RESEARCH HIGHLIGHTS

Selections from the scientific literature

NEUROSCIENCE

Stimulating depression away

Patients with treatment-resistant depression showed rapid improvement after electrodes were inserted at a site in the medial forebrain — a region associated with motivation and reward.

Of the seven patients who received deep brain stimulation, Volker Coenen at University Hospital Freiburg, Germany, and his colleagues report that six responded — measured by a common scale of depression — within days. This response is much faster than the many weeks required for an antidepressant effect in other pilot studies in which researchers targeted other sites in the same brain region and used a higher current. However, the authors say that their results are preliminary and need to be confirmed in larger, controlled studies.

Biol. Psychiatry **http://dx.doi.org/10.1016/j.biopsych.2013.01.034 (2013)**

MICROBIOLOGY

Dogs and owners share microbes

Humans are colonized by the same types of microbe as the people and the pets they live with.

Rob Knight at the University of Colorado Boulder and his team used DNA sequencing to analyse the microbes colonizing the skin, guts and mouths of 159 people and 36 dogs, living in 60 households.

Humans tended to have similar microbial communities — particularly on the skin — to their spouses and children. Adult dog-owners also had more skin microbes in common with their dogs than with other dogs. However, microbes in the mouths and guts of canines differed from those of their owners. Shared skin microbiota might help to explain why dog ownership is associated with reduced allergy rates in children, the researchers say.

eLIFE 2, **e00458 (2013)**

RYAN TAYLOR

ANIMAL BEHAVIOUR

Babies of stressed squirrels grow faster

Social stress alters hormone levels in red-squirrel mothers and leads to faster-growing pups.

In a 22-year study, Ben Dantzer, now at the University of Cambridge, UK, and his team found that, in densely populated red-squirrel (*Tamiasciurus hudsonicus*; pictured) communities, females that had faster-growing pups saw more of them survive their first winter. The researchers simulated crowded conditions by playing recordings of squirrels' territorial cries. Mothers living in dense groups or exposed to the cries had higher levels of breakdown products from the stress hormone cortisol in their faeces. Pups of squirrels that heard the recordings grew faster than pups of females that heard bird noises. Feeding pregnant squirrels cortisol also boosted the growth rate of their pups, by 41%.

Science **http://dx.doi.org/10.1126/science.1235765 (2013)**

BIOMATERIALS

Worm-inspired adhesive

Whether tissue is wet or dry, a new bandage will stick to it — like an intestinal parasite.

Jeffrey Karp at Brigham and Women's Hospital in Boston, Massachusetts, and his team have designed a gripping material that steals the sticky secrets of the spiny-headed worm *Pomphorhynchus laevis*. The parasite pierces its fish host with a proboscis that then swells up to lock into place.

The researchers' adhesive is made up of spikes coated with a super-absorbent plastic. When the spikes come into contact with water in tissue, they swell and fasten to the tissue. The removable bandage adhered tightly to pig skin and intestine, and was more than three times as adhesive as surgical staples for affixing skin grafts.

Nature Commun. 4, **1702 (2013)**

NEUROSCIENCE

Autism gene alters endocannibinoids

Certain gene mutations associated with autism interfere with nervous-system signals that activate the same pathways as cannabis.

Some people with autism have a mutation or deletion in the neuronal gene neuroligin-3. But, although mice carrying a gene with the human mutation show autism-like behaviours, mice that lack the gene do not. Csaba Földy, Robert Malenka and Thomas Südhof at Stanford University

in California have found that mutation, as well as deletion, of the gene changes how certain groups of neurons in the brain transmit signals. Signalling of a neuronal receptor that responds to cannabis and to endocannibinoids (which are made by the brain) is impaired in mice in which neuroligin-3 is mutated or missing. This suggests that disrupted endocannibinoid signalling contributes to autism, a mechanism that could suggest new strategies for treatment.
Neuron **http://dx.doi.org/10.1016/j.neuron.2013.02.036 (2013)**

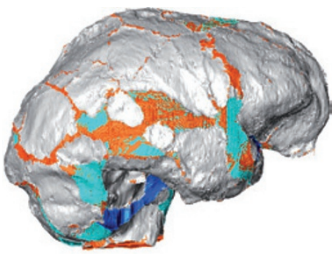
PALAEONTOLOGY

'Hobbit' brains not so small

New estimates of brain size for *Homo floresiensis* make it more feasible that the diminutive hominid descended from *Homo erectus*.

