

ASTRONOMY

An embarrassment of planets

A system predicted to contain as many as seven planets orbiting a Sun-like star has been discovered 39 parsecs from the Sun — the most populous extrasolar planetary system found so far.

The planets orbit HD 10180 near the southern constellation Hydrus. Christophe Lovis at the University of Geneva in Switzerland and his team used a spectrograph at the European Southern Observatory in Chile to look for a characteristic stellar 'wobble' caused by planets tugging on their parent star. Their results suggest that five planets of a similar mass to Neptune orbit at distances of 0.06–1.4 times the Earth–Sun distance. A possible sixth planet, with a mass similar to that of Saturn, has an orbital period of about 6 years.

The seventh prospective planet could have a mass just 1.4 times that of Earth, making it the smallest extrasolar planet found so far. But with an orbital distance equivalent to just 2% of Earth's, it is likely to be a scorched world.

Astron. Astrophys. 528, A112 (2011)

CHEMISTRY

Vesicles form with pH shift

Lipid bilayers, which make up cell membranes, can change shape in response to external stimuli. To reproduce this behaviour in a synthetic system, Jan van Esch at Delft University of Technology

in the Netherlands and his co-workers have produced a vesicle — a water-filled compartment bounded by a bilayer membrane — that forms and collapses in response to changes in pH.

The system comprises a solution containing a molecule with two 'tails', each of which can form reversible covalent bonds with another molecule. When there is a sufficiently

high number of the molecules, the bonds form and the vesicles spontaneously take shape; conversely, when bonds break, the vesicles eventually collapse (**pictured**). The stability of the bonds is also affected by the solution's pH, with vesicles forming at a pH of more than 7, and dissociating completely when pH falls below 4.

These reversible vesicles might be useful for applications that require controlled encapsulation and delivery. *Angew. Chem. Int. Edn* doi:10.1002/anie.201007401 (2011)

CANCER IMMUNOLOGY

Hide no more, tumour

Deadly pancreatic tumours evade attack by the immune system by developing a stroma — a shell of connective tissue enmeshed with white blood cells that suppress the immune response. Robert Vonderheide at the University of Pennsylvania in Philadelphia and his team now report a way to reverse this immune suppression.

The authors studied



ARCHAEOLOGY

North America's first tool users?

The Clovis people who lived in North America about 13,200 years ago have long been thought to be the continent's first tool-using humans. But the discovery of older human artefacts at a site in Texas is challenging this idea.

In sediments dating from between 13,200 and 15,500 years ago, Michael Waters of Texas A&M University in College Station and his team found 15,528 stone artefacts that seem to have been undisturbed by soil movement. This suggests

that the artefacts, including ancient tools (**pictured**), existed before the Clovis people came to dominate the landscape. A few of the tools have similarities to Clovis ones, but are simpler and still distinct. The authors suggest that a different sort of people was using tools in North America before the Clovis people.

Science 331, 1599–1603 (2011)

For a longer story on this research, see go.nature.com/2sijzo

21 patients undergoing chemotherapy for pancreatic cancer, and added an antibody that stimulates a protein called CD40 to their treatment regimen. CD40 is known to activate certain types of immune cell, including tumour-specific T cells. Tumours in four of the patients regressed.

The scientists repeated the treatment regime in mice genetically engineered to develop similar pancreatic cancers. About 30% of mouse tumours regressed, with holes appearing in the stroma. Surprisingly, the immune cell responsible for killing tumour and stroma cells was not the T cell but the macrophage. *Science* 331, 1612–1616 (2011) For a longer story on this research, see go.nature.com/2ZNMhb

NEUROSCIENCE

No sleep, better mood

Sleep-deprived people are known to have stronger reactions to negative experiences, but some patients with depression seem to perk up with lack of sleep. To resolve this paradox, Matthew Walker at the University of California, Berkeley, and his team used functional magnetic resonance imaging to scan the brains of 14 people who hadn't slept for about 36 hours while presenting them with emotionally neutral and pleasant-looking images.

