RESEARCH HIGHLIGHTS

Selections from the scientific literature

CANCER

Blocking tumour sugar metabolism

An emerging strategy in cancer drug development is to target key metabolic molecules in tumours. Researchers have pinpointed one for prostate cancer: an enzyme involved in glucose metabolism that seems to be crucial to cancer survival.

Almut Schulze at the Cancer Research UK London Research Institute and her colleagues found that the survival of three different prostate cancer cell lines depended on glucose. Using small RNA molecules to silence genes for 222 enzymes and other molecules involved in glucose metabolism, the authors screened these cells for genes required for survival, and homed in on one, *PFKFB4*. Shutting this gene down in tumour cells stopped them from growing when they were injected into mice.

PFKFB4 enables cancer cells to produce antioxidants, which neutralize harmful oxidizing molecules. The researchers say that this protein could be a target for cancer drugs.

Cancer Discov. **http://dx.doi.org/10.1158/2159-8290.CD-11-0234 (2012)**

M. SECCHI/CORBIS

GEOSCIENCE

Venice: sliding down, tilting east

Although previous research had indicated that Venice had stabilized, an up-to-date study suggests that the city is still sinking — and even tilting slightly to the east.

Yehuda Bock at the University of California, San Diego, and his colleagues combined Global Positioning System data from five stations in Venice and its lagoon from 2001 to 2011 with four years of data from space-based radar instruments. They found that Venice is sinking at a rate of 1–2 millimetres per year, with a general eastward tilt, and say that shifting tectonic plates and sediment compaction might be responsible.

The results may help the city to prepare for flooding caused by rising sea levels and seasonal tides.

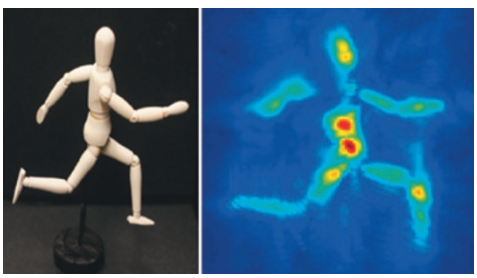
Geochem. Geophys. Geosyst. **http://dx.doi.org/10.1029/2011GC003976 (2012)**

OPTICS

Camera sees hidden objects

An ultrafast camera can create images of objects hidden behind a wall by capturing scattered laser light.

Ramesh Raskar at the Massachusetts Institute of Technology in Cambridge and his group fired a pulse of laser light at a wall on the far side of a hidden object (**pictured, left**), and recorded the time at which the scattered light — including the small fraction of photons that bounced off the object — reached their camera. The device records images every 2 picoseconds, allowing it to record the distance travelled by each photon with sub-millimetre precision. The team's algorithm then uses this information to reconstruct the image (**right**).



This ability to see around corners could be invaluable in dangerous or inaccessible locations, such as in highly contaminated areas or inside machinery with moving parts.

Nature Commun. **3, 745 (2012)**

For a longer story on this research, see go.nature.com/nlsom5

IMMUNOLOGY

Early exposure to microbes is key

An observed increase in the prevalence of certain autoimmune diseases has been linked to the lack of childhood exposure to microbes. A study by Dennis Kasper and Richard Blumberg at Harvard Medical School in Boston, Massachusetts, and their colleagues reveals a possible cellular mechanism for this 'hygiene hypothesis'.

The authors found that when they induced asthma or colitis in juvenile mice raised in a sterile environment, the animals had higher-than-normal levels of a type of immune cell called invariant natural killer T cells in their lungs or colon, respectively. These cells trigger inflammation and have been linked to ulcerative colitis and asthma. Moreover, expression

of CXCL16, an inflammatory signalling molecule linked to the T cells, was also elevated in the lungs and colon, and seemed to be regulated by microbes.

Mice exposed to microbes as neonates, but not as adults, showed a decreased accumulation of the T cells, emphasizing the importance of early exposure.

Science **http://dx.doi.org/10.1126/science.1219328 (2012)**

For a longer story on this research, see go.nature.com/hacoqo

REGENERATIVE BIOLOGY

Cell transplants repair colon

Tissue derived from gut stem cells can repair intestinal damage when transplanted into mice.

