

RESEARCH HIGHLIGHTS

Selections from the scientific literature

NEUROSCIENCE

Alzheimer's clue from spatial test

Young adults who are at increased risk of developing Alzheimer's disease show abnormal function in a part of the brain involved in spatial navigation.

Nikolai Axmacher at Ruhr University Bochum in Germany and his colleagues used neuroimaging to measure the functioning of the 'grid-cell' system in the entorhinal cortex as participants with or without the *APOE-ε4* risk gene navigated a virtual arena.

The 38 high-risk individuals showed reduced grid-cell functioning compared with the 37 controls and tended to avoid the centre of the arena. Activity in the hippocampal region was higher when the grid-cell system was impaired, as if to compensate for the deficit. Reduced grid-cell functioning may prove useful as an early biomarker of Alzheimer's, the authors suggest.

Science 350, 430–433 (2015)

ASTRONOMY

Red-giant rogue in Andromeda

Astronomers have spotted a giant 'runaway star' speeding through the Andromeda galaxy; the first of its kind seen outside the Milky Way.

Whereas most stars flow together around the centre of their galaxy, some, known as runaways, travel at different directions and speeds to their peers, and may even escape their galaxy entirely. Spotting red-supergiant runaways is rare — stars in this late stage of life left their birthplace long ago, making their unusual speeds harder to spot than for younger runaways.

Kate Evans and Philip



ZOOLOGY

Bright light as sex signal

Brighter female glow-worms lay more eggs than their dim rivals and are more attractive to potential nocturnal mates.

Juhani Hopkins at the University of Oulu in Finland and his colleagues allowed 26 female glow-worms (*Lampyris noctiluca*; pictured) to mate in the lab. The glowing lanterns of the insects varied in size from 7 square millimetres to 19 square millimetres — larger lanterns produce a brighter glow. Each glow-worm laid between 25 and 195 eggs, with those perceived by the researchers to be brightest laying the most. Male glow-worms presented with fake females also preferred those with brighter lights.

The lanterns of female glow-worms may provide clues about fitness to males, who are unable to assess size — also an indicator of fecundity — in the dark.

Biol. Lett. <http://dx.doi.org/10.1098/rsbl.2015.0599> (2015)

Massey at the Lowell Observatory in Flagstaff, Arizona, studied a red supergiant in the Andromeda galaxy known as J004330.06+405258.4 and calculated that it is travelling 400–450 kilometres

per second faster than its neighbours. The star is the first massive runaway to be spotted outside our own galaxy and the fastest anywhere for its size, say the authors.

Astron. J. 150, 149 (2015)

MATERIALS

Iron skin senses the softest touch

An iron-based artificial skin can sense the lightest touch.

Ahmed Alfadhel and Jürgen Kosel at the King Abdullah University of Science and Technology in Thuwal, Saudi Arabia, made a tactile sensor by embedding iron nanowires in hair-like structures called cilia, made of a polymer called polydimethylsiloxane, on a magnetic sensor. When the magnetized cilia are bent by touch, they trigger the sensor.

The skin can flex and, depending on the size of the cilia, can be sensitive enough to measure a person's wrist pulse. Because the cilia use permanent magnets rather than electromagnets, the device does not require much power and — unlike most other tactile sensors — it can work underwater and measure liquid flow, the authors say.

Adv. Mater. <http://doi.org/f3jp2n> (2015)

GENOMICS

Gene regulation predates animals

The oldest ancestor of animal life used the same tricks that modern humans do to turn genes on and off.

Alex de Mendoza at the Institute of Evolutionary Biology in Barcelona, Spain, and his colleagues studied gene regulation in the fungus-like single-celled organism *Creolimax fragrantissima*, which branched onto a separate evolutionary path before the evolution of multicellular organisms.

To produce different cell types, multicellular organisms use three main gene-regulation processes: transcription factors, alternative splicing and

ANDY SANDS/NATURE PICTURE LIBRARY

non-coding RNAs. The authors found that *C. fragrantissima* uses the same processes to switch between life stages, meaning that these regulatory elements were likely to have been used by the last universal common ancestor of all animals, the authors say. *eLife* <http://doi.org/8kh> (2015)

DISEASE

Plague is an ancient pathogen

Plague was plaguing humanity thousands of years earlier than previously thought, but in a less transmissible form.

