

GENE EDITING

CRISPR corrects β -thalassaemia

A common genetic blood disorder has been corrected in cultured stem cells by using a cutting-edge genome-editing technique.

The disorder β -thalassaemia is characterized by reduced levels of haemoglobin due to mutations in the gene for β -globin (*HBB*). Yuet Kan and his colleagues at the University of California, San Francisco, created induced pluripotent stem cells using skin fibroblasts from a person with β -thalassaemia. They then used the CRISPR–Cas9 gene-editing technique to correct the unwanted mutation precisely, without affecting other genes. After differentiation in culture into precursors of red blood cells, the modified cells showed higher expression of *HBB* than unmodified cells.

Transplantation of such corrected cells back into the original patient could one day provide a cure for β -thalassaemia, say the authors.

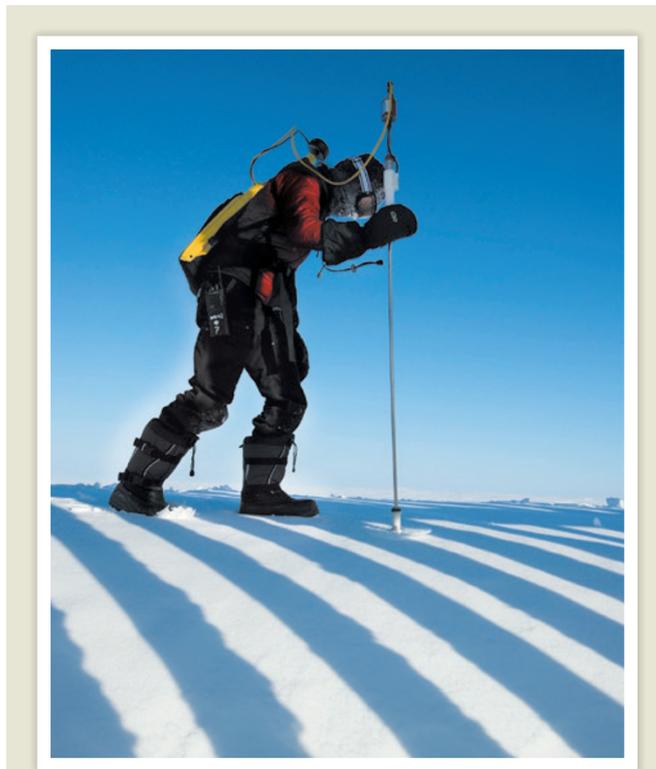
Genome Res. <http://doi.org/t3v> (2014)

ASTRONOMY

Another super-Earth found

A 'super-Earth' planet — an extrasolar planet larger than Earth but smaller than Neptune — has been detected in the habitable zone of a star called Gliese 832.

Robert Wittenmyer at the University of New South Wales in Sydney, Australia, and his colleagues used data from various telescopes to detect a planet with a mass of 5.4 Earths in orbit around this star. Although the planet



POLAR SCIENCE

Arctic snowpack thins

As Arctic sea ice has shrunk and thinned, so has the snowpack blanketing it.

Melinda Webster at the University of Washington in Seattle and her colleagues studied data on spring snow depth gathered between 2009 and 2013 by radar surveys conducted from the air and verified with surface measurements (pictured). They compared these to information collected between 1954 and 1991 by Soviet ice stations. The error bars are large, but between the older and the current surveys, snow thickness had decreased by some 37% in the western Arctic and by 56% in the Beaufort and Chukchi seas.

As sea ice starts forming later each autumn, there is less time for snow to accumulate before winter sets in, the authors say.

J. Geophys. Res. Oceans <http://doi.org/t3q> (2014)

is in the habitable zone — the region around a star in which it is thought that life could potentially exist — its large size suggests that it may have a thick atmosphere. This might make it more like a 'super-Venus', with a dense atmosphere leading to high surface temperatures that

would render it inhospitable.

Despite this, the presence of this potentially rocky inner planet, as well as a previously discovered outer giant planet, makes the Gliese 832 system a rare miniature version of our Solar System, the authors suggest.

Astrophys. J. 791, 114 (2014)

CHEMISTRY

Cleaner, greener ammonia

A method of producing ammonia could yield a greener route to nitrogen-based fertilizers.

Ammonia is currently synthesized by combining nitrogen and hydrogen under high pressures and temperatures in a reaction called the Haber–Bosch process. Making the hydrogen consumes around 5% of the world's natural-gas production, and releases large amounts of carbon dioxide.

Stuart Licht at George Washington University in Washington DC and his colleagues applied a voltage to steam and air (the source of nitrogen) bubbling through molten hydroxide containing catalytic nanoparticles of iron oxide. This produced ammonia from nitrogen and water directly by electrolysis. The nanoparticles clump together over time, slowing the reaction, and moderate temperatures and pressures are still needed. However, if the process can be scaled up, it could be less energy-intensive than the current industrial method.

