

RESEARCH HIGHLIGHTS

Selections from the scientific literature

AGRICULTURE

Easy to thresh and better to sow

When domesticating wheat, Neolithic humans preferred plants that kept the grain on the stalk until ripe. That not only made the crop easier to harvest, but also made it faster to separate grain from chaff.

Shahal Abbo at the Hebrew University of Jerusalem and his colleagues experimentally threshed nearly 200 types of wheat, including wild strains and traditional varieties.

For wheat heads that did not shatter, threshing time was reduced by about 30% compared with more-brittle types. And for plants with resilient heads and weak husks, threshing time decreased by a further 85%. This resulted in many fewer broken kernels, making the seed more likely to be saved for future sowing.

Post-harvest processing, sometimes considered a barrier to the domestication of cereal crops, may have played an underappreciated part in promoting it, the authors say. *Ann. Bot.* 112, 829–837 (2013)

APPLIED PHYSICS

Jumping droplets repel each other

Water droplets that form on strongly repellent surfaces often coalesce and leap off. When they do, they carry an

electric charge that can be used to control them.

Evelyn Wang at the Massachusetts Institute of Technology in Cambridge and her colleagues observed that jumping droplets sometimes repel each other in the air (pictured). To learn why, they studied droplets coalescing on a superhydrophobic copper oxide nanostructure, and found that the droplets sometimes gain a small positive charge as they merge and leap into the air.

The authors suggest that this electrostatic effect could be exploited to remove or

manipulate the droplets, and so produce surfaces that can be easily cleaned or de-iced.

Nature Commun. 4, 2517 (2013)

CANCER

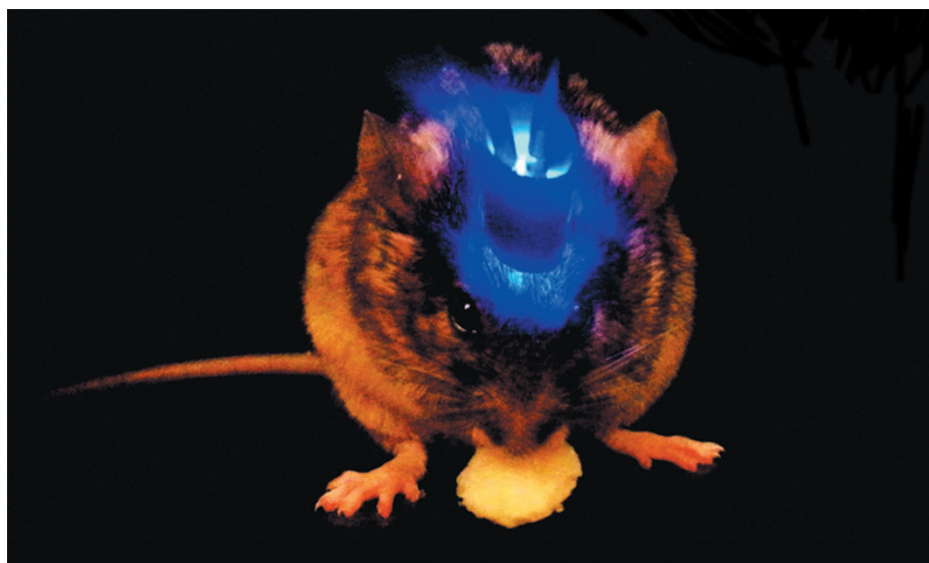
Tumour types have traits in common

Combining genomic data from tumours found in different organs has revealed previously unknown cancer-related genes, and has led to a system for classifying tumours that could predict a patient's response to therapy.

In recent years, studies of

cancer genomics have focused on mapping the genetic changes that contribute to the disease. Rameen Beroukhim of the Broad Institute in Cambridge, Massachusetts, and his colleagues analysed how the number of copies of genes varied across almost 5,000 tumours representing 11 kinds of cancer. The team found 140 genome regions in which copy-number variations were associated with cancer. Of those, 102 contained no known cancer-related gene, suggesting a suite of new cancer drivers.

In related work, Chris Sander and his colleagues at



JOSH JENNINGS

NEUROSCIENCE

Hunger neurons hunted out

Scientists have revealed a key brain circuit that causes mice to eat uncontrollably.

Garret Stuber at the University of North Carolina, Chapel Hill, and his colleagues manipulated a precise set of brain cells using optogenetics — a technology that lets scientists control neurons by shining light into living brains (pictured). The neurons that they studied connect two brain areas: the lateral

hypothalamus, which is involved in eating behaviour, and the BNST, which collects input on 'motivational states' such as hunger and thirst.

When these neurons were activated, well-fed mice began to gorge and showed a marked preference for high-calorie food. When the cells were inhibited, even mice that were previously deprived of food refrained from eating.