Yersinia pestis bacteria, which are thought to have been behind the Black Death that killed millions in the fourteenth century, have previously been found in burial sites dating back 1,500 years.

But Eske Willerslev at the Natural History Museum of Denmark in Copenhagen and his colleagues looked even further back. They analysed DNA obtained from the teeth of 101 humans (pictured) who died in Europe and Asia between 2,800 and 5,000 years ago and found *Y. pestis* DNA in seven individuals. Analysis of the DNA showed that a strain similar to the Black Death strains was widespread in the Bronze Age, but only the more recent strains had a gene called *ymt*, which helps *Y. pestis* to colonize the guts of fleas. Without fleas to aid transmission, plague spreads less efficiently.

Cell <http://dx.doi.org/10.1016/j.cell.2015.10.009> (2015)



STEM CELLS

Molecular menu creates neurons

Astrocyte cells in the brain can be reprogrammed into neurons using a precise sequence of molecules. The technique may one day be useful in brain repair.

Similar cells have previously been reprogrammed into neurons using viruses, but Gong Chen and Gang-Yi Wu at Pennsylvania State University in University Park and their colleagues now show that the transformation can be done with small molecules.

They treated human astrocytes with nine different molecules in sequence, converting them into neurons that survived for more than five months in culture and more than one month after transplantation into a mouse brain. The method works for human brain astrocytes but not for human spinal astrocytes or mouse astrocytes, suggesting that different sets of molecules may be needed for different astrocytes or to obtain different neuronal subtypes, the authors report. *Cell Stem Cell* <http://doi.org/8m5> (2015)

LAB TOOLS

Superconducting sensors warm up

An extremely sensitive, superconductor-based magnetic sensor can work at around 77 kelvin, a temperature achievable with liquid nitrogen rather than the expensive liquid helium required by typical existing devices, which operate at just above absolute zero.

Superconducting quantum-interference devices (SQUIDs) can sense individual quanta of magnetic flux by measuring voltage induced in a loop of superconducting material. Boris Chesca of Loughborough University, UK, and his team connected hundreds of loops in series to boost the signal. The authors

SOCIAL SELECTION

Popular topics
on social media

Backlash over journals blacklisting

Researchers on social media are split over the decision of academic librarian Jeffrey Beall to add the *Frontiers* journals to his 'blacklist' of "questionable publishers". Beall, at the University of Colorado Denver, announced the move in a tweet, saying that it followed "wide disapproval from scientists". His website Scholarly Open Access maintains a list of journals that may be "predatory publishers" — a term Beall coined for publications that charge scientists fees to publish research but that do not offer services such as peer review, or that make misleading claims on impact factors or indexing. Critics of Beall's blacklisting of *Frontiers* maintain that the open-access publisher is reputable and does offer proper peer review. Daniël Lakens, an experimental psychologist at the Eindhoven University of Technology in the Netherlands and an associate editor at *Frontiers in Psychology: Cognition*,

tweeted: "Frontiers being added to Beall's list reveals the big weakness of Beall's list: It's not based on solid data, but on Beall's intuition." Beall told *Nature* that he stands by his decision.

➔ **NATURE.COM**
For more on
popular papers:
go.nature.com/ch66au



say that their SQUID design is as sensitive as many devices already in use and is ready for production. The higher operating temperature makes it ideal for applications such as portable magnetic resonance imaging machines, they say. *Appl. Phys. Lett.* 107, 162602 (2015)

ATMOSPHERIC SCIENCE

Arctic snow is not becoming dirtier

Dust and soot might not be behind the observed darkening of the Greenland ice sheet (pictured).

Tiny particles of dirt absorb sunlight that would be reflected into space by ice — contributing to local warming. Satellite measurements suggest that the amount of sunlight reflected by Greenland's icy

surface has been decreasing since 2001.

But surveys of the snow in northwest Greenland conducted in 2013 and 2014 by Chris Polashenski at the US Army Cold Regions Research and Engineering Laboratory in Fort Wainwright, Alaska, and his colleagues, found that the concentration of dark-coloured particles was much the same as in previous decades. Rather than dirtier ice, the declining reflectivity seen in satellite measurements could be due to a degrading sensor on NASA's Earth-observing satellite Terra. *Geophys. Res. Lett.* <http://doi.org/8kg> (2015)

➔ **NATURE.COM**
For the latest research published by *Nature* visit:
www.nature.com/latestresearch