Science 345, 637–640 (2014)

MICROBIOLOGY

Resistance genes mapped

Researchers have pinpointed mutations encoding antibiotic resistance in bacteria that cause pneumonia, borrowing a technique more often used to hunt for gene variations linked to common human diseases.

Streptococcus pneumoniae is a leading killer of children under five worldwide. The bacterium is prone to develop antibiotic resistance, but pinning down the mutations

responsible has proved difficult.

A team led by Stephen Bentley and Julian Parkhill, at the Wellcome Trust Sanger Institute in Hinxton, UK, analysed the genomes of 3,701 samples of *S. pneumoniae* collected from carriers in a refugee camp in Thailand and from patients in Massachusetts clinics.

The authors searched for regions of the genome that differed between bacteria resistant to β -lactam antibiotics (such as penicillin) and those still susceptible to them. They found 301 DNA variations in 51 regions linked to drug resistance, including novel genes as well as those involved in building the cell wall, the target of the β -lactams.

PLoS Genet. 10, e1004547 (2014)

IMAGING

Seeing through a mouse skull

Glowing nanotubes have allowed researchers to peer through a mouse's skull and examine its living brain in real time.

Calvin Kuo and Hongjie Dai of Stanford University in California and their colleagues injected fluorescent molecules based on carbon nanotubes into the tails of mice. The nanotubes were then carried around in the animals' bloodstreams and when lasers were shone onto the rodents' skulls, the molecules gave off near-infrared light (pictured) that was visible through the bone. This allowed the researchers to image blood moving through the brain to a depth of more than 2 millimetres and to detect

obstructed arteries. However, the method might not be usable in humans because of our thicker skulls.

Nature Photon. <http://doi.org/t2z> (2014)

SEISMOLOGY

From earthquakes to icequakes

Big earthquakes on land can trigger small distant 'icequakes' in the Antarctic ice sheet.

At magnitude 8.8, the 2010 Maule earthquake in Chile was the largest quake in the Southern Hemisphere for half a century. Zhigang Peng at the Georgia Institute of Technology in Atlanta and his colleagues hunted for traces of it at seismic stations across Antarctica.

They discovered high-frequency shaking representing small icequakes, with waves of tremors appearing in the kilometre-thick ice sheet that covers the frozen continent. These seemed to be triggered by the lower-frequency rumble stemming from the Chilean event, and represent the first evidence of links between quakes in the solid earth and in the cryosphere.

Nature Geosci. <http://dx.doi.org/10.1038/ngeo2212> (2014)

STEM CELLS

Fresh growth from elderly cells

Human skin cells can be reprogrammed into neural cells that form synapses with neurons in severed spinal cords in rats.

A team led by Paul Lu and Mark Tuszynski at the University of California San Diego in La Jolla took skin fibroblasts from an 86-year-old man, converted them in culture into induced pluripotent stem cells (iPS cells) and then into neural stem cells, and grafted these cells into two-week-old immunodeficient rats whose spinal cords were damaged at the neck. Three months later, the stem cells had grown into

SOCIAL SELECTION

Popular articles on social media

Clash over the Kardashians of science

Here's a novel approach for getting an article noticed: put 'Kardashian' in the title. A paper that compared Twitter-using researchers to the celebrity Kim Kardashian incited a backlash on social media.

Neil Hall, a genomics researcher at the University of Liverpool, UK, introduced a metric called the Kardashian Index, or K value. This is calculated by dividing a researcher's number of Twitter followers by the number of scientific citations he or she has. The K value supposedly identifies scientists whose visibility exceeds their contributions — somewhat like a certain socialite, Hall suggests. The article was intended as satire, but not everyone was amused. "This paper suggests only highly cited scientists deserve a large Twitter following, & everyone else should shut up," tweeted Katie Mack, an astrophysicist at the University of Melbourne in Australia.

Genome Biol. 15, 424 (2014)



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neurons that projected axons along the whole length of the rat spinal cord, even extending into the brain. Unlike similar experiments with neurons derived from embryonic stem cells, these iPS-cell-derived neurons did not restore movement in the rats' limbs, perhaps as a result of scar tissue that formed at the injury site.

Neuron <http://doi.org/t36> (2014)

MICROBIOLOGY

Ecosystems afloat in asphalt

Water droplets suspended in the world's largest tar 'lake' are teeming with diverse ecosystems of bacteria and methane-producing microorganisms, despite the inhospitable living conditions.

Droplets just a few microlitres in volume that were isolated from Pitch Lake (pictured), a huge tar pit on the island of Trinidad, contain a menagerie of bacteria and archaea, report Rainer Meckenstock at the Helmholtz Zentrum in Munich, Germany, and his colleagues.



They used DNA sequencing to reveal that multiple species work together to break down the oil surrounding the water droplets, which are thought to originate deep underground.

These microhabitats could be an unrecognized factor in the biodegradation of large volumes of oil, the authors suggest.

Science 345, 673–676 (2014)
For a longer story on this research, see go.nature.com/odleal

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