

# RESEARCH HIGHLIGHTS

Selections from the scientific literature

## ASTRONOMY

### Star partners form strongest magnet

Having a stellar partner might allow a dying star to become a magnetar — the strongest known magnet in the Universe — instead of a black hole.

Large stars usually form black holes when they die, so astronomers have wondered why some become magnetars, an unusual kind of neutron star. Simon Clarke of the Open University in Milton Keynes, UK, and his colleagues used the European Southern Observatory's Very Large Telescope to study the Westerlund 1 star cluster, which includes a magnetar.

They found a star that they say was probably the companion to the one that formed the magnetar. The two orbited each other closely, and as the larger one began to die, it transferred its outer layers to the smaller star. This made the small star rotate more rapidly, eventually creating an ultra-strong magnetic field.

*Astron. Astrophys.* 565, A90 (2014)

## PALAEONTOLOGY

### Oldest sperm found in fossil

Tiny fossil crustaceans found in Australia contain remarkably preserved giant sperm that are between 16 million and 23 million years old — the oldest reproductive cells ever discovered.

Renate Matzke-Karasz at Ludwig Maximilian University in Munich, Germany, and her colleagues examined ancient freshwater sediments in Queensland and used synchrotron X-rays to image the internal structure of fossil ostracods, crustaceans around 1 millimetre in length. The authors found well-preserved

detail of soft tissue, including internal organs and sperm clusters around 1.2 mm long. The team even identified nuclei in some sperm.

Many modern ostracods have huge sperm relative to their body size, and these fossils show that the trait evolved long ago, although it is not clear why.

*Proc. R. Soc. B* <http://doi.org/ssh> (2014)

## ORGANIC CHEMISTRY

### Simple recipe for small molecules

A synthesis method that uses just one chemical reaction and 12 building blocks could allow chemists to

automate construction of the backbones of thousands of small molecules.

This kind of modular simplicity is standard in the laboratory synthesis of proteins, nucleotides and, increasingly, carbohydrates. Martin Burke and his colleagues at the University of Illinois at Urbana-Champaign analysed more than 2,800 natural products, including pharmaceuticals, that contain polyene motifs — chains of carbon atoms connected by alternating single and double bonds. The researchers report that more than 75% of polyene structures can be made by sequentially linking building blocks from a small library of organic acid molecules

that contain boron. These 'MIDA-boronates' were invented by Burke's group and are commercially available.

This approach avoids the need to invent a customized method for every polyene-containing compound, the authors say.

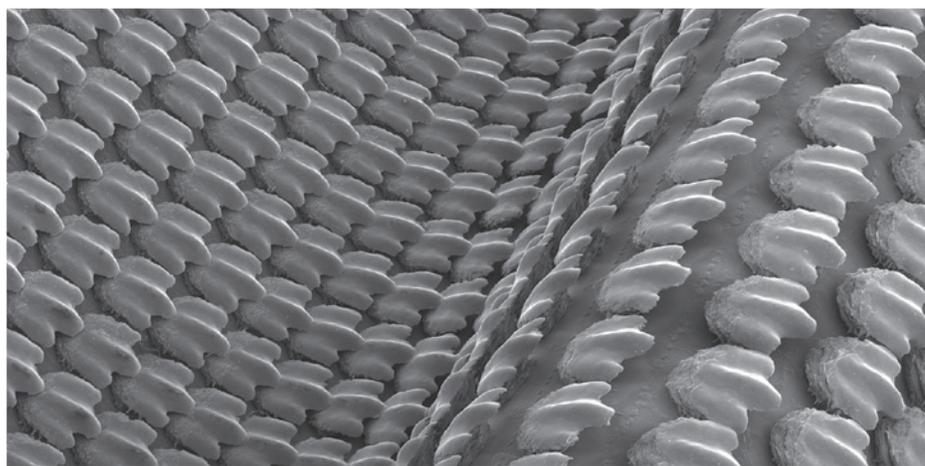
*Nature Chem.* <http://doi.org/ssv> (2014)

## GENOMICS

### Spider genomes hold venom secrets

Genome sequences from two spider species reveal the composition of their silk, and how spider venom exacts its toxic toll.

Mikkel Schierup at Aarhus



## BIOPHYSICS

### Fast swimming with fake shark skin

A material that mimics shark skin enables a swimming robot to move quickly through the water by improving hydrodynamics.

Li Wen, James Weaver and George Lauder at Harvard University in Cambridge, Massachusetts, used three-dimensional printing to embed thousands of rigid tooth-like scales on a flexible membrane (pictured), based on the skin structure of the shortfin

mako shark (*Isurus oxyrinchus*). The authors compared the synthetic shark skin to a smooth control model in a robot swim test and found that the experimental skin moved 6.6% faster.

The skin eases swimming both by reducing drag and by generating vortices that boost thrust, the authors suggest.

*J. Exp. Biol.* 217, 1656–1666 (2014)