Science 341, 1517–1521 (2013)

NEVAD MILJKOVIC AND DANIEL J. PRESTON/MIT

the Memorial Sloan-Kettering Cancer Center in New York used data from 12 cancer types to group tumours on the basis of genomic signatures rather than according to the organ in which the tumour originated. These signatures might one day be used to personalize cancer therapies.

Nature Genet. 45, 1127–1133; 1134–1140 (2013)

For a longer story on this research, see go.nature.com/nbqobm

ASTRONOMY

Fine weather on far-off planet

Skies are clear and blue on an extrasolar planet 14 times more massive than Earth.

Using the Large Binocular Telescope in Arizona, a team led by Valerio Nascimbeni at the University of Padua, Italy, studied ultraviolet and infrared light coming from the dwarf star GJ3470, 31 parsecs from Earth. By watching the star dim as a known planet passed in front of it, the astronomers could probe light scattered by the planet's atmosphere.

The data suggest that the planet has a blue, cloud-free sky, which could help to reveal the composition of its atmosphere. The data are also precise enough to suggest that ground-based telescopes can now be used to discover Earth-sized planets around similar stars, rather than relying on space-based observatories.

Astron. Astrophys. <http://doi.org/n2b> (2013)

CLIMATE SCIENCES

How plants helped Earth to stay cool

Plant growth spurred by rising levels of carbon dioxide pollution in the atmosphere has slowed the rate of global warming considerably.

Stephen Pacala of Princeton University in New Jersey and his colleagues used an Earth-system model to analyse historical emissions from industry and changes in land

use, including deforestation and agricultural development. The team simulated the carbon cycle and climate from 1861 to 2005 with and without the fertilization effect of CO₂ on vegetation.

Although the model did not incorporate certain factors, such as pre-1960 land use, the results suggest that if vegetation had not soaked up so much of the gas, levels of CO₂ would have risen by an extra 85 parts per million — boosting temperatures by about 0.31 °C.

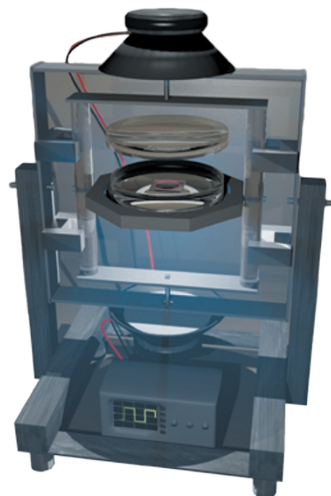
Proc. Natl Acad. Sci. USA <http://doi.org/n2c> (2013)

ORGANIC ELECTRONICS

Sound shakes semiconductor

Gently vibrating a solution of semiconductor molecules as they crystallize into a conductive film helps to reduce structural flaws. This yields higher-quality organic transistors that can be used in flexible, lightweight electronic devices.

A team led by Oana Jurchescu of Wake Forest University in Winston-Salem, North Carolina, used audio speakers operating at a low-frequency of around 100 hertz to shake molecules as they formed a thin crystalline film (apparatus **pictured**). This boosted the film's semiconducting properties, making it almost as good a semiconductor as single crystals grown by diffusion



COMMUNITY CHOICE

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ANIMAL BEHAVIOUR

Chimps ignore watching eyes

HIGHLY READ
on www.elsevier.com/animal-behaviour in September

Unlike humans, chimpanzees do not alter their behaviour significantly when eyes are gazing down on them.

Daniel Nettle at Newcastle University, UK, and his colleagues observed chimps (*Pan troglodytes*) consuming shelled peanuts in front of a large image of a chimp (**pictured**). Although chimps adjust their eating habits in the presence of dominant chimps and recognize such stylized black-and-white cartoons as faces, the animals in these experiments did not hesitate to take peanuts when 'watched' by the image. Humans are more charitable and honest under images of watching eyes than in their absence, and may be unique in their extreme sensitivity to faces, the authors say.

Anim. Behav. 86, 595–602 (2013)



from molecular vapour — a method that, unlike shaking liquid solutions, does not lend itself to high-throughput manufacture at room temperature.

Other methods such as heating or including additives in the film also improve superconductivity, but vibration might be cheaper and more scalable, the researchers think.

Adv. Mater. <http://dx.doi.org/10.1002/adma.201302838> (2013)

NANOTECHNOLOGY

Friction at the atomic scale

The effect of atomic bonds on friction has been demonstrated, for the first time, at the scale of just a few atoms.

Variations in atomic surfaces

are thought to modulate the force of friction in a way that depends on the direction in which objects are moved, but this has been difficult to show experimentally. Jay Weymouth of the University of Regensburg in Germany and his colleagues have now done so.

They passed the tip of a tungsten lateral-force microscope between regions of a silicon crystal surface, on which pairs of silicon atoms were oriented at right angles to each other. Oscillations of the tip varied depending on whether it was sliding along or across the direction of the paired atoms.

Phys. Rev. Lett. 111, 126103 (2013)

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