# RESEARCH HIGHLIGHTS

*Selections from the scientific literature*

BIOENGINEERING

## Muscle in a dish twitches

Human muscle that contracts has been grown in the lab.

Existing models of human skeletal muscle are two-dimensional and do not mimic the structure or behaviour of natural tissue well. Nenad Bursac at Duke University in Durham, North Carolina, and his colleagues took samples of living human muscle cells and grew them in three dimensions using a scaffold. This coaxed the cells into forming muscle that could spontaneously twitch. When the team stimulated it with electrical pulses similar to nerve signals, the muscle contracted.

The tissue also responded to various drugs, including a steroid-like one, in much the same way as human muscles. The researchers plan to use their tissue to test drugs for muscle disorders.

***eLife*** **http://doi.org/zfs (2015)**

COSMOCHEMISTRY

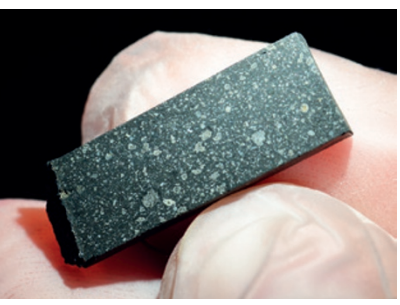
## How nitrogen got to Earth

Earth's nitrogen may have originated in the icy reaches of the primordial Solar System.

A team led by Dennis Harries of the University of Jena in Germany discovered and analysed a chromium nitride mineral inside two meteorites (**pictured**). The researchers say that the mineral could have formed from ammonia in ices that swirled around the newborn Sun. Shock waves from distant collisions between fragments in this protoplanetary disk heated up the ammonia, releasing it to react with metals such as chromium. The team also found that the isotopic signature of the nitrogen in the mineral is similar to that of Earth's atmospheric nitrogen.

Much of the early Solar System's nitrogen could have been released in this way, with some ending up in Earth's early atmosphere, the authors suggest.

***Nature Geosci.*** **http://dx.doi.org/10.1038/ngeo2339 (2015)**



DENNIS HARRIES

J. ROGER BROTHERS

ANIMAL BEHAVIOUR

## Turtles' magnetic attraction to home

Sea turtles use geomagnetic signatures to return to nesting sites near where they were born.

These animals navigate across oceans using Earth's magnetic field, but it has been unclear how they find the same coastal nesting sites as their mothers. Roger Brothers and Kenneth Lohmann at the University of North Carolina in Chapel Hill studied loggerhead sea turtles (*Caretta caretta*; pictured) in Florida.

They found that the location of the animals' nests each season was associated with changes in the strength and direction of Earth's magnetic field at each site. In areas where the same magnetic signature spreads out over time, nests were made farther apart. When the signature shrank, the nests were closer together.

Similar mechanisms could be at work in other animals that migrate back to their birthplaces, the authors suggest.

***Curr. Biol.*** **http://doi.org/zc7 (2015)**

DEVELOPMENTAL BIOLOGY

## Stem cells for bone growth

Stem cells that give rise to bone and cartilage in mice after birth have been found by two teams.

A group led by Siddhartha Mukherjee and Timothy Wang at Columbia University in New York found that cells at the ends of mouse bones can produce other cells that make bone, cartilage and the spongy tissue in bone marrow. When implanted near a broken bone, these stem cells developed into bone-making cells.

Charles Chan and Michael Longaker at Stanford University in California and their colleagues identified mouse stem cells with similar capabilities, as well as the molecular signals that maintain such cells and guide their development. When combinations of these factors were added to fat tissue in mice along with collagen protein, bone or cartilage formed a month later.

***Cell*** 160, **269–284; 285–298 (2015)**

ECOLOGY

## Small trees save forests

Small trees are often removed from conifer forests in dry areas to reduce the risk of wildfires, but a US study has

revealed that insect outbreaks pose a greater threat to such forests than fire does.

William Baker and Mark Williams at the University of Wyoming in Laramie studied records of fires and insect outbreaks in dry forests in the western United States from 1999 to 2012, and found that insects caused the loss of 5.6 times more forest area than did wildfires. The team also analysed land surveys from the late nineteenth century and found that small trees — of about 40 centimetres or less in diameter — made up almost 62% of total trees, a higher proportion than was thought.

The findings suggest that, historically, forests were resilient because of the smaller trees, and that removing these to control fire risk could be misguided.

