

# RESEARCH HIGHLIGHTS

Selections from the scientific literature

## CANCER

### Predictor pairs images and genes

Automated image processing can be integrated with molecular profiling to provide a fuller portrait of cancer.

Pathologists routinely use visual examinations of cell types in tumour biopsies to direct patient care. However, it is hard to integrate these visual analyses with data from gene-expression studies.

Florian Markowitz and Yinyin Yuan at the University of Cambridge, UK, and their team came up with software that can analyse images of stained tissue sections to determine the identity and arrangement of cells in tumours. For some cell types, certain spatial patterns were associated with longer patient survival. However, an algorithm that combined image-based and gene-expression data predicted survival more accurately than algorithms that used either type of information alone.

*Sci. Transl. Med.* 4, 157ra143 (2012)

## MICROBIOLOGY

### Bacteria beaten by bacteria

Infections caused by a strain of *Clostridium difficile* responsible for recent epidemics might be treatable using a mix of gut bacteria.

A team led by Trevor Lawley of the Wellcome Trust Sanger Institute near Cambridge, UK, infected mice with the *C. difficile* strain and then treated them with an antibiotic commonly used in humans. Instead of killing the pathogen, the antibiotic displaced other gut bacteria and permitted a persistent *C. difficile* infection.

Treating the infected mice with faeces from healthy

animals restored their intestinal flora and resolved their infections. A mixture of six different bacterial species isolated from the faeces had the same effect, promising a treatment more palatable to patients than faecal transplantation.

*PLoS Path.* 8, e1002995 (2012)

## CLIMATE-CHANGE ECOLOGY

### Plankton diversity loss looms

They are responsible for about half of all photosynthesis on Earth — and plankton could be drastically affected by climate change.

Mridul Thomas and his team

at Michigan State University in East Lansing considered 194 phytoplankton strains. Using the existing literature, the authors estimated the maximum growth rate, optimum temperature for growth and the temperature range over which growth can occur, for each of the strains. Many strains seem to be tightly adapted to the average temperature at their location. Tropical strains, in particular, tend to have optimal growth temperatures at or just below the mean temperature in their environment. The authors' models indicate that an average temperature rise of just 2°C in the tropics by 2100 could reduce the diversity of

phytoplankton in the region by a third — unless, that is, the plankton can evolve greater heat tolerance.

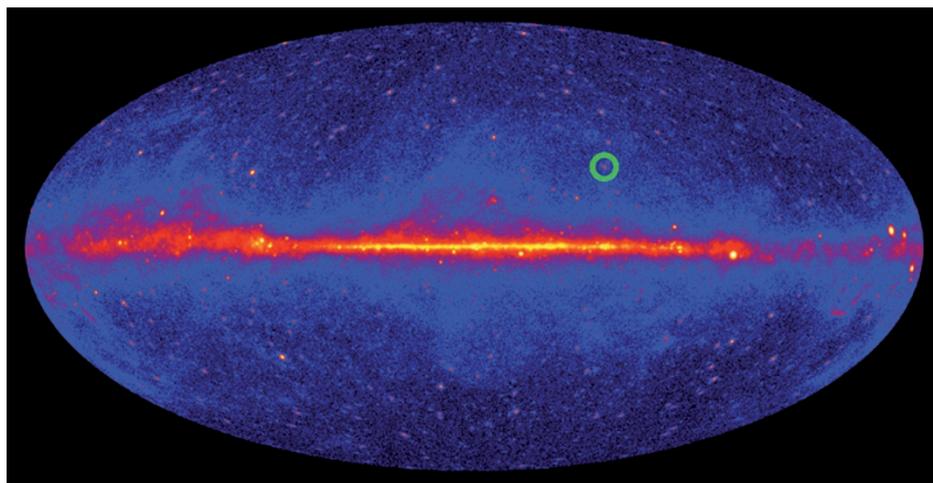
*Science* <http://dx.doi.org/10.1126/science.1224836> (2012)

## BIOSENSORS

### Naked-eye ELISA developed

Researchers have developed a sensitive bioassay that can be read with the naked eye.

The assay is based on a laboratory technique known as an ELISA (enzyme-linked immunosorbent assay), in which an enzyme generates a coloured compound whenever



## ASTRONOMY

### Picking out a predatory pulsar

Researchers have used raw computing power to hunt down a 'black widow' pulsar that is evaporating its companion star.

Pulsars are stellar remnants that emit lighthouse-like beams of radiation. They often emit gamma rays, but can usually be spotted only if they also emit easier-to-detect radio waves. However, Holger Pletsch of the Max Planck Institute for Gravitational Physics in Hannover, Germany, and his colleagues found

the current pulsar (pictured; circled) through a blind search of data from the Fermi Gamma-ray Space Telescope.

Using computers to analyse huge swathes of raw data, the team picked out the pulsar, which takes 93 minutes to orbit its companion star. This orbital period is the shortest of any binary pulsar of this type yet found.

*Science* <http://dx.doi.org/10.1126/science.1229054> (2012)



antibodies recognize a target molecule. However, detecting low levels of this compound requires expensive instruments that few labs in the developing world can afford, so Molly Stevens and Roberto de la Rica of Imperial College London devised an alternative.

