

RESEARCH HIGHLIGHTS

Middle Ordovician orgy*Geology* **37**, 443–446 (2009)

Fossils of some of the largest trilobites ever found have been located in Portugal, and they bear witness to a very active social life in these extinct marine arthropods.

Artur Sá at the University of Trás-os-Montes and Alto Douro in Vila Real and his colleagues found fossils reflecting mass-mating, moulting and furtive manoeuvres among trilobites that lived during the Middle Ordovician period, 470 million–460 million years ago. The arthropod assemblage, from a roof-slate quarry in the Arouca Geopark, captures five contemporary families of three trilobite orders in a single formation for the first time.

Sá's team notes gigantism among six of these species, with one specimen reaching 70 centimetres long, and estimates for incomplete remains suggesting a possible 90 centimetres in another. The researchers suggest that their large size might be an adaptation to cold water.



M. VALÉRIO/AROUCA GEOPARK

GENETICS**Long-lasting without fasting***PLoS Genet.* **5**, e1000467 (2009)

Restricting calories is known to increase life span, but changing the source of those calories can affect organisms in similar ways, reports a team led by Valter Longo at the University of Southern California in Los Angeles.

Longo's team studied long-lived *Saccharomyces cerevisiae* mutants lacking *SCH9* and other genes involved in yeast life extension. The mutants expressed higher levels of genes involved in glycerol synthesis and metabolism. Knocking out glycerol-synthesis genes eliminated life extension in mutants lacking *SCH9*. And a glycerol diet allowed yeast to live at least twice as long as those fed glucose, and slightly longer than those on calorie-restriction diets. The team concludes that replacing pro-ageing foods such as glucose with glycerol helps to boost cellular protection and lengthen yeast lifespan.

NANOMATERIALS**Inked in***J. Am. Chem. Soc.* **131**, 6692–6694 (2009)

Like a pen writing with molecular ink, the copper-coated tip of an atomic force microscope can attach molecules from a solution to anchored molecules on a surface through chemical reactions, forming patterns with lines as narrow as 50 nanometres.

Fraser Stoddart and his colleagues at Northwestern University in Evanston, Illinois, achieved this precision by exploiting the bond-forming reaction between two chemical groups: azides and alkynes. Molecules decorated with these groups link in the presence of copper, so the tip acts as a moving,

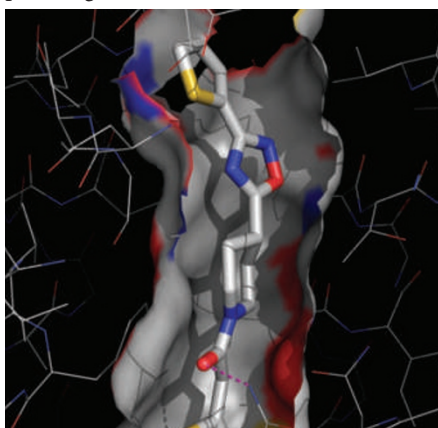
solid catalyst. It could be used to write arrays of modified biomolecules onto a surface.

A related 'dip-pen' technique coats the tip with a copper-containing solution, but has a lower writing resolution of 300 nanometres.

MICROBIOLOGY**Tag-teaming tuberculosis***Nature Med.* **15**, 537–544 (2009)

High doses of the drug ethionamide cause side effects that limit its use against tuberculosis. Now, Alain Baulard of the Pasteur Institute in Lille, France, and his colleagues report that blocking the regulatory protein EthR in *Mycobacterium tuberculosis* boosts ethionamide's activity, markedly reducing the necessary dose of the drug.

EthR controls production of the bacterial enzyme EthA, which activates ethionamide. Baulard's team designed and screened a drug library for compounds likely to block EthR (one example pictured below) and thereby release its control on EthA. One such compound, BDM31343, bound to EthR and rendered ethionamide three times more potent against tuberculosis in mice.

**CLIMATE****Cyclones take it higher***Geophys. Res. Lett.* doi:10.1029/2009GL037396 (2009)

Tropical cyclones spew water vapour into the stratosphere, possibly adding to global warming, according to David Romps and Zhiming Kuang of Harvard University.

By analysing 23 years of satellite pictures and tropical-cyclone tracking data, they found that the storms frequently launch clouds and ice upwards. Whereas only 3% of non-cyclone cloud in the upper troposphere reaches the stratosphere, 8% of cyclone clouds reach those heights.

Stratospheric water vapour has an important role in global warming and ozone depletion. And because global warming may alter cyclone frequency and severity, this may represent another climate-change feedback mechanism.

CHEMISTRY**Mini magnets***J. Am. Chem. Soc.* doi:10.1021/ja8098454 (2009)

Semiconductor nanoparticles, or quantum dots, should not be magnetic, yet some reports suggest that they are. Robert Meulenberg, currently at the University of Maine in Orono, Jonathan Lee at Lawrence Livermore National Laboratory in California and their co-workers present evidence that this magnetism comes from the chemical groups stuck to the dots' edges.

The group used X-ray magnetic circular dichroism and X-ray absorption spectroscopy to study the magnetic properties of electrons involved in chemical bonds in cadmium, one ingredient of cadmium-selenide quantum