***Front. Ecol. Evol.*** **http://doi.org/zfj (2015)**

NORA ALVAREZ-BERRÍOS

NEUROSCIENCE

## How baby rodents block pain

Nerve injury in very young animals does not result in pain as it does later in life, probably because of an anti-inflammatory response in the spinal cord.

Maria Fitzgerald of University College London and her colleagues damaged hind-limb nerves in rat and mouse pups. They tested the sensitivity of the paws to painful stimuli, such as mechanical pressure, then recorded the excitability of spinal neurons at different ages and analysed immune profiles. They found that both pain sensitivity and neural excitability developed in the pups at an age equivalent to human adolescence, when anti-inflammatory molecules were replaced by those that promote inflammation.

The team reversed this pain suppression in injured young rats by blocking production of IL-10, an anti-inflammatory cytokine. The results could explain why such 'neuropathic' pain sometimes emerges mysteriously in human adolescents, the authors say.

***J. Neurosci.*** 35, **457–466 (2015)**

GLACIOLOGY

## Antarctic ice melt may speed up

Antarctica's vast ice sheets may be more vulnerable to warming than was thought.

Using a three-dimensional computer model, David Pollard of Pennsylvania State University in University Park and his colleagues identified two new ways in which ice sheets can collapse. Meltwater and rainfall can drain into crevasses in the ice, leading to vertical fractures. Moreover, heavy ice near the top of the sheets can break apart, shearing off huge chunks.

The results may help to explain how the East Antarctic Ice Sheet could have collapsed enough to cause the high sea levels that occurred during warm periods over the past 25 million years. Accounting for these mechanisms, the authors suggest that the West Antarctic Ice Sheet could collapse faster than predicted — over decades rather than centuries to millennia.

***Earth Planet. Sci. Lett.*** 412, **112–121 (2015)**

MICROBIOLOGY

## Tuberculosis has history in its DNA

Key historical events such as the First World War drove the global spread of a strain of tuberculosis-causing bacteria that is prone to becoming resistant to drugs.

Thierry Wirth of the National Museum of Natural History in Paris and his colleagues collected 4,987 samples of the Beijing strain of *Mycobacterium tuberculosis*, isolated from patients from 99 countries, and analysed the microbe's DNA to trace its ancestry. They found that the strain originated in East Asia 6,600 years ago with the rise of agriculture. From there, it spread throughout the world, increasing in prevalence when the human population grew in the nineteenth century, as well as when people were vulnerable to infection during the First World War and after HIV began to spread as epidemics. The drug-resistant strains that now affect Asia appeared when the Soviet Union — and its health system — collapsed in the 1990s.

***Nature Genetics*** **http://dx.doi.org/10.1038/ng.3195 (2015)**

## SOCIAL SELECTION

*Popular articles on social media*

### Ranking universities by happiness

Universities are often ranked using metrics for research income and academic impact, but scores such as those published by *Times Higher Education* do not say much about the quality of life of researchers at those institutions. A blog post (go.nature.com/4bxozj) by structural biologist Jenny Martin that calls for new researcher-friendly metrics for ranking universities — including a happiness index — is drawing enthusiastic reviews on social media. "I am so going to work on increasing our Happiness-index in the group!" tweeted Jodie Bradby, a physicist at the Australian National University in Canberra. The proposal was "a new spin on academic metrics … that I can get behind", said Stephanie Januchowski-Hartley, a conservation scientist at Texas A&M University in Corpus Christi, also on Twitter.

**NATURE.COM**
For more on popular papers:
go.nature.com/qulfg7

ECOLOGY

## Gold-rush threat to tropical forests

Deforestation due to gold mining is increasing in South America, particularly around biodiversity hotspots.

Gold mining has become more feasible in remote tropical forests owing to the drastic rise in demand and price for the metal over the past decade. To study its impact, Nora Alvarez-Berríos and Mitchell Aide at the University of Puerto Rico-Río Piedras in San Juan analysed satellite images of tropical forests in South America from 2001 to 2013. They found that roughly 1,700 square kilometres of forest had been cleared (**pictured**) and only 250 $km^2$ was regenerated in and around gold-mining sites.

Although forest loss from gold mining is small compared with that from agriculture, for instance, it is accelerating — unlike deforestation as a result of other land-use changes. Moreover, nearly one-third of the losses are occurring within 10 km of protected areas.

***Environ. Res. Lett.*** 10, **014006 (2015)**

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