RESEARCH HIGHLIGHTS

Selections from the scientific literature

CHEMISTRY

Power from deep-sea vents

Researchers have harnessed deep-sea hydrothermal vents to produce electricity.

Masahiro Yamamoto of the Japan Agency for Marine-Earth Science and Technology in Yokosuka and Ryuhei Nakamura of the RIKEN Center for Sustainable Resource Science in Wako and their team exploited the differences in chemistry between sea water and fluids that leak from hydrothermal vents. Steep concentration gradients of chemicals such as hydrogen sulphide allowed the researchers to generate more than 21 milliwatts of power from a fuel cell based on a platinum cathode and an iridium anode.

This successfully powered three light-emitting diodes 1,000 metres below the surface, both at an artificial vent created by deep-sea drilling and a natural vent.
Angew. Chem. **http://doi.org/f2dtrm (2013)**

GEOLOGY

Meet the world's largest volcano

A submarine mountain in the northwest Pacific could be the largest single volcano on Earth, rivalling even the mighty Olympic Mons on Mars.

Tamu Massif, situated 1,500 kilometres east of Japan, is roughly the size of the British Isles. Seismic-profiling studies penetrated its depths and revealed that its lava flows dip away from the volcano's summit in all directions. This suggests that all the lava came from a single eruptive vent, say William Sager of the University of Houston in Texas and his colleagues.

The dome-shaped mountain probably formed in a single eruptive blast that began some 140 million years ago.
Nature Geosci. **http://doi.org/nqd (2013)**
For a longer story on this research, see go.nature.com/beeqp4

HENNO GOUS

ANIMAL BEHAVIOUR

Clumping caterpillars

Entomologists sometimes see caterpillars clumping together, but the reason for this behaviour has defied explanation.

Researchers had proposed that the aggregations conserved water or energy, but John Terblanche of Stellenbosch University in South Africa and his colleagues have dispatched those ideas. They collected Cape Lappet moth caterpillars (*Eutricha capensis*) and reared them as individuals and in groups of up to 100. Metabolic rates and water use did not decrease with group size.

Given that aggregating caterpillars did not conserve energy, the researchers suggest that the behaviour may confer other advantages, such as faster growth rates or safety in numbers.
J. Exp. Biol. **http://doi.org/npp (2013)**

ECOLOGY

US forests grow to be different

Trees have made a major comeback in the northeastern United States, but the regrown forest is in some ways markedly different from that of 400 years ago, when European colonists started clearing trees for agriculture.

Jonathan Thompson of the Smithsonian Conservation Biology Institute in Front Royal, Virginia, and his colleagues examined land-survey records from 1620 to 1825 in nine northeastern states. Colonial surveyors often divided up plots of land using 'witness trees' to mark the corners, generally noting the genus, so the authors were able to compare these data with modern forest inventories.

Although most of the same tree species were present in both time periods (with the exception of the now-rare American chestnut, *Castanea dentata*), their relative abundances differ greatly. Colonists removed a forest dominated by species such as beech and hemlock conifers, but today's trees form a canopy of mostly maple and birch.
PLoS ONE **8, e72540 (2013)**

TECHNOLOGY

A cheaper, quieter MRI machine

Magnetic resonance imaging (MRI) is expensive, noisy and requires bulky equipment. It can also have side effects, such as stimulating nerves in patients. These problems arise from the constant switching between positive and negative magnetic-field gradients used to manipulate the spin of hydrogen nuclei throughout the patient's body. The energized nuclei produce radiofrequency signals, which carry the information used to build up an image.

By exploiting the radiofrequency pulses used to prepare the nuclei, Jonathan Sharp at Alberta Innovates Technology Futures in Calgary, Canada, and his

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