

RESEARCH HIGHLIGHTS

Selections from the scientific literature

MICROBIOLOGY

Bacteria 'blink' to expel molecules

A voltage-sensitive fluorescent protein has revealed, at the single-cell level, the electrical signals that bacteria use to eject compounds.

The electrical potential across biological membranes drives the transport of some molecules into and out of cells, but measuring this voltage difference in bacteria has proved difficult. Adam Cohen and his colleagues at Harvard University in Cambridge, Massachusetts, modified the marine bacterial protein proteorhodopsin so that it fluoresced in response to voltage changes. They then expressed the engineered protein in the bacterium *Escherichia coli*.

When the bacteria were exposed to a membrane-permeable dye, flashes of fluorescence coincided with precipitous decreases in the amount of dye in the cell. This suggests that the dye is pumped out of the cell in response to electrical signals. *Science* 333, 345–348 (2011)

ANIMAL BEHAVIOUR

Learning lizards make smart moves

Lizards have surprised researchers by demonstrating flexible problem-solving and learning skills previously seen

mostly in birds and mammals. The reptiles had been thought to have rigid, stereotyped behaviour patterns and limited cognitive abilities.

Manuel Leal and Brian Powell at Duke University in Durham, North Carolina, presented six Puerto Rican *Anolis evermanni* lizards with two wells (pictured), one of which contained a fly larva reward and was associated with a plain blue disc. After a habituation period, the creatures were challenged to dislodge the blue disc covering the well with the reward. Four of the six lizards repeatedly solved this problem by either biting or shoving the cap aside to reveal the treat, and chose

the blue disc over differently coloured discs. When the reward was placed under a new disc colour, two lizards were able to reverse their choice.

Such behavioural flexibility may have enabled *Anolis* lizards to radiate across the tropics of the Americas, and suggests that scientists should rethink their ideas on reptile cognition. *Biol. Lett.* doi:10.1098/rsbl.2011.0480 (2011)

HIV

Antibody search hits gold

A treasure trove of 576 antibodies that bind to and neutralize HIV has been

discovered in four infected individuals, vastly expanding the number of antibodies known to inactivate a broad range of HIV strains. Such molecules could be useful in treating, or even preventing, HIV infection.

Only a handful of broadly neutralizing antibodies against HIV had previously been isolated, partly because the molecules mutate so often. So Michel Nussenzweig at the Rockefeller University in New York and his colleagues devised a new way to fish out the antibodies — by targeting an area of the molecules not prone to frequent mutation.

They found that the



ECOLOGY

Carbon parks in the city

Urban green spaces lock up tonnes more carbon than previously thought.

By using satellite imagery and analysing vegetation carbon content, researchers estimate that around 230,000 tonnes of carbon are stored in the above-ground vegetation of Leicester (pictured) — an average-sized city in central England. This is equivalent to 3.16 kilograms of carbon per square metre of the city, an order of magnitude greater than current national

estimates for Leicester. The highest carbon-storage density was linked to tree cover in publicly owned or managed areas.

The team, led by Zoe Davies at the University of Kent in Canterbury, UK, recommends improved monitoring and management of urban vegetation to maximize its contribution to mitigating greenhouse-gas emissions.

J. Appl. Ecol. doi:10.1111/j.1365-2664.2011.02021.x (2011)

