

# RESEARCH HIGHLIGHTS

## Underwater dunes

*Geology* **38**, 491–494 (2010)

Sand dunes are a common feature of wind-swept deserts on Earth and on other planets, and can assume a variety of shapes depending on sand and wind characteristics. To investigate the physical mechanisms involved in dune formation and dynamics, scientists in France combined simulations with underwater experiments.

Sylvain Courrech du Pont and Pascal Hersen at the University of Paris Diderot and their colleagues created sand structures similar to real dunes using controlled motions of a plate of sand in a water tank.

The researchers observed that dune morphology is largely affected by the angle between different dominant 'wind' directions. Extended longitudinal dunes were stable whereas crescent-shaped ones were not. The results could help scientists to extract historical information about regional wind regimes from dune observations. **Q.S.**



BILDAGENTUR/PHOTOLIBRARY

## MICROBIAL ECOLOGY

### Bacterial pest killer

*PLoS Pathog.* **6**, e1000905 (2010)

The insecticidal bacterium *Bacillus thuringiensis* has been much used in biopesticides and its toxins are produced by many genetically modified crops. But little is known about the ecology of this soil- and plant-dwelling microbe.

Ben Raymond at the Royal Holloway University of London in Surrey, UK, and his colleagues studied a natural *B. thuringiensis* population in test cabbage fields. They found that an insect-killing strain, ST8, was the most common and the one most associated with plant leaves, where typical insect hosts feed. ST8 was also better than other strains at moving from soil to seedlings, showing specific adaptations.

The researchers demonstrate that the proportion of the population producing insecticidal toxins increased when more insect larvae were added. **C.L.**

## ASTROPHYSICS

### WHIMsically elusive

*Astrophys. J.* **714**, 1715–1724 (2010)

Peering into the local reaches of the Universe, astronomers find that they can see only about half the amount of atomic matter expected to be there. The other half is probably tied up in thin, wispy tendrils of gas called the warm-hot intergalactic medium (WHIM), say Taotao Fang of the University of California, Irvine, and his colleagues.

The researchers used two X-ray telescopes to look at a strong spotlight emanating from a blazar, a supermassive black hole at the centre of a distant galaxy. The light passed through

a closer feature known as the Sculptor Wall, an agglomeration of galaxies also thought to contain a lot of WHIM. This 'wall' absorbed certain wavelengths of the light, allowing the researchers to confirm, with high precision, the presence of WHIM, which has a density 30 times that of the Universe's average. **E.H.**

## BIOLOGY

### A paper submarine

*Proc. R. Soc. B* doi:10.1098/rspb.2010.0155 (2010)

Female argonaut octopuses produce and inhabit brittle 'paper nautilus' shells in which they store their eggs. Scientists have speculated that the shells also help to keep the creatures buoyant. Julian Finn and Mark Norman at Museum Victoria in Melbourne, Australia, confirm that the air sometimes seen trapped in these creatures' shells is used for this purpose.

The researchers captured three females of the species *Argonauta argo* (pictured) and removed all trapped air from their shells. After release in the ocean, the argonauts jetted towards the surface, where they forced their shells above water and collected air. They then sealed this air into their shells

using a pair of arms and forced themselves downwards to a depth at which they became neutrally buoyant. **D.P.C.**

## NEUROSCIENCE

### Brainy creations

*PLoS Biol.* **8**, e1000373 (2010)

The brain's glial cells support and protect neurons. Evidence suggests that certain glial cells, called astroglia, can be reprogrammed *in vitro* to become neurons, raising hopes that such cells could be used in brain repair. However, these neurons fail to establish functional synapses — connections that enable communication between cells.

Magdalena Götz and Benedikt Berninger at the Ludwig-Maximilians University of Munich in Germany manipulated gene expression in astroglia taken from the brains of newborn mice. They generated neurons complete with synapses *in vitro* by inducing higher and more persistent expression of certain gene-regulating proteins that had been induced in previous studies. They also found that distinct regulatory proteins instruct the formation of different neuronal subtypes. **L.O.-S.**

## BIODIVERSITY

### Counting creatures

*Am. Nat.* doi:10.1086/652998 (2010)

Biologists have come up with a wide range of estimates for the number of arthropod species on Earth. These invertebrates, which include insects, contribute significantly to global species richness. Andrew Hamilton at the University of Melbourne in Australia and his colleagues attempt to improve on these numbers by using two new models to estimate tropical arthropod species richness.



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