

# RESEARCH HIGHLIGHTS

Selections from the scientific literature

## NEUROSCIENCE

### Hormone linked to depression

A hormone released by fat cells that is associated with a reduced risk of type 2 diabetes could also protect against depression.

Blood levels of the hormone adiponectin are positively correlated with insulin sensitivity. Xin-Yun Lu at the University of Texas at San Antonio and her colleagues manipulated levels of adiponectin in the blood and brains of mice, and assessed the animals' likelihood of exhibiting depression-like behaviours in response to stressors. The researchers found that mice with low blood levels of the hormone were more likely to show signs of depression than were control animals. Injecting adiponectin-neutralizing antibodies into the mouse brain also increased the likelihood of depression-like symptoms. By contrast, injecting adiponectin into the brain had an antidepressant-like effect in both normal-weight and obese, diabetic mice.

The findings could explain why depression is twice as prevalent in people with type 2 diabetes as in the general population.

*Proc. Natl Acad. Sci. USA*  
<http://dx.doi.org/10.1073/pnas.1202835109> (2012)

## PALAEoANTHROPOLOGY

### Lucy's relatives walked upright

An analysis of bones from the same species as 'Lucy' — a hominin who lived 3.2 million years ago — suggests that this species was more human-like than previously thought.



Carol Ward at the University of Missouri in Columbia and her team analysed dozens of *Australopithecus afarensis* bones (example pictured), unearthed between 1990 and 2007 in Hadar, Ethiopia. The bones have been dated to between 3 million and 3.4 million years ago, and are thought to be from individuals intermediate in size between the smallest and the largest *A. afarensis* specimens yet found.

Foot bones indicate that *A. afarensis* had an arched foot, whereas vertebrae suggest



## ECOLOGY

### For more than just kissing

The ecological impact of mistletoe plants — proposed to be keystone species crucial to ecosystem health — has been quantified. This is the first such attempt for any keystone species.

Mistletoes (Loranthaceae; pictured) provide fruit and nectar, as well as nesting and roosting sites for animals such as birds and insects. David Watson and Matthew Herring at Charles Sturt University in Albury, Australia, removed mistletoes from 17 woodland sites in the state of New South Wales in 2004. Three years

after the plants' removal, species richness had declined by an average of 20.9% overall, and by 26.5% in the case of woodland-dependent bird species. By contrast, in 11 control sites where mistletoes remained, average species richness had increased.

Mistletoes promote biodiversity mainly by enriching the soil with nutrients through leaf fall and decomposition, the authors suggest. *Proc. R. Soc. B.* <http://dx.doi.org/10.1098/rspb.2012.0856> (2012)

a more human-like upper backbone than previously suspected. Both are consistent with upright walking. *J. Hum. Evol.* <http://dx.doi.org/10.1016/j.jhevol.2011.11.012> (2012)

## MICROBIOLOGY

### Watching biofilms form

A sophisticated imaging technique has enabled researchers to watch bacteria assemble into tight-knit, organized communities called biofilms and to discern the structure and key protein components that hold these communities together.

Biofilms help bacteria to survive stressors such as antibiotics, but studying intact, living biofilms has proved difficult. Veysel Berk at the University of California, Berkeley, and his team developed a method to fluorescently label proteins in cells and continuously image them using conventional and super-resolution microscopy. The researchers watched dividing *Vibrio cholerae* cells, which cause cholera, and found that biofilms form when daughter cells remain attached to their parent cells, generating cell clusters. These clusters group together and are enclosed by a protein envelope to ultimately form the biofilm.

A. DESCAT/MAP/GARDEN WORLD

The team also pinpointed the roles of four proteins that form the protein envelope and that allow cells to stick to each other and to surfaces.

*Science* 337, 236–239 (2012)

## ASTRONOMY

## Dark galaxies revealed

'Dark' galaxies contain no stars, making them impossible to observe using optical telescopes. Now, Sebastiano Cantalupo and his colleagues at the University of California, Santa Cruz, have managed to detect a faint fluorescent glow from a few such galaxies.

The researchers used the European Southern Observatory's Very Large Telescope to look at bright galaxies known as quasars, which can illuminate nearby dark galaxies. The team was able to see the glowing outline of a dozen candidate dark galaxies, thanks to radiation from a quasar exciting the hydrogen gas in these galaxies.

