

RESEARCH HIGHLIGHTS

Selections from the scientific literature

GENOME EDITING

Editing enzyme made more precise

By tweaking the structure of an enzyme that cuts DNA, researchers have lowered the error rate of CRISPR–Cas9 gene editing.

Feng Zhang at the Broad Institute of MIT and Harvard in Cambridge, Massachusetts, and his colleagues engineered the Cas9 enzyme so that it is less likely to act at DNA sites that are not targeted by the RNA molecules that guide the enzyme. The team generated several versions of Cas9 that reduced off-target errors by at least tenfold compared with unaltered Cas9 enzymes. Three of those versions were just as active at their target sites as ordinary Cas9.

Even so, the error rate may need to be reduced further for CRISPR gene editing to be used for human therapies.

Science <http://doi.org/9q2> (2015)

MICROBIOMES

Gut bacteria change with cold

Gut microbes alter the metabolism of mice to help the animals to adapt to the cold.

Mirko Trajkovski of the University of Geneva, Switzerland, and his team studied mice that were kept at low temperatures, and found that their microbiomes diverged from those of mice housed at room temperature. When microbes from cold-exposed mice were transplanted to those without any bacteria, the recipients made more beige fat cells, which burn more energy to produce heat than white fat cells do. The transplants also improved the recipients' metabolism by boosting their insulin sensitivity. Both cold



P. SUTTER/CORBIS

ZOOLOGY

Cuttlefish use electric camouflage

When cuttlefish freeze as enemies approach, they are reducing their bioelectric fields, which predators can detect.

Christine Bedore at Duke University in Durham, North Carolina, and her colleagues showed videos of approaching predators, including sharks, to *Sepia officinalis* cuttlefish (pictured) in lab tanks, and analysed their behaviour and the electric fields they emitted. Most cuttlefish froze when they saw the predator, flattening themselves against the tank, reducing

their breathing rate and closing their orifices. These behaviours reduced their bioelectric fields, which are generated by ion exchange between respiratory structures and seawater.

Captive sharks that were presented with electric currents mimicking both frozen and resting cuttlefish were more likely to bite at the stronger fields that represented resting creatures. This suggests that the freeze response lowers the electric 'visibility' of cuttlefish.

Proc. R. Soc. B 282, 20151886 (2015)

exposure and transplants increased the absorptive surface of the gut, enhancing caloric uptake.

The microbiome's control over energy expenditure could make it a therapeutic target for combating obesity, the researchers suggest.

Cell 163, 1360–1374 (2015)

GEOLOGY

Mediterranean quake risk rises

Earthquakes threaten the eastern Mediterranean more than scientists had thought.

A team led by Vasiliki Mouslopoulou at the GFZ

German Research Centre for Geosciences in Potsdam analysed and carbon-dated ancient shorelines in Crete to estimate when and how quickly earthquakes over the past 50,000 years pushed the island upwards. They conclude that at least 40 quakes of magnitude 8 or greater would have raised the land to its current level.

The quakes came in clusters separated by quieter periods. The entire eastern Mediterranean could be at higher risk of future mega-quakes — and the resulting tsunamis — than previously suspected.

Geophys. Res. Lett. <http://doi.org/9q3> (2015)

SYNTHETIC BIOLOGY

Kill switches limit modified microbes

Genetic switches that make bacteria self-destruct in response to specific signals could help to keep engineered microbes in check.

Microbes that have been genetically modified for industrial and other uses rely on the addition of certain nutrients to grow, but this makes it difficult to design organisms that can be contained in different environments. To overcome this, James Collins of the Massachusetts Institute of