated with specific alternative exon transcripts and isoform expression within stimulated T cells. These results suggest that regulation of specific transcriptomes is important for mounting an immune response. — LMZ

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1423695112 (2015).

MATERIALS SCIENCE

Seeing sonic hot spots

Mechanical impact can detonate explosives, but how impact heats these materials to initiate reactions has been unclear. You *et al*. used mild ultrasound irradiation to study composite materials —small crystals of sucrose or table salt in rubber—while performing thermal imaging. Uncoated particles remained unheated, but particles that had a coating that could delaminate (a polyethylene glycol layer that liquefies or Teflon) heated very rapidly (up to ~22,000 K per second). Delamination allows the particle to move and friction-heat against the matrix, an effect that authors also saw in samples of polymer-bonded explosive (PBX). — PDS



PTFE coatiing on an NaCl crystal degraded by ultrasonic heating

Nat. Commun. 10.1038/ncomms7581 (2015).

MINERAL PHYSICS

Strength to put a stop to sinking slabs

Tectonic plates plunging toward Earth's core can unexpectedly stop sinking in the middle of the mantle. Marquardt and Miyagi provide a potential explanation involving the abundant mantle mineral ferropericlase. Their x-ray diffraction experiments revealed a large increase in the strength of ferropericlase with increased pressure. This translates to a viscosity increase at mid-mantle depths, providing a rheological barrier that subducted ocean lithosphere cannot easily penetrate. This mechanism of slab stagnation may also explain some of the mantle's well-known chemical heterogeneity. — BG

Nat. Geosci. 10.1038/ngeo2393 (2015).

ANTIBIOTICS

Extent of children's antibiotic exposure

Antibiotics are widely used in human and veterinary medicine and in personal care products, so people are increasingly exposed to them in the environment and in food. How high is the resulting antibiotic burden? Wang *et al.* measured the concentrations of 18 representative antibiotics in the urine of 1064 schoolchildren from three economically and geographically distinct areas in eastern China. They show that 58.3% of samples contained at least one antibiotic and that more than 20% of samples contained more than one. A lack of suitable analytical methods for some commonly used antibiotics means that the total antibiotic burden is likely to be even higher. Based on contamination data for the aquatic environment, exposures of children in the United States and Europe may be similar to those in this study. — JFU

Environ. Sci. Technol. 10.1021/es5059428 (2015).