RESEARCH HIGHLIGHTS

Selections from the scientific literature

ENERGY

Benefits outweigh clean-energy costs

Large-scale investments in wind, solar and hydropower could double the electricity generated globally from these sources by 2050 — with only modest environmental costs.

Thomas Gibon of the Norwegian University of Science and Technology in Trondheim and his colleagues compared the environmental impacts of low-carbon and fossil-fuel-based power generation over the entire life cycle of these installations.

They found pollution from the construction of renewable-energy infrastructure is ultimately small compared with direct emissions from gas- and coal-fired power plants, even if a large amount of carbon from these plants is later captured and stored.

Proc. Natl Acad. Sci. USA **http://doi.org/v8d (2014)**

COLIN MONTEATH/HEDGEHOG HOUSE/MINDEN PICTURES/CORBIS

METEOROLOGY

Weather explains Asian glacier survival

Some glaciers in central Asia could be weathering climate change better than those in neighbouring mountain ranges because of different seasonal weather patterns.

Geoscientists have puzzled over why the glaciers of the Karakoram region (pictured) have not receded as much as others nearby. A team led by Sarah Kapnick of Princeton University, New Jersey, compared about 30 years of temperature and precipitation data up to 2007 with climate simulations covering 1861 to 2100. The team found that Karakoram gets most of its precipitation during winter. By contrast, nearby ranges such as the central Himalayas experience mainly summertime rains driven by monsoons.

This seasonal difference could be preventing the Karakoram glaciers from shrinking, and could even be causing some of the glacier expansion seen there in the past several years.

Nature Geosci. **http://doi.org/v9g (2014)**

ZOOLOGY

Birds colour-match their nests

Zebra finches seem to actively camouflage their nests when building them.

Many birds' nests appear camouflaged, but this could be a serendipitous result of their use of local materials. Ida Bailey at the University of St Andrews, UK, and her team let 20 male zebra finches (*Taeniopygia guttata*; **pictured**) choose between two types of paper strip when building their nests: one matching the cage colour and the other contrasting. Of the birds, 14 predominantly chose the colour that matched the cage decor.

ANDREW WALMSLEY/NATURE PICTURE LIBRARY

This is the first experimental evidence that birds choose to camouflage their nests, say the authors.

The Auk 132, **11–15 (2015)**

MATERIALS

Plants inspire medical coating

A coating for medical implants such as artificial heart valves could prevent blood-clot formation — a common problem in which blood cells and proteins stick to the surfaces of such devices.

To make the surfaces less sticky, Donald Ingber of Harvard University in Boston, Massachusetts, and his team adapted technology inspired by the carnivorous pitcher plant, which has a slick layer of water that causes insects to slide into the plant's 'mouth'.

The authors designed a two-layer coating: the first layer uses a perfluorocarbon to bind to smooth surfaces, and the second is a slippery film of medical-grade liquid perfluorocarbon. Tubing coated with this material had a lower build-up of clots and microorganisms than uncoated tubing when implanted in pigs. The material could reduce the need for anti-clotting drugs, which can cause bleeding.

Nature Biotechnol. **http://doi.org/v9j (2014)**

NEURODEGENERATION

A monkey model of Alzheimer's

The molecule that has been implicated in Alzheimer's disease causes many hallmarks of the disorder in monkey brains, suggesting the

potential for a primate model of the disease.

Amyloid-β forms plaques in the brains of people with Alzheimer's. Fernanda De Felice at the Federal University of Rio de Janeiro, Douglas Munoz at Queen's University in Kingston, Canada, and their colleagues injected small aggregates of amyloid-β into the brains of macaques. They found that the molecule ended up in key cognitive centres, where they noticed many of the same changes seen in diseased brains, such as the loss of neuronal connections.

Alzheimer's research relies heavily on rodent models, and these findings could lead to the development of better animal models of the disease, the authors say.

J. Neurosci. 34, **13629–13643 (2014)**

BIOTECHNOLOGY

Another try at gene therapy for SCID

Gene therapy has cured children who have severe combined immunodeficiency (SCID), without so far causing cancer as previous treatment forms did.

David Williams at Boston Children's Hospital in Massachusetts, Alain Fischer of the Necker Hospital for Sick Children in Paris and their co-workers made a viral vector containing a corrected version of the mutated gene that otherwise hobbles the immune systems of children with SCID. Nine boys were treated; eight survived during the 1–3-year follow-up period, while one died of an infection that predated the treatment.

