

# RESEARCH HIGHLIGHTS

Selections from the scientific literature

## OPTICS

### A poor man's hologram

Three-dimensional films have been a hit at the box office, but making them requires pricey equipment. Baoqing Sun at the University of Glasgow, UK, and his colleagues propose a simpler alternative. Instead of using cameras or lasers to achieve a three-dimensional (3D) effect, they illuminate an object with a rapidly changing pattern of black and white squares. Single-pixel detectors placed around the object capture light reflected in various directions, and an algorithm reconstructs a 3D image from these simple inputs.

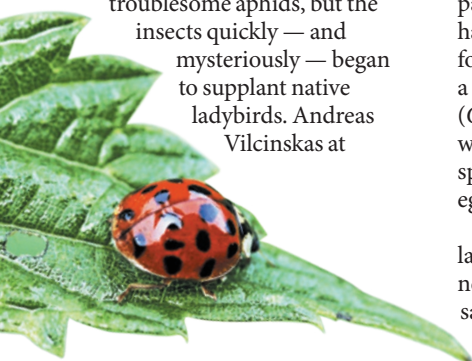
Although the scheme takes several minutes to image a stationary object, it is cheaper than current 3D systems. In addition, it should work for wavelengths such as the far infrared that are beyond the reach of current technology. *Science* 340, 844–847 (2013)

## ECOLOGY

### Invasive insect's inner weapon

Ladybirds from central Asia act as a Trojan horse for a microscopic killer.

Farmers brought harlequin ladybird beetles (*Harmonia axyridis*, pictured) to North America and Europe to eat troublesome aphids, but the insects quickly — and mysteriously — began to supplant native ladybirds. Andreas Vilcinskis at



Justus Liebig University Giessen in Germany and his colleagues discovered that a parasite lurks within harlequin ladybirds' circulatory system and eggs. And although the parasite does not harm the harlequins, the researchers found that it is deadly to a native ladybird species (*Coccinella septempunctata*), which, like many beetle species, eats its competitors' eggs and larvae.

When the harlequin ladybird was introduced to new ecosystems, the authors say, its hidden parasites probably became biological

weapons that helped it to take over new territory.

*Science* 340, 862–863 (2013)

For a longer story on this research, see: <http://go.nature.com/cajaty>

## HUMAN MIGRATIONS

### Minoans came from Europe

Ancient DNA from remains found in caves on the Greek island of Crete suggests that the Minoan civilization emerged from farmers who settled on Crete thousands of years beforehand. This challenges an early theory, which held that

the Minoans — recognized as being one of Europe's first 'high cultures' from their pottery and colourful frescoes — originated from Egyptian refugees.

A team led by George Stamatoyannopoulos at the University of Washington in Seattle analysed mitochondrial DNA (mtDNA) from teeth and bone samples of 37 individuals who lived on Crete between 4,400 and 3,700 years ago. The authors found 6 mtDNA haplotypes unique to Minoans and 15 that are common in modern and ancient European populations, but none characteristic of present-day



## ECOLOGY

### Fish mismatch makes bears eat elk

In bringing lake trout to Yellowstone National Park humans may have inadvertently triggered a cascade of changes with consequences for migratory elk.

A team led by Arthur Middleton, then at the University of Wyoming in Laramie, looked at the long-distance effects of introducing lake trout to the park in the western United States. The lake trout have caused a marked decline in native trout and, unlike the natives, the interlopers spawn on lake bottoms — out of

reach of grizzly bears.

Earlier research suggested that, when fish are in short supply, grizzlies prey on elk calves. The authors used a demographic model to calculate that this dietary shift has cut the growth of elk populations by as much as 11% — even in groups that overwinter well outside the park. The decline of these elk is often blamed, perhaps erroneously, on the reintroduction of wolves.

*Proc. R. Soc. B* <http://dx.doi.org/10.1098/rspb.2013.0870> (2013)

BARRETT HEDGES/GETTY

MARY C. LEGG/AGE FOTOSTOCK/GETTY

African populations. The North African influence on Minoans probably occurred through cultural exchange, the authors say.

**Nature Commun.** 4, 1871 (2013)  
For a longer story on this research, see: [go.nature.com/cscvvy](http://go.nature.com/cscvvy)

## PALAEOLOGY

## 'Ghost' reptile lived late

The identification of a fossilized reptile indicates that extinct 'fish lizards' called ichthyosaurs were more diverse late in their history than is often thought.