In their method, the ELISA enzyme controls the aggregation of nanoparticles, giving rise to a blue colour if a target protein is present and a red colour if it is not. Although the bioassay cannot quantify protein levels, it can detect an HIV protein at concentrations as low as 1 attogram per millilitre.

*Nature Nanotechnol.* <http://dx.doi.org/10.1038/nnano.2012.186> (2012)

## MICROBIOLOGY

## Cheating yeast finish last

The 'tragedy of the commons' holds that cheaters have an advantage over cooperators because cheaters benefit from common goods without contributing to them. Studies in yeast suggest a new mechanism to avert such a tragedy.

Adam James Waite and Wenying Shou of the Fred Hutchinson Cancer Research Center in Seattle, Washington, started cultures that had equal amounts of three yeast strains: one that produced adenine and required lysine; another that produced lysine and required adenine, and a third, 'cheating' strain, which required lysine but did not supply any nutrients.

Contrary to expectations, 'cooperative' strains dominated in some cultures, and could occasionally drive cheaters to extinction. Genome sequencing revealed that the dominating strains had adapted to their new environment by

accumulating mutations that improved nutrient transport. When these mutations arose in cooperative strains and compensated for the cost of cooperation, the cheaters were outcompeted.

*Proc. Natl Acad. Sci. USA* <http://dx.doi.org/10.1073/pnas.1210190109> (2012)

## CLIMATE

## Tailored geoengineering

Climate-engineering techniques that cool Earth by reflecting sunlight back into space may be tailored to minimize negative effects on individual regions without compromising overall cooling.

Douglas MacMartin at the California Institute of Technology in Pasadena and his colleagues used a global climate model to explore the impact of techniques such as the injection of aerosols into the stratosphere. The team then modelled the effects of varying the interventions spatially and seasonally, and showed that the average global temperature could be reduced while still supporting goals such as the recovery of Arctic sea ice.

The model suggests that climate interventions could provide the world with more than a single 'global thermostat', the authors say. *Nature Clim. Change* <http://dx.doi.org/10.1038/nclimate1722> (2012)

## CONDENSED MATTER PHYSICS

## Building a space-time crystal

Just as a crystal consists of a regular array of particles repeated in space, so a space-time crystal should consist of a regular pattern of particles that also repeats cyclically over time. Now, Xiang Zhang at the University of California, Berkeley, and his team have published the first proposal for an experiment that could realize this abstract notion.

The authors' idea is to trap a ring of cold ions in a magnetic

## COMMUNITY CHOICE

The most viewed papers in science

## ANIMAL BEHAVIOUR

## Bears show knack for numbers

**HIGHLY READ**  
on [www.journals.elsevier.com/animal-behaviour](http://www.journals.elsevier.com/animal-behaviour) over the past 3 months

Bears may be able to estimate and compare numbers of items.

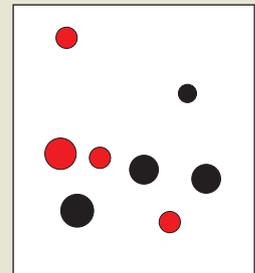
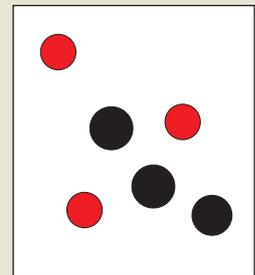
Jennifer Vonk of Oakland University in Rochester, Michigan, and Michael Beran of Georgia

State University in Atlanta trained three captive black bears (*Ursus americanus*) to

distinguish between two groups of dots (pictured) displayed on a touch-screen computer. One bear was trained to touch the group containing the most dots, and the others to select the group with the fewest. By varying the size and positions of the dots, researchers tested whether the animals could recognize dot number independently of the total area covered by the dots. Although the bears showed a preference for dots occupying a larger area, they also showed some ability to judge the relative numbers of dots.

The bears' numerical skills may have evolved to help them in complex foraging environments, the authors suggest.

*Anim. Behav.* 84, 231–238 (2012)



field so that they adopt a regular arrangement and then rotate in their lowest energy state, thereby creating temporal repetition. Such a device might be able to store quantum information, and could thus have applications in quantum computing, the researchers say. *Phys. Rev. Lett.* 109, 163001 (2012)

## PALAEOZOOLOGY

## Palaeoflamingo nest found

A fossilized nest, found in Spain and containing five eggs, belonged to a previously unknown species of palaeoflamingo, the ancient ancestor of the modern, long-legged bird. The nest — made from twigs and leaves 15 million to 20 million years ago — was found alongside

bone fragments, encased in limestone in the Bardenas Reales de Navarra Natural Park.

Gerald Grellet-Tinner from the Field Museum in Chicago, Illinois, and his team report that the eggshells are characteristic of flamingos, whereas the nest and the number of eggs more closely resemble those of grebes, freshwater diving birds.

Modern grebes and flamingos differ in their nest-building and feeding styles, but DNA studies have suggested that the two species are closely related. The present discovery supports that connection and points to a time when the two species shared survival strategies.

*PLoS ONE* 7, e46972 (2012)

**NATURE.COM**

For the latest research published by Nature visit:

[www.nature.com/latestresearch](http://www.nature.com/latestresearch)