The researchers deleted certain key sections of the viral vector's DNA and found that the virus did not insert itself as often into cancer genes in the patients' genomes as earlier versions of the virus did. None of the boys has yet developed cancer, but the researchers note that only long-term monitoring will rule out that possibility.

N. Engl. J. Med. 371, **1407–1417 (2014)**

M. ORTIZ CATALAN *ET AL. SCI. TRANSL. MED.* 6, 257RE6 (2014)

WATER RESOURCES

Cities will grow thirsty

The number of large cities prone to insufficient water supplies could increase over the next 25 years — even without accounting for climate change.

Julie Padowski and Steven Gorelick at Stanford University in California used projected urban population growth and increasing agricultural demands to assess changes in water needs. They focused on 71 cities around the world that depend on water from surface rivers or reservoirs, and estimate a 28% increase in the number of cities that will suffer supply vulnerability in 2040 compared with 2010. Among the most vulnerable are Ouagadougou, Burkina Faso; Guangzhou, China; and Dublin, Ireland.

Redistributing water from agriculture and from other non-urban areas could mitigate water shortages, the duo says.

Environ. Res. Lett. 9, **104004 (2014)**

MARINE ECOLOGY

Marine slime ferries parasite

Sticky molecules found in aquatic ecosystems could help to transmit land-based pathogens to marine animals.

Karen Shapiro at the University of California, Davis, and her colleagues added varying levels of a gelatinous compound, alginic acid, to seawater samples containing the parasite *Toxoplasma gondii*, which is carried by cats. They found that it increased the number of parasites stuck to marine aggregates, and that similarly sticky molecules also allow the parasite to adhere to kelp surfaces. Snails, which graze on kelp, ingested and accumulated the pathogen.

Sea otters are known to eat snails, and this finding could explain why the mammals have been infected with *T. gondii*.

Proc. R. Soc. B 281, **20141287 (2014)**

SOCIAL SELECTION

Popular articles on social media

Online fun with Nobel forecasts

As this year's Nobel laureates were inundated with congratulations online, the few researchers who correctly guessed the winners also earned themselves a little kudos. For example, Kate Jeffery, a neuroscientist at University College London, correctly foretold on Twitter that her colleague John O'Keefe would win the Nobel Prize in Physiology or Medicine for work on the brain's positional system.

In an interview, Jeffery said that she wasn't just making a casual prediction, but was actively rooting for her former postdoc adviser. She also had reason to celebrate the other two winners, May-Britt Moser and Edvard Moser of the Kavli Institute for Systems Neuroscience in Norway. As a PhD student, Jeffery worked in the same lab as the Mosers when they were postdocs. "It really has been a delight to see a Nobel-prizewinning discovery unfold from start to finish," she said.

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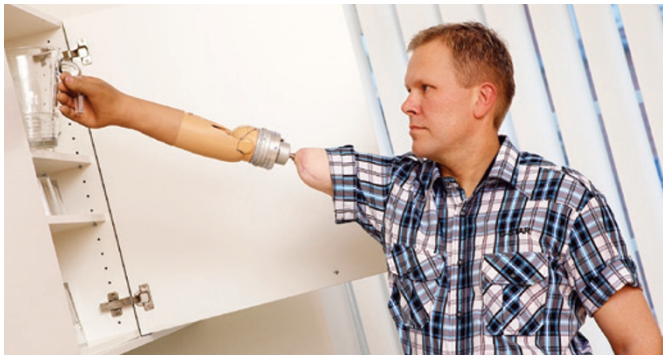

NEUROTECHNOLOGY

Better control over bionics

Two groups have developed technologies for artificial arms that give people finer control over the limb than over conventional prostheses.

Daniel Tan at the Louis Stokes Veterans Affairs Medical Center in Cleveland, Ohio, and his colleagues implanted electrodes in the arm muscles of two people, who each had a prosthetic arm and hand. Pressure sensors in the bionic fingers together with the embedded electrodes, which sent complex electrical patterns to residual nerves in the arm, enabled the subjects to sense different types of touch — such as tapping and constant pressure — without feeling the tingling caused by previous devices. This allowed them to handle delicate objects such as cherries.

In a separate study, Max Ortiz-Catalan at Chalmers University of Technology in Gothenburg, Sweden, and his co-workers attached an artificial arm (**pictured**) to a man's humerus bone, using the implant to direct electrodes to specific arm muscles. The electrodes detected the man's intended movements better than conventional skin sensors, allowing for more-precise control of the prosthesis.

Sci. Transl. Med. 6, **257ra138; 257re6 (2014)**

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