RESEARCH HIGHLIGHTS

Up for a fight?

Am. Nat. 168, 100–113 (2006)
The wide-open mouth of an adult male collared lizard (*Crotaphytus*; pictured) signals not amazement, but aggressive intent. Such 'gaping' is a feature of male–male displays. A. Kristopher Lappin of Northern Arizona University in Flagstaff and his colleagues have looked into what exactly is on show.

The main weapon of these lizards is their bite — about which contenders might want information if they are to decide whether or not to join battle. From measurements of bite force and of the jaw muscles inside the mouth, Lappin and his co-workers conclude that the size of the muscles, shown during gaping, provide a bite-force indicator. Hence the display — the message of which, the authors suggest, is amplified by conspicuous white patches at the corners of the lizard's mouth.

A. K. LAPPIN

SEISMOLOGY

Danger spotting

Geophys. Res. Lett. 33, L11309 (2006)
The devastating tsunami in the Indian Ocean on 26 December 2004 could have been anticipated even without a dedicated early-warning system, according to Geoffrey Blewitt of the University of Nevada in Reno and his co-workers.

They show that ground movements of 1 centimetre or more in India — about 2,000 kilometres from the epicentre of the magnitude-9 earthquake that caused the tsunami — could have been detected by the Global Positioning System (GPS) just 15 minutes after the start of the quake, and used to calculate the true size of the event. Existing seismic sensors initially indicated that the quake was of magnitude 8–8.5, which was considered too small to generate an oceanwide destructive tsunami. These inaccurate estimates meant that warning of the tsunami hazard was delayed by hours.

MARINE BIOLOGY

Chain reaction kills coral

Ecol. Lett. 9, 835–845 (2006)
Researchers in the United States provide new insight into a chain reaction that is killing the world's reefs.

Jennifer Smith, now of the University of California, Santa Barbara, and her colleagues reveal how algae — which increase when overfishing depletes the natural grazers that control the marine plant — can contribute to coral damage. They find that the algae release sugars that fuel the growth of coral-suffocating bacteria.

The team performed experiments using the green algae *Dictyosphaeria cavernosa* and *Pocillopora verrucosa* coral that was recovered from Palmyra Atoll, about 1,750 kilometres south of Hawaii in the Pacific Ocean.

CLIMATE SCIENCE

Poles apart

Science doi:10.1126/science.1123296; 10.1126/science.1125249 (2006)
Help may be at hand for climate scientists struggling to explain dramatic shifts in Earth's past ice cover.

The periods of glaciation that began around 3 million years ago come and go on a 40,000-year cycle, which clearly follows changes in Earth's tilt towards the Sun. What puzzled scientists was the lack of evidence for a cycle tracking the planet's proximity to the Sun during summer, which varies over a 20,000-year period. These properties of the Earth and its orbit affect the amount of sunshine reaching Earth's surface, which in turn influences ice cover.

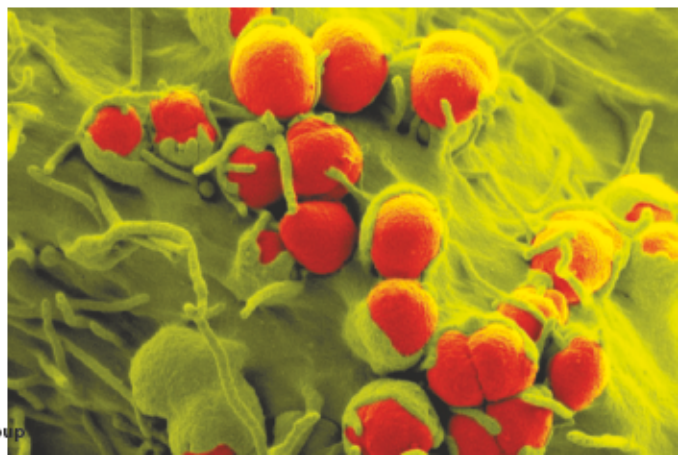
Maureen Raymo of Boston University and her colleagues argue that the proximity effect is cancelled out in the sea-level records used to track glaciation because changes in ice volume at the South Pole are equal and opposite to those at the North Pole. In a separate study, Peter Huybers of Harvard University in Cambridge, Massachusetts, suggests instead that proximity is simply cancelled by speed: when Earth is close to the Sun, it moves faster, so a hot summer is also a short one.

The two hypotheses have different implications for global climate; further data might determine which effect is the greater.

MICROBIOLOGY

Quick costume change

PLoS Biol. 4, e185 (2006)
Neisseria gonorrhoeae (pictured below), the bacterium responsible for the sexually transmitted disease gonorrhoea, manages to thwart the body's immune system by rapidly changing its outer proteins, or pilins. Researchers suggest that the bug might



SPL

accomplish this trick by having more than one genome copy per cell.

Hank Seifert and Deborah Tobiason of Northwestern University, Chicago, Illinois, discovered through flow cytometry and other molecular-biology techniques that *N. gonorrhoeae* has on average three genome copies per cell, with some cells having two and others up to six. This would make it easier for the bug to alter its proteins because it can shuffle bits of pilin gene between its genomes.

