

## GENE EDITING

### CRISPR fixes muscle disease

Three teams of researchers have used CRISPR–Cas9 gene editing to treat mice that have the most common and severe form of muscular dystrophy.

Duchenne muscular dystrophy is a fatal disease caused by mutations that disable the gene encoding dystrophin, an important muscle protein. Teams led by Charles Gersbach of Duke University in Durham, North Carolina; Amy Wagers of Harvard University in Cambridge, Massachusetts; and Eric Olson of the University of Texas Southwestern Medical Center in Dallas used the CRISPR–Cas9 gene-editing technique to repair the dystrophin gene in mice that have such mutations.

The three teams used viruses to shuttle the components of the CRISPR–Cas9 system into the muscle cells of infant and adult mice. Treated mice made functional dystrophin and showed improvements in cardiac and skeletal muscle function.

*Science* <http://doi.org/bbnp> (2016); *Science* <http://doi.org/bbps> (2016); *Science* <http://doi.org/bbpb> (2016)

## MATERIALS

### Self-folding origami master

Heat can bend a thin polymer film into different shapes inspired by origami.

Previous self-folding materials could either bend themselves into a shape and return to their original form, or permanently change shape. Tao Xie at Zhejiang University in Hangzhou, China, and his colleagues created a material

that could do both. At a relatively low temperature of around 80 °C, the polymer's molecular chains shift but chemical bonds in the network remain intact, which causes the material to temporarily fold into a predefined shape. At a higher temperature of around 130 °C, the bonds break and reform, inducing a permanent change in the material's molecular structure.

The same polymer could fold into multiple different shapes, which might eventually be useful in devices

that are deployed in the body or in space.

*Sci. Adv.* 2, e1501297 (2016)

## ANIMAL BEHAVIOUR

### Sharks have a nose for navigation

Sharks use their keen sense of smell for navigation as well as for feeding.

Andrew Nosal at the Scripps Institution of Oceanography in La Jolla, California, and his colleagues plugged the noses of wild leopard sharks (*Triakis*

water temperatures reduced electricity production at mid-latitudes, where most of the world's electricity is generated. Annual usable power capacity decreased by 7–12% for thermoelectric plants and by 1.2–3.6% for hydroelectric plants in the 2050s.

The authors suggest that boosting the efficiency of power plants, along with other adaptation measures, could reduce these impacts.

*Nature Clim. Change* <http://doi.org/bbsp> (2016)

*semifasciata*) with cotton balls soaked in petroleum jelly, tagged the animals with acoustic transmitters and released them 9 kilometres offshore. Over roughly four hours, sharks without nose plugs swam two-thirds of the way back to shore in relatively straight paths, whereas sharks with plugged noses took more tortuous paths, swimming only one-third of the way back.

The sharks could be detecting gradients of chemicals that are associated with coastal marine life, such



## ENERGY

### Electricity at risk in a warmer world

Global warming's effects on water availability could hamper electricity production at power plants worldwide in the coming decades.

Michelle van Vliet of Wageningen University in the Netherlands and her colleagues modelled electricity production throughout the twenty-first century at more than 24,000 hydroelectric facilities and at about 1,400 water-cooled thermoelectric plants powered by natural gas, coal or nuclear energy. Decreased stream flow and warmer

as dissolved amino acids, the authors say.

**PLoS ONE** 11, e0143758 (2016)

#### CANCER BIOLOGY

## Gene promotes melanoma spread

Suppressing a regulatory gene in skin cancer could block the spread of cancer cells throughout the body.

The gene, *BMI1*, has been linked to the growth of certain tumours. To study its effect on tumour spread, or metastasis, Jacqueline Lees of the Massachusetts Institute of Technology in Cambridge and her colleagues looked at melanoma tumours in mice. Melanoma cells that expressed high levels of *BMI1* were more likely to spread to the lungs than were tumours that had normal *BMI1* levels. The gene also promoted resistance to drugs, and induced the expression of genes that have been linked to invasive melanoma and poor disease prognosis in humans.

The results suggest that *BMI1* could be a compelling drug target, the authors say. **Genes Dev.** 30, 18–33 (2015)

#### INFECTIOUS DISEASE

## Poliovirus tweaked for safer vaccines

Poliovirus has been genetically modified so that it can be used in vaccines



BIOL. LEFT.

