OIL BIODEGRADATION

Microbial life thrives in an oily bubble

Microorganisms can break down hydrocarbons in oil reservoirs. Microbes grow primarily at the interface between oil and water, where they can find nutrients and dispose of metabolites. Meckenstock *et al.* now show that tiny water droplets can also provide a suitable home for hydrocarbon-degrading microorganisms. The authors examined oil from Pitch Lake, Trinidad and Tobago, and found that diverse microorganisms thrived in these tiny isolated microhabitats. — NW

Science, this issue p. 673

Pitch Lake, Trinidad and Tobagao

RIBOSOME STRUCTURE

Factors that aid ribosomal protein synthesis

The ribosome is a large macromolecular machine responsible for making proteins inside cells. During its mechanical cycle, parts of the ribosome must move. These movements are facilitated by proteins that bind to the ribosome. Gagnon *et al*. describe the structure of one such protein, Elongation Factor 4, bound to the ribosome. This protein appears to help the ribosome to reverse its conformation as it is making a protein, which might prevent the ribosome from stalling during protein synthesis. — VV

Science, this issue p. 684

CARDIOVASCULAR DISEASE

Better blood thinner, without bleeding

Blood thinners prevent heart attacks and strokes by making it harder for blood to clot, but these drugs can put patients at risk of dangerous bleeding. Now Moeckle *et al*. describe an enzyme that can prevent clots without this perilous side effect. They engineered the enzyme apyrase to remove the pro-clotting molecule ADP from the blood quickly. In dogs and mice with heart attacks, apyrase stopped blood cells from aggregating, the first step in forming a clot. At the highest dose, the animals suffered less heart damage and did not bleed excessively. In comparison, clopidogrel, a blood thinner used currently in patients, protected the heart less well and did cause excessive bleeding. — KLK

Sci. Transl. Med. **6**, 248ra105 (2014).

IN OTHER JOURNALS

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

PHYSICS

Making more-directional magnetic materials

Magnetic materials generally reach an ordered state when they are made cold enough. Theoretical physicists, however, came up with the fascinating concept of a quantum spin liquid (QSL), which remains in a disordered (liquidlike) state even at absolute zero. Some three-dimensional (3D) materials may show hints of becoming a QSL at higher temperatures, which makes them easier to study. Modic *et al.* synthesized a form of the 3D compound Li_2IrO_3 in which magnetic interactions strongly depend on spatial direction, in line with theoretical predictions. X-ray diffraction pointed to a crystal structure made up of honeycomb planes with varying orientations. Although these crystals show magnetic ordering, the authors envision a series of related structures of this material that all could be QSLs. — JS

Nat. Commun. **5**, 4203 (2014).

EVOLUTION

How proteins can evolve new functions

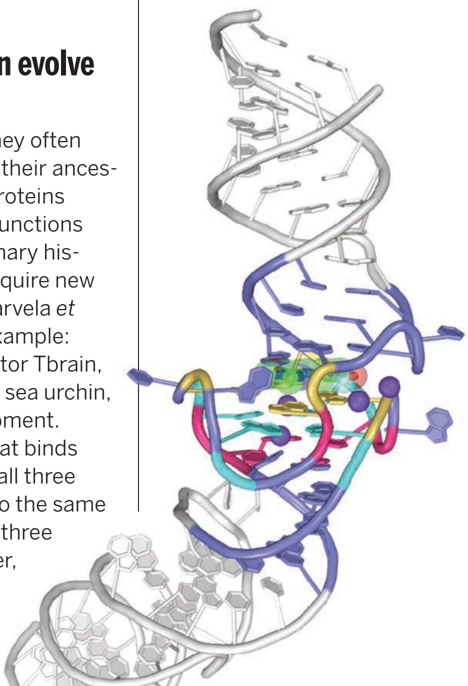
As species evolve, they often retain proteins from their ancestor species. Those proteins often retain critical functions throughout evolutionary history, but they can acquire new roles, too. Cheatle Jarvela *et al*. investigate one example: the transcription factor Tbrain, which drives mouse, sea urchin, and sea star development. A region of Tbrain that binds to DNA appeared in all three species and bound to the same DNA sequence in all three species, too. However, both mouse and sea star Tbrain also bound to a second DNA sequence, which differed between the two species. In sea stars, that second binding induced gene expression. The work highlights one path genes can take to evolve new functions. — LMZ

Mol. Biol. Evol. 10.1093/molbev/msu213 (2014).

