

## BIOTECHNOLOGY

### Gene therapy halts type 1 diabetes

Transferring part of an insulin gene into liver cells triggers a specific immune response that protects mice from one form of diabetes.

Type 1 diabetes occurs when T cells target and kill insulin-producing islet cells in the pancreas. Maria Grazia Roncarolo of Stanford University in California and her team transferred a gene fragment encoding some of the insulin B chain into the livers of mice engineered to develop this disease, and monitored the effects. Islet cells lived for up to 33 weeks after treatment of animals in a prediabetic state. In untreated mice, around 80% of insulin-producing cells were destroyed. The transfer, in combination with an antibody, reversed symptoms in mice that had developed diabetes.

The gene fragment stimulated regulatory T cells that are specific for insulin, suppressing the insulin-attacking T cells.

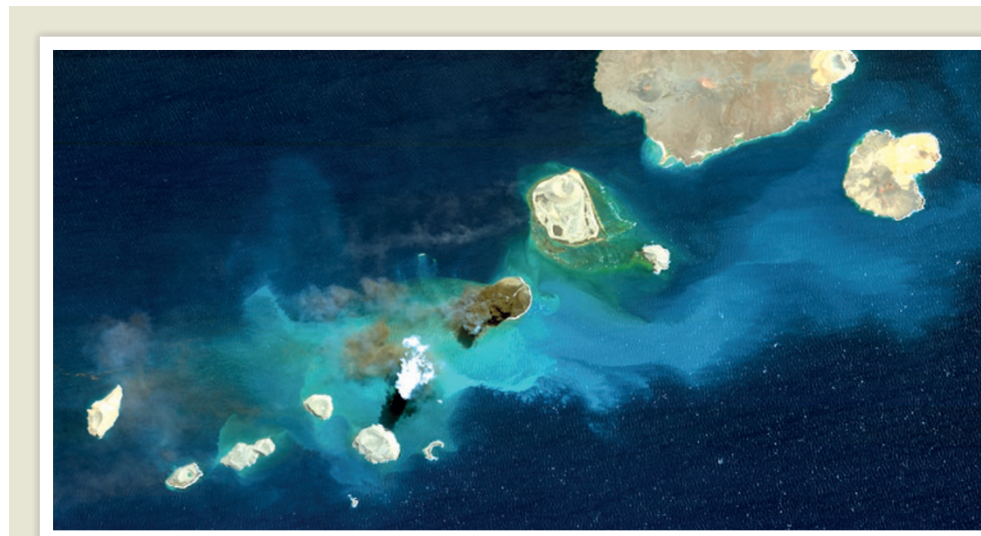
*Sci. Transl. Med.* 7, 289ra81 (2015)

## MATERIALS

### Memory metal sets flex record

An alloy that can bend and return to its original shape at least 10 million times could prove useful in applications including medical devices and refrigeration.

Bending a 'shape-memory alloy' changes its crystal structure from one phase to another, whereas applying heat reverses that transition. But structural damage causes these materials to lose their shape memory within a few thousand cycles. A team led by Eckhard Quandt at the University of Kiel, Germany, and Manfred



## VOLCANOLOGY

### New islands reveal Red Sea rifting

Two volcanic islands that have emerged in the southern Red Sea suggest that the area is more geologically active than was thought.

Sholan Island surfaced in December 2011 and Jadid Island appeared in October 2013, forming part of the Zubair archipelago (pictured). Seismic data and satellite radar measurements show that both islands were created by magma squirting up along north-south fractures under the sea floor,

says a team led by Sigurjón Jónsson of the King Abdullah University of Science and Technology in Thuwal, Saudi Arabia. The area is seeing a decades-long episode of rifting, in which one plate of Earth's crust pulls apart from another.

Observing newly formed islands in such detail is rare, and the islands will probably remain above water despite erosion, say the authors.

*Nature Commun.* 6, 7104 (2015)

Wuttig at the University of Maryland, College Park, has now created a titanium-nickel-copper alloy (Ti<sub>54</sub>Ni<sub>34</sub>Cu<sub>12</sub>) that averts this memory loss. Layers of Ti<sub>2</sub>Cu in the material act as templates that guide the complete transition between the two crystal phases.

This template approach could offer a way of creating better shape-memory alloys. *Science* 348, 1004-1007 (2015)

## PALAEOCLIMATOLOGY

### Tropics feel effect of iceberg thaw

Prehistoric icebergs in the North Atlantic had a greater influence on tropical climate than was previously thought.

Rachael Rhodes of Oregon State University in Corvallis and her colleagues constructed a 60,000-year methane record from a west Antarctic ice core. They found elevated methane levels during cold periods, which seemed to coincide with 'Heinrich events' — the breaking off of icebergs from Greenland glaciers on a massive scale. The team suggests that fresh water flooding into the Atlantic from the thawing icebergs helped to cool the Atlantic region, which contributed to the slowing down of ocean circulation. This led to increased rainfall in the tropics, where wetlands grew and produced more methane.

The climatic impact of some Heinrich events lasted for

up to 1,500 years, suggesting that Atlantic circulation was weakened for much longer than the thaw periods.

*Science* 348, 1016-1019 (2015)

## CHEMICAL BIOLOGY

### Antifungal drug dodges resistance

A yeast-killing compound evades drug resistance and is less toxic than a related drug used in the clinic.