GENETICS

Director's cut

Nature Meth. 3, 503–509; 511–518 (2006)

For more than 25 years, researchers have identified genetic control regions, such as promoters, by virtue of the fact that they are in accessible parts of the chromosome and can be cut by the enzyme DNase I.

Now two groups have mapped all such DNase I-hypersensitive sites in 1% of the human genome. Francis Collins of the National Human Genome Research Institute in Bethesda, Maryland, and John Stamatoyannopoulos of the University of Washington, Seattle, and their colleagues let the enzyme digest human DNA, then put the fragments on microarrays to pinpoint the cuts.

The papers show that the regulatory regions differ from one cell type to another, that they cluster around the ends of genes, and that they are organized into 'superclusters' spanning hundreds of thousands of base pairs.

CELL BIOLOGY

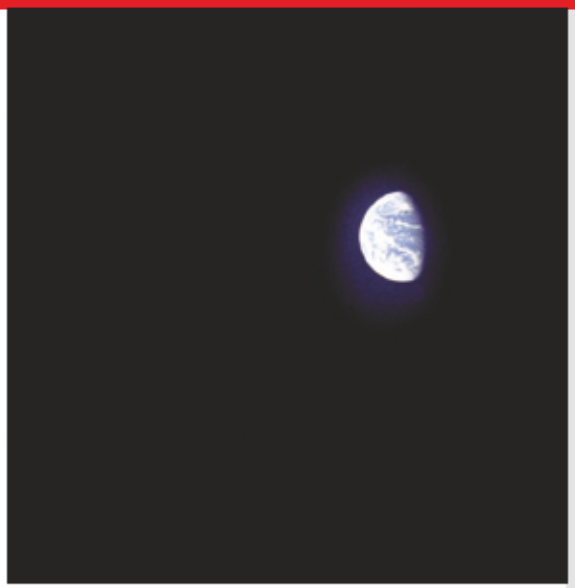
Pore relations

Nature Cell Biol. doi:10.1038/ncb1424; doi:10.1038/ncb1427 (2006)

Messenger RNAs are produced in the nucleus, but are used to make protein in the cytoplasm. Two studies shed new light on how they cross the nuclear membrane.

Karsten Weis of the University of California, Berkeley, and Susan Wente of the Vanderbilt University Medical Center in Nashville, Tennessee, and their colleagues focused on the role of the protein Dbp5, which attaches to newly synthesized RNAs.

The teams show that Dbp5 is activated by binding to another protein, Gle1, and a small cofactor known as $InsP_6$. Gle1 sits on the cytoplasmic face of the nuclear pore complex that allows transport across the nuclear membrane. What Dbp5 is doing is unclear, but the authors speculate that its activation at this point might ensure that mRNAs make it through the pore and do not go back.



NASA

ASTRONOMY

Are we alone?

Astrophys. J. 644, 1223–1231 (2006)

Are there habitable planets of Earth mass outside the Solar System? Observationally, we can't say — current techniques are unable to find extrasolar planets that small.

Sean Raymond, now at the University of Colorado in Boulder, and his colleagues sidestep this difficulty by performing multiple simulations of planet formation in four solar systems known to contain gas-giant planets similar to Jupiter.

Their results are not terribly encouraging. If the giant planets formed early and migrated quickly through the zone of terrestrial-planet formation, one of the four systems developed a promising candidate. This weighed in at 0.6 Earth masses and contained a substantial water fraction, some of which would be liquid.

But if the giant planets migrated later, they shook up the planets' cradle so much that no system conceived a habitable planet.

NEUROBIOLOGY

Make or break

Nature Med. doi:10.1038/nm1438 (2006)

A new way of measuring protein turnover in the human central nervous system could be used to probe the roots of diseases such as Alzheimer's.

Neurodegeneration in Alzheimer's disease is associated with the accumulation in the brain of the protein amyloid-β. This could be caused either by enhanced production of the protein by neurons, or by a disturbance in its clearance. Randall Bateman of the Washington University School of Medicine, St Louis, Missouri, and his colleagues have developed a technique to clock these rates *in vivo*.

They measured the uptake of an isotope-labelled amino acid into amyloid-β protein as it was being synthesized. In healthy patients, uptake roughly matched the protein's breakdown rate. An imbalance may provide an indicator of disease.

JOURNAL CLUB

Peter Moore
King's College London, UK

An ecologist finds fault with fecundity.

I am disturbed both by the current pace of environmental change, and by the lack of sound survey data that allow the biological impact of such changes to be measured.

Vegetation responses to change are generally slow, and so it takes decades of committed survey work to document them effectively. Such research is often neglected because it generates few publications per unit of effort and time expended.

Fortunately, a few far-sighted ecologists, working in the days when science was assessed by quality and need, laid foundations upon which we can build. Among these was Franklyn Perring, a skilled