

RESEARCH HIGHLIGHTS

Selections from the scientific literature

PHOTONICS

Water lens with adjustable focus

Researchers have developed a microscopic lens with a focal length that can be controlled in less than a millisecond.

Controlling the focus of an optical lens is useful for microscopy and photography, but existing reconfigurable lenses are often bulky or slow to adjust. Romain Quidant and his colleagues at the Institute of Photonic Sciences in Barcelona, Spain, created a controllable lens by placing a disc of gold nanorods inside a thin chamber of water and putting it on top of a conventional lens.

They used a laser to excite the electrons in the nanorods, heating the water and changing its refractive index to create a lens-like effect. The team was able to vary the focal distance of the lens by tens of micrometres with sub-nanometre accuracy, and in only 200 microseconds. *ACS Photonics* <http://doi.org/2cd> (2015)

BIOMATERIALS

DNA-based gel for printing organs

A gel that can be infused with live cells and nutrients makes a promising material for printing three-dimensional tissues such as artificial organs.

Dongsheng Liu at Tsinghua University in Beijing, Wenmiao Shu at Heriot-Watt University in Edinburgh, UK, and their team made two water-based inks from peptides and synthetic DNA strands



ECOLOGY

Competing bluebirds make tougher sons

Female western bluebirds that have to compete for nesting sites produce more early-hatching male chicks than do females with fewer competitors. The chicks are also likely to be more aggressive. This has long-term effects on the range and behaviour of subsequent generations.

Renée Duckworth and her colleagues at the University of Arizona in Tucson discovered that female western bluebirds (*Sialia mexicana*; pictured) that live in areas with many neighbours and few nesting sites laid eggs containing more androgen — a hormone that boosts aggression

in the offspring — than females facing less competitive pressure. Those first eggs also tended to produce more males, which can compete for and colonize new territory. When the researchers increased the number of nesting sites in study areas in western Montana, however, the females produced eggs with less androgen, and fewer male offspring in the early eggs.

This eventually allowed the western bluebird to boost its numbers and displace its competitor, the mountain bluebird (*S. currucoides*). *Science* 347, 875–877 (2015)

that form a stable hydrogel when mixed. The team printed layers of the gel to build up millimetre-scale structures (pictured). They also infused their inks with live mouse cells and showed that the cells survived the printing process and remained functional.

Unlike some previous biocompatible scaffolds, the hydrogel is strong enough to keep its shape without swelling or shrinking, but it can also be broken down easily by DNA-digesting enzymes. *Angew. Chem. Int. Edn* <http://doi.org/f24b2n> (2015)

VOLCANOLOGY

Sulfur in magma gets a lift

Sulfur and metals can hitch a ride on bubbles rising in molten magma. This could explain why some volcanoes spew out more sulfur than expected, and how metal ores can form in the crust nearby.

Sulfur-rich magma normally sinks to the bottom of magma chambers. A team led by Jim Mungall at the University of Toronto in Canada used lab studies and

mathematical modelling to show that magma droplets, which contain metals, can form on the surface of vapour bubbles. Droplets that do not reach the surface cool and form rocks that are rich in sulfur, copper and gold.

In another study, Jon Blundy and his team at the University of Bristol, UK, used lab experiments to conclude that sulfur-rich gases interact with salty, copper-rich fluids inside a magma chamber to form thick deposits of copper-based minerals — similar to those that provide three-quarters of

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