The antifungal drug amphotericin B (AmB) does not typically result in resistant fungi, but it kills human cells so can be used only at low doses. To create AmB derivatives that are less toxic to humans and do not cause resistance, Susan

Lindquist at the Whitehead Institute for Biomedical Research in Cambridge, Massachusetts, Martin Burke at the University of Illinois at Urbana-Champaign and their colleagues used just three steps of chemical synthesis.

The new compounds killed infectious yeast in the lab and in mice, but were less toxic to human cells and mice than AmB. Yeast strains that were resistant to the compounds *in vitro* were unable to cause lethal infections in mice, unlike non-resistant strains, suggesting that drug-resistant strains are less fit.

The new antifungals kill yeast by pulling out ergosterol molecules from the yeast cell wall, but they do not bind to the similar molecule cholesterol in animal cell membranes.

*Nature Chem. Biol.* <http://dx.doi.org/10.1038/nchembio.1821> (2015)

## EVOLUTION

## Migration explains drab female birds

Some female warblers lost their bright colours just as the birds were evolving to become migratory, suggesting that this behavioural change spurred the evolution of sex differences in plumage colour.

To find out why female songbirds are often as colourful as the males in tropical species but less colourful in northern ones, Troy Murphy at Trinity University in San Antonio, Texas, and his colleagues studied 108 species of wood warblers (*Setophaga tigrina*; female pictured left, male pictured right). Migratory species tend to live farther north, and the authors found that the longer the bird's migration, the more distinct the sexes look. In multiple species, these sex differences evolved at around the same time as the birds first began migrating.

The findings suggest that sex differences in colour are driven by the needs of females. Non-migratory females often defend their territories using bright colours to signal fighting ability. But females that migrate rarely act in this way, and bright colours could make them more visible to predators during their migration.

*Proc. R. Soc. B* 282, 20150375 (2015)

## NEUROSCIENCE

## Stroke brain still controls device

Rats can use their brain activity to control an external device through an implanted electrode, even after a stroke. The finding suggests that people who have motor problems as a result of a stroke could one day benefit from such brain-machine interfaces.

Karunesh Ganguly at the San Francisco Veterans Affairs Medical Center in California and his colleagues placed electrodes near the part of the motor cortex in the rat brain that was injured by stroke, and then trained the animal to shift the angle of a water-feeding tube using just its brain activity. The team found that stroke-affected rats learned this task as quickly as control animals, even though the stroke animals showed only minimal improvements in movement.

The results suggest that the brain area injured by a stroke can still form new brain-cell connections.

*J. Neurosci.* 35, 8653–8661 (2015)

## CLIMATE-CHANGE BIOLOGY

## Warming threat to ocean biodiversity

Marine biodiversity could undergo drastic changes in as much as 70% of the world's oceans if global warming is not limited to below 2°C by 2100.

Grégory Beaugrand at the CNRS Laboratory of Oceanology and Geosciences in

## SOCIAL SELECTION

Popular topics on social media

### How best to respond to reviewers

Comments from referees reviewing a paper can sometimes be less than polite, making it tempting for authors to send equally rude replies. But a trio of blog posts emphasizes the importance of professional, constructive responses from authors (see [go.nature.com/yzwvmt](http://go.nature.com/yzwvmt); [go.nature.com/hzp3bg](http://go.nature.com/hzp3bg) and [go.nature.com/hchv3i](http://go.nature.com/hchv3i)). The posts, by three ecologists, aim to help researchers to avoid common pitfalls that can lower their chances of publication. Commenters on Twitter appreciated the guidance. Responding to one of the blogs, Auriel Fournier, a PhD student at the University of Arkansas in Fayetteville, tweeted: "I'm struggling with this right now, this was a very helpful and timely post."

**➔ NATURE.COM**  
For more on popular papers: [go.nature.com/d52ezu](http://go.nature.com/d52ezu)

Wimereux, France, Richard Kirby at the University of Plymouth, UK, and their colleagues modelled how patterns of biodiversity across the oceans would change under different future climate scenarios, and compared them to patterns over the past 50 years and during prehistoric warm and cold periods.

With low levels of warming (mean temperature rise of roughly 1°C), around 16% of the ocean would see increased biodiversity through species invasions and about 6% of oceans would experience a decrease. In the most extreme warming scenario, of roughly 3.7°C, these numbers rise to about 32% and 44%. Such severe warming could produce a greater change in marine biodiversity than has been seen over the past 3 million years or so.

*Nature Clim. Change* <http://dx.doi.org/10.1038/nclimate2650> (2015)

## ECOLOGY

## Coral faces algal sabotage

Caribbean coral have been invaded by algae that slow their growth and may have been introduced by humans.

Tye Pettay and Todd LaJeunesse at Pennsylvania State University in University Park and their colleagues



sampled various coral species (*Orbicella faveolata*; pictured) from around the world and analysed the genetics of their symbiotic algae. They found that one alga in the Caribbean, *Symbiodinium trenchii*, comprised just a few lineages that were closely related to those in the Indian and Pacific oceans. Corals living with this symbiont tolerated high temperatures better than those without it, but incorporated calcium into their skeletons at around half the rate.

The findings indicate that this alga invaded the Caribbean thanks to human activities, and could have negative long-term ecological impacts in this region.

*Proc. Natl Acad. Sci. USA* <http://dx.doi.org/10.1073/pnas.1502283112> (2015)

**➔ NATURE.COM**  
For the latest research published by Nature visit: [www.nature.com/latestresearch](http://www.nature.com/latestresearch)