LIN YIQUANG/XINHUA/YEYVINE

without the risk of spreading the disease.

Inactivated polio vaccine is currently made (pictured) using highly infectious strains of the virus. To guard against accidental release, the World Health Organization in Geneva, Switzerland, has called on manufacturers to switch to weakened live strains called Sabin strains, despite their tendency to mutate into infectious forms.

A team led by Philip Minor at the UK National Institute for Biological Standards and Control in Pottery Bar created a genetically modified Sabin strain that, when inactivated, still elicited an immune response in rats. However, the virus did not mutate into active forms in cell lines and failed to infect macaques, so it would be unlikely to spread the disease among humans if it was accidentally released.

**PLoS Pathog.** 11, e1005316 (2015)

#### HUMAN EVOLUTION

## Immunity boosted by archaic humans

Genes inherited from ancient hominins have improved the human immune system.

*Homo sapiens* interbred with Neanderthals and other ancient humans called Denisovans less than 100,000 years ago. Janet Kelso and her team at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, looked for Neanderthal and Denisovan genetic ancestry that has benefited humans by analysing the genomes of hundreds of people from around the world. They found a cluster of three Toll-like receptor (TLR) genes, which are involved in rapidly sensing and responding to infections as part of the innate immune response. Two Neanderthal versions of this cluster and one from Denisovans are common in different human populations. The archaic TLR genes are linked to reduced

## SOCIAL SELECTION

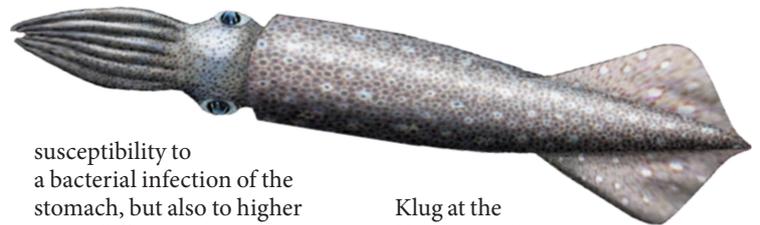
Popular topics on social media

## Spoof kissing paper sparks debate

A satirical study showing that a mother's kisses didn't help injured children to feel better left several clues that it was fake. The funder was Proctor and Johnson, a made-up medical company, and one of the references was entitled, "So what the hell is going on here?". The paper, describing a fictional randomized controlled trial (RCT) of mothers kissing their toddlers, was designed to illustrate the limitations of evidence-based medicine, which uses data from such clinical trials to direct the practice of medicine. Many people who shared the article on Twitter played along with it. Angela Smith, a urologist at the University of North Carolina School of Medicine at Chapel Hill, tweeted: "Maternal kisses apparently ineffective at alleviating boo-boos in RCT—our household now switching to 'blowing on it.'" But some commentators said that the article, which the editor of the *Journal of Evaluation in Clinical Practice* knowingly published in his journal, could be misleading and needs to be clearly labelled as satirical.

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**J. Eval. Clin. Pract.** <http://dx.doi.org/10.1111/jep.12508> (2015)



susceptibility to a bacterial infection of the stomach, but also to higher rates of allergies.

In a separate study, a team led by Lluís Quintana-Murci at the Pasteur Institute in Paris identified innate immunity genes that Europeans and Asians seem to have inherited from Neanderthals, including the same cluster of TLR genes. **Am. J. Hum. Genet.** <http://doi.org/bbn3> (2016); <http://doi.org/bbn2> (2016)

#### PALAEONTOLOGY

## Squid relatives sped through water

Squid-like creatures that lived more than 60 million years ago could swim rapidly, supporting claims that they swam freely rather than just near the ocean bottom.

Fossils of belemnite marine animals from 200 million to 66 million years ago are common, but Christian

Klug at the University of Zurich in Switzerland and his colleagues report three *Acanthoteuthis* belemnite specimens from Germany with soft tissue components that have never been seen in such fossils before (reconstruction pictured). The tissue included fossil fins and organs called statocysts, which detect the direction and acceleration of movement through water. These suggest that the animals, which are relatives of modern squid, were fast-swimming predators.

This and other fossil evidence suggests a free-swimming, rather than an ocean-bottom-dwelling, lifestyle for belemnites. **Biol. Lett.** 12, 20150877 (2016)

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