RNA STRUCTURE

A fluorescent tool for tagging RNA

A fluorescent tool for tagging RNA, green fluorescent protein (GFP) revolutionized cell biology by allowing researchers to tag proteins with the glowing substance. Scientists recently developed an analogous RNA tool, called Spinach, which consists of a short segment of RNA bound to a molecule that mimics the GFP chromophore (the part responsible for its fluorescence). Warner *et al*. now report the crystal structure of Spinach. They find that an unusual RNA conformation held the chromophore in place. The conformation includes a G-quadruplex, a structure



Structure of the full-length Spinach RNA

CREDITS: (LEFT TO RIGHT) CHRISTINE UND DAVID SCHMITT/FLICKR; KATHERINE WARNER AND ADRIAN FERRÉ-D'AMARÉ

A deadly creosote bush in the Mojave Desert

GUT MICROBIOTA

How to eat poison and get away with it

Plants such as the creosote bush can't run away from grazing animals; instead, they defend themselves by making poisonous compounds for defense. Woodrats living in the Mojave Desert detoxify these chemicals in their livers, allowing them to safely eat this plant. Now Kohl *et al.* find that woodrats have another resource to draw on: their gut microbes. Bacteria in their guts use an enzyme called aryl alcohol dehydrogenase to detoxify the chemicals. When the team treated woodrats with antibiotics and fed them creosote, the animals suffered toxic effects. However, when the woodrats simultaneously ate microbes from untreated animals, they stayed resistant to the toxin. The woodrats' gut microbes let them thrive in a tough environment populated by plants nobody else wants to eat. — CA

Ecol. Lett. 10.1111/ele.12329 (2014).

composed of four RNA strands. Solving the structure allowed the authors to design a miniature Spinach and may open the door to other fluorescent RNAs. — VV

Nat. Struct. Mol. Biol. 10.1038/nsmb.2865 (2014).

NANOMATERIALS

Peering into the heart of a quantum dot

When you shrink semiconductors down to quantum dots—particles a few billionths of a meter in diameter—their color becomes very sensitive to their size. Over the past decade, scientists have exploited this property in numerous optical devices without knowing the precise atomic structure of the particles they were using. Beecher *et al.* now report detailed structures of three classes of cadmium selenide quantum dots, each with a different size and light absorption spectrum. The key was to use a selenium precursor that facilitated the synthesis of highly uniform samples. In the past, the dots in a single sample tended to range too much in size for this degree of characterization. — JSY

J. Am. Chem. Soc. 10.1021/ja503590h (2014).

TECHNOLOGY TRANSFER

Technology transfer for adaptation

We will not adapt to climate change solely through the use of technology, but certainly it must play a key role. Biagini *et al.* studied how technology transfer —the transfer of technology from those who have it to those who need it—is incorporated into adaptation projects funded by the Global Environmental Facility. Some projects focused on "hard" technologies, such as special materials to use for reef rehabilitation in India, but more focused on the transfer of knowledge and institutional organization, such as agroforestry training in Haiti. Most projects demonstrated existing technologies on a small scale or focused on deploying existing technologies early or in specialized areas. Many projects focused on domestic rather than "north-south" transfer from richer to poorer countries, reflecting the regional context of many adaptation challenges. — BW

Nat. Clim. Change 10.1038/nclimate2305 (2014).

NEUROSCIENCE

Hearing sounds can improve your vision

Sounds can draw our attention to a specific location and make us aware of something that we may otherwise overlook. But do auditory cues improve the function of other senses, such as sight? To find out, Feng *et al*. recorded the electrical activity in people's brains when they were seeing and hearing stimuli. The researchers played a sound from one side and then quickly flashed a visual stimulus either on the same side as the sound or on the opposite side. When the sound and the visual stimulus came on the same side, electrical activity in the brain increased and people correctly identified the visual stimulus more often. This suggests that sound helps the brain process co-localized visual input. — PRS

J. Neurosci. **34**, 9817 (2014).

CELL BIOLOGY

Stem cell factories inside teeth

Development is thought to be one-way: Stem cells produce cells that mature into specific types, such as neurons and glia in nervous systems. But Kaukua *et al.* found nervous system cells transforming back into stem cells in a surprising place: teeth. Researchers knew that "tooth pulp" contains mesenchymal stem cells, which can mature into teeth, bones, and cartilage. But where those stem cells come from was not clear. So the team traced the cells' development, adding fluorescent labels to mouse glial cells around neurons in the mouth and gums. Some glial cells migrated toward the inside of teeth and transformed into mesenchymal stem cells, eventually maturing into tooth cells, they found. Identifying which chemical cues in teeth pulp signal glial cells to transform into stem cells, the team notes, could offer a new way to grow stem cells in the lab. — SW

Nature 10.1038/nature13536 (2014).

Science

Stem cell factories inside teeth

Sarah C.P. Williams

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