Previously, it was thought that only a subset of ichthyosaurs adapted for fast swimming in the open ocean had survived into the Cretaceous period, from 145 million to 66 million years ago. Valentin Fischer at the University of Liège in Belgium and his colleagues describe a new species with archaic features, *Malawania anachronus*, from a 1.5-metre-long fossil.

The recognition of this 'ghost lineage' reveals that two distantly related groups of ichthyosaurs lived in the Cretaceous. This challenges assumptions that low numbers and diversity in ichthyosaurs during this period contributed to their extinction.

**Biol. Lett.** <http://dx.doi.org/10.1098/rsbl.2013.0021> (2013)

## MOLECULAR BIOLOGY

## Small RNA tunes protein

A small RNA molecule that controls whether bacteria coalesce into biofilms has a surprising mode of action.

Small RNAs are known to regulate gene expression by binding to target messenger RNAs, typically blocking their translation into proteins. A team led by Gisela Storz at the US National Institutes of Health in Bethesda, Maryland, and Poul Valentin-Hansen at the University of Southern Denmark in Odense found

that a small RNA produced by *Escherichia coli* also binds to a target protein. The binding activates synthesis of a compound needed to form a biofilm.

Mutant bacteria in which this RNA-protein binding was abolished produced less of the compound and were less able to form biofilms. The results suggest that this small RNA tunes the protein's activity by interacting with it directly.

**Genes Dev.** <http://dx.doi.org/10.1101/gad.214734.113> (2013)

## APPLIED PHYSICS

## Cheap, flexible, white light

Silver nanowires offer a way to solve two problems facing those making light-emitting diodes (LEDs).

LEDs tend to be made from inorganic materials. Those based on organic materials are thinner, lighter weight, cheaper to make and more easily spread over large, flexible surfaces. But the white light that they produce is not the same at all angles, and current organic LEDs are hampered by stiff electrodes. These are not compatible with flexible manufacturing and are made of indium tin oxide, an increasingly scarce material.

Whitney Gaynor, then at Stanford University in California, and her colleagues made alternative electrodes using silver nanowires encased in transparent plastic. These produce stable white light at all angles and are better suited to manufacturing the LEDs on flexible, plastic surfaces.

**Adv. Mater.** <http://dx.doi.org/10.1002/adma.201300923> (2013)

## DEVELOPMENT

## Images of a metamorphosis

A three-dimensional imaging technique makes it possible to watch butterfly pupae mature within the chrysalis.

In most studies of developing insects, seeing means

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## EARTH SCIENCE

## Cosmic rays show how boulders move

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in March 2013

Rare isotopes generated by cosmic rays can reveal the timing of events such as megafloods and rock debris flows.

Analysis of the isotopes' concentrations can help researchers to estimate a rock's age, a method known as cosmogenic dating. Benjamin Mackey and Michael Lamb at the California Institute of Technology in Pasadena extended this technique to show how boulders move and erode. They modelled the accumulation of these isotopes in boulders and found that the isotopes' distribution near the surface indicates how often a metre-plus sized rock has been transported.

Because boulders are often used to date landforms, such information provides clues about geological events and the creation of features such as glaciers and shorelines.

**J. Geophys. Res. Earth Surf.** 118, 184–197 (2013)

destroying. Researchers must dissect a number of specimens at different time points rather than following the maturation of a single individual. Russell Garwood and Tristan Lowe at the University of Manchester, UK, and their colleagues used high-resolution X-ray computed tomography to peer into living pupae of painted lady butterflies (*Vanessa cardui*). The authors took several scans over the insects' approximately 16-day development and produced detailed models (**pictured**) of external and internal anatomy. The technique showed that butterfly breathing apparatus forms surprisingly early, and promises to allow quantitative developmental studies of a range of insects.

**J. R. Soc. Interface** 10, 20130304 (2013)

## ANIMAL MODELS

## Multiplexed mouse mutants

Animals carrying mutations in multiple genes can be engineered in a single step

with the help of a bacterial protein and targeted RNA.

Introducing a number of mutations to mice is usually tedious and time-consuming. Researchers introduce a genetic change into embryonic stem cells, mix them into embryos and transplant these into surrogate mothers. Resulting pups are then interbred for generations.

A group led by Rudolf Jaenisch at the Whitehead Institute for Biomedical Research in Cambridge,

Massachusetts, has succeeded in making several genetic changes at once by using a bacterial system called CRISPR/Cas that normally serves to destroy viruses.

The technique allowed the authors to target both copies of a number of genes in embryonic stem cells and to manipulate genes in fertilized eggs. The method could allow researchers to create mice with a host of mutations in months rather than years, the authors say.

**Cell** 153, 910–918 (2013)

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