The team estimates the dark galaxies contain a gas mass around one billion times that of the Sun. These galaxies could serve as reservoirs of hydrogen fuel for star formation in larger galaxies, the authors suggest.

*Mon. Not. R. Astron. Soc.* <http://dx.doi.org/10.1111/j.1365-2966.2012.21529.x> (2012)

## COGNITIVE NEUROSCIENCE

## A smart hub in the brain

Human intelligence could result from high levels of activity in a region of the brain called the lateral prefrontal cortex, as well as strong connectivity between this region and the rest of the brain.

Human intelligence is marked by the ability to direct thoughts and behaviour in pursuit of a goal. This 'cognitive control' has previously been linked to activity in the lateral prefrontal cortex. Using functional magnetic resonance imaging, Michael Cole at Washington University in Saint

Louis, Missouri, and his team examined the activity of this region and its connectivity across the brain in 94 young adults. Individuals with high levels of connectivity were more likely to perform well on tests of both cognitive control and intelligence.

The lateral prefrontal cortex could act as a global hub for human intelligence that exerts its effects across the brain.

*J. Neurosci.* 32, 8988–8999 (2012)

## BIOPHYSICS

## Trout nose yields magnetic cells

Certain animals, including some birds and fish, are guided by magnetic fields, and researchers have isolated magnetic cells that could be at the root of this internal compass.

Michael Winklhofer at Ludwig-Maximilians-University in Munich, Germany, and his colleagues took epithelial cells from the rainbow trout nose and exposed them under a microscope to a moderately strong, rotating magnetic field. A few of the cells spun at the same frequency as the magnetic field, indicating that they were sensitive to the field, whereas the other cells did not alter their behaviour. High-resolution imaging showed that the responsive cells had micrometre-scale structures composed of iron-rich crystals attached to their cell membranes. These caused the cells to align with the magnetic field.

*Proc. Natl Acad. Sci. USA* <http://dx.doi.org/10.1073/pnas.1205653109> (2012)

## BIODIVERSITY

## Extinctions still to come

Up to 90% of extinctions due to Amazon rainforest loss have yet to occur, a modelling study suggests.

Robert Ewers and his team at Imperial College London in Ascot used deforestation

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## CANCER BIOLOGY

## p53 can be cancer's friend, not foe

**HIGHLY READ**  
on [www.cell.com](http://www.cell.com)  
10 June–10 July

The protein p53 is well known for its role as a tumour suppressor; however, p53 can also help breast tumour cells to dodge the effects of chemotherapy.

Normal p53 activates programmed cell death, or apoptosis, and the p53 gene is often mutated in cancer. Researchers expected that tumours with mutant p53 would be more difficult to treat than those with normal p53, but previous studies on breast cancer have not found this. Guillermina Lozano at the MD Anderson Cancer Center in Houston, Texas, and her team therefore tested the effects of a chemotherapy drug, doxorubicin, on mice bearing breast tumours with either normal or mutated p53.

Tumours in mice with normal p53 shrank little in response to treatment and relapsed more quickly than those with mutated p53. After treatment, many tumour cells with normal p53 entered a state of senescence in which they stopped dividing — however, the cells secreted signalling proteins that could trigger the proliferation of neighbouring cells, leading to relapse.

*Cancer Cell* 21, 793–806 (2012)



A. LEES

data from 1978 to 2008 — plus data on forest-dependent vertebrates — to create a model that relates species extinction to the timing and amount of habitat loss. The model takes into account the fact that species do not become extinct immediately after losing their habitats and that deforestation happens intermittently, rather than all at once as previous models have assumed.

The authors calculated the number of species headed for extinction owing to previous deforestation, or the 'extinction debt': an average of two mammals, four or five birds,

and one amphibian for every 2,500 square kilometres.

The team then projected Amazon extinctions up to 2050 on the basis of four scenarios of different levels of forest regulation. They found that in the most likely scenario, 60–70% of expected extinctions would be yet to come as a result of past and future habitat loss.

*Science* 337, 228–232 (2012)  
For a longer story on this research, see <http://go.nature.com/rmo2d3>

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