The volunteers rated a greater proportion of the images as 'pleasant' than did people who had maintained a normal sleep routine. The sleep-deprived individuals also showed increased activation in brain regions that mediate reward-driven behaviour, as well as greater connectivity between certain visual and emotional processing centres.

The results suggest that sleep deprivation can enhance reactivity to both positive and negative stimuli.

J. Neurosci. 31, 4466–4474 (2011)

BIOPHYSICS

Tiny swimmers trapped by lasers

Large, self-propelling microorganisms can be optically trapped with laser beams, a process previously achieved only for smaller motile cells such as sperm and *Escherichia coli*.

Gregor Thalhammer and his colleagues at Innsbruck Medical University in Austria used two opposing laser beams and a system involving a mirror, prism and lenses to capture a variety of organisms. These included protists such as dinoflagellates and *Euglena gracilis*, which measures, on average, 50 micrometres in length. The team's technique avoids creating damaging levels of heat. *Euglena* was held for 13 minutes without showing signs of heat stress. The method could be used to manipulate microbes for imaging, as well as in other experiments, the authors say. *J. Opt.* 13, 044024 (2011)



ECOLOGY

Feasting fish scatter seeds

Massive Amazonian characid fish can carry seeds kilometres across jungle flood plains, potentially making them one of the most important seed distributors in this habitat.

Jill Anderson, now at Duke University in Durham, North Carolina, and her colleagues radio-tracked 24 of the animals (*Colossoma macropomum*; pictured) during three flood seasons. They also monitored how long captive fish of this species retained consumed seeds.

COMMUNITY CHOICE

The most viewed papers in science

STEM CELLS

The roots of insulin production

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19 Feb–21 Mar

The pancreas harbours a small population of insulin-producing stem cells — cells that might one day be harnessed to replace damaged cells in people with diabetes.

Whether new insulin-producing β -cells in the adult pancreas develop from stem cells has been hotly debated. Simon Smukler and his colleagues at the University of Toronto in Ontario, Canada, now report the isolation of 'pancreas-derived multipotent precursor cells' from mouse and human tissue samples. These cells make insulin and can take on various cellular identities, including that of the β -cell. The authors traced the origin of the mouse precursor cells to the embryonic pancreas.

Transplantation of both mouse and human precursor cells into diabetic mice lowered blood sugar levels and reduced diabetes-associated weight loss.

Cell Stem Cell 8, 281–293 (2011)

The authors conclude that wild fish can probably carry seeds up to 5.5 kilometres — one of the longest distances reported for fruit-eating animals — often to habitats where the seeds will germinate once the flood waters recede. However, overfishing has greatly depleted the numbers of larger *C. macropomum*, which carry seeds farther than their smaller counterparts, and may be threatening this mode of seed dispersal.

Proc. R. Soc. B doi:10.1098/rspb.2011.0155 (2011)

For a longer story on this research see go.nature.com/fv4zyd

into the banks of the Delaware River at a site in Pennsylvania looking for prehistoric changes in soil chemistry and sediment particle size, and for ancient plant material. They found increased sediment deposits from AD 1100–1600 — an indicator of elevated erosion — as well as signs that humans had cleared trees around rivers to farm corn. The erosion and flooding were made worse by the wet climate of the Little Ice Age in AD 1450–1530. European settlers later caused further ecological changes to the flood plains as a result of their various land-use practices.

Geology 39, 363–366 (2011)

ARCHAEOLOGY

Early farmers caused floods

Several hundred years before Europeans settled in North America, small Native American farming communities were already having a big impact on eastern flood plains — clearing the land and thus increasing erosion, runoff and flooding.

Gary Stinchcomb of Baylor University in Waco, Texas, and his colleagues dug deep

CORRECTION

The highlight 'Copper makes for selectivity' (*Nature* 471, 413; 2011) stated that selectivity of 90% was achieved using organolithium reagents. In fact, this was achieved by using organolithium reagents in combination with copper-based catalysts.

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