Mamoru Watanabe at the Tokyo Medical and Dental University, Hans Clevers at the Hubrecht Institute and University Medical Centre in Utrecht, the Netherlands, and their colleagues cultured intestinal fragments from mice and transplanted the cells, which included colonic stem cells, into mice with acute colitis. These mice gained more weight than untreated mice during the first week after treatment, and four weeks after transplantation the repaired intestinal lining seemed to be identical to the surrounding native tissue.

Colonic tissue grown from a single stem cell and placed in the mouse gut also regenerated the lining. Culturing colonic tissue from stem cells could be a therapeutic approach for human intestinal disorders such as colitis, the authors say.

Nature Med. **http://dx.doi.org/10.1038/nm.2695 (2012)**

PLANETARY SCIENCE

What lies beneath Mercury's surface

After its first year in orbit around Mercury, NASA's MESSENGER spacecraft has yielded data on the planet's structure: the iron core is larger than previously thought and, unusually, is encased in a relatively thin shell of iron sulphide.

Maria Zuber at the Massachusetts Institute of Technology in Cambridge and her colleagues built a gravity model for the planet using measurements of tiny changes in the spacecraft's orbit. Combining this model with data on the planet's topography and spin, the authors found that as much as 85% of Mercury's radius is taken up by its dense iron core. This, along with the iron sulphide shell, helps to explain the planet's gravity field.

Another paper from Zuber and colleagues suggests that volcanic and tectonic activity persisted well past Mercury's first several hundred million years. This could explain surface features observed by the team, such as uplifted or tilted basin floors.

Science **http://dx.doi.org/10.1126/science.1218809; http://dx.doi.org/10.1126/science.1218805 (2012)**

For a longer story on this research, see go.nature.com/orseqg

METABOLISM

Gain neurons, gain weight

Mice consuming a high-fat diet generate new neurons in a part of the brain that controls feeding and metabolism. These cells may, in turn, promote the accumulation of fat.

Seth Blackshaw at Johns Hopkins University in Baltimore, Maryland, and his colleagues found a region of brain-cell production in the hypothalamus — which regulates eating and energy use — in young adult mice. Animals fed a high-fat diet had four times the rate of neuronal production in this region, called the median eminence, than those on a normal diet.

When this brain-cell generation was blocked, mice on the fatty diet gained less weight and exhibited a speedier metabolism than animals that ate the same diet and continued to produce new neurons.

Nature Neurosci. **http://dx.doi.org/10.1038/nn.3079 (2012)**

COMMUNITY CHOICE

The most viewed papers in science

GENETICS

Tracking Taz's transmissible cancer

HIGHLY READ on www.cell.com 20 Feb–21 Mar

The contagious facial cancer devastating populations of the endangered Tasmanian devil in Australia probably originated from a female animal, a genomic analysis finds.

Elizabeth Murchison and Michael Stratton at the Wellcome Trust Sanger Institute in Hinxton, UK, and their colleagues sequenced the genomes of two healthy Tasmanian devils and two geographically distinct tumours derived from the cancer, which is spread through biting. They also analysed the genomes of 104 other tumours from across Tasmania and found that the original tumour has evolved into different subclones. Six devils had tumours with two different genetic profiles, suggesting that exposure to the cancer does not protect the animals against future bites.

Cell 148, **780–791 (2012)**

D. TAL/ALBATROSS/ALAMY

GEOPHYSICS

The reawakening of Santorini

After 60 years of silence, the volcano that erupted to form the Greek islands of Santorini (**pictured**) thousands of years ago seems to have reawakened.

Andrew Newman at the Georgia Institute of Technology in Atlanta and his colleagues analysed data from 24 Global Positioning System stations around the volcano from 2006 to 2012. They found that, since the beginning of 2011, the volcano's main caldera, a crater-like depression, has been expanding by up to 18 centimetres in diameter per year — probably as a result of the expansion of its source of magma, some four kilometres below the surface. The ground deformation coincided with observations of renewed seismic activity in the area.

The earthquake activity and ground deformation could be a prelude to a small eruption, the researchers say, but a mega-eruption is unlikely. However, other volcanoes of the same type that have shown similar signs of unrest have returned to normal activity without erupting at all.

Geophys. Res. Lett. **http://dx.doi.org/10.1029/2012GL051286 (2012)**

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