The origins of *H. floresiensis* have been intensely debated in the decade since the roughly 18,000-year-old fossils of the 1-metre-tall hominid were discovered on the island of Flores in eastern Indonesia. Yousuke Kaifu at the University of Tokyo and his colleagues used replicas of an *H. floresiensis* skull and high-resolution computed-tomography scans to make models (**pictured**) of the hominid's brain. Their calculation of 426 cubic centimetres — roughly one-third the volume of a human brain, and the most accurate estimate so far — is slightly bigger than previous estimates. Just big enough, the authors say, that it is mechanistically possible that *H. erectus* underwent extreme dwarfism on an isolated island.
Proc. R. Soc. B 280, **20130338 (2013)**

DAISUKE KUBO



ECOLOGY

Seeds travel on unpaved roads

Dirt roads could be providing important corridors for seed distribution.

Alberto Suárez-Esteban and his colleagues at the Doñana Biological Station in Seville, Spain, collected animal faeces from 66 kilometres of man-made breaks in vegetation, such as firebreaks and dirt roads, as well as adjacent scrubland, in Doñana National Park in southwest Spain. The researchers identified and counted the seeds contained in 615 faecal samples from rabbits, carnivores and ungulates such as deer.

Carnivores and rabbits preferred to defecate on tracks, dispersing up to 124 times as many viable seeds along the tracks as in the scrub. Although ungulates avoided defecating along the tracks, their faeces also contained considerably fewer viable seeds.

The authors suggest that such human disruptions could have an overlooked role in plant conservation by helping animals to spread seeds between isolated plant populations, but they could also provide routes for invading species.
J. Appl. Ecol. **http://dx.doi.org/10.1111/1365-2664.12080 (2013)**

CLIMATE CHANGE

Evolution in acidic oceans

An increase in ocean acidity could drive substantial genetic change in sea urchins in just one generation.

Melissa Pespeni at Hopkins Marine Station in Pacific Grove, California, and her colleagues housed developing purple sea urchins (*Strongylocentrotus purpuratus*) under current acidity levels and the higher levels that are expected from increasing amounts of carbon dioxide in the atmosphere. The authors measured changes in the frequency of 19,493 genetic variants as fertilized eggs grew into swimming and feeding larvae. Although conditions of high acidity had little effect on the growth of the animals, major shifts occurred in genes that code for 40 classes of proteins. These changes were concentrated in genes related to the construction of urchins' shells and how the organisms regulate metabolism and pH.

Increased acidity could be selecting for genetic variants that improve survival under these conditions, the researchers suggest.
Proc. Natl Acad. Sci. USA **http://dx.doi.org/10.1073/pnas.1220673110 (2013)**

COMMUNITY CHOICE

The most viewed papers in science

MATERIALS

Nanospheres make clever membranes

HIGHLY READ on www.acs.org in March

Spheres of silica coated in gold have been made into membranes whose permeability can be engineered.

Ilya Zharov and Patricia Ignacio-de Leon at the University of Utah in Salt Lake City created nanospheres that self-assemble into arrays, and can then be heated to make inorganic membranes. By coating the silica spheres with gold, the duo were able to attach a variety of chemical groups to the spheres. Surface modifications affected how various molecules passed through the membranes, a process that could be further controlled by changes in pH. Such materials could have applications in chemical separations, catalysts and sensors, the authors say.
Langmuir 29, **3749–3756 (2013)**

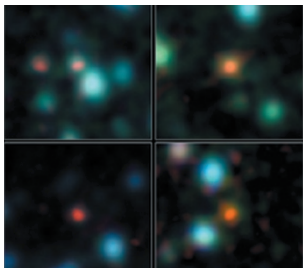
ASTRONOMY

Dusty galaxies come into view

Astronomers have made their first statistically reliable survey of one kind of star-forming galaxy in the early Universe.

Knowledge of these distant objects is important for our understanding of these galaxies' formation and evolution, but enshrouding dust usually obscures their details — making them hard to identify with telescopes that collect radio waves or visible light. Jacqueline Hodge at the Max Planck Institute for Astronomy in Heidelberg, Germany, and her colleagues used the Atacama Large Millimeter/submillimeter Array (ALMA) in Chile to penetrate the dust veil by looking for emissions at submillimetre wavelengths of light — a length between infrared and radio waves.

ALMA/J. HODGE/A. WEISS



The scientists' observation of 126 previously unresolved galaxies in the southern constellation Fornax brought blurry objects into sharper focus (**pictured**). At least one-third, and possibly up to one-half, of them turned out to be multiple galaxies.
Astrophys. J. 768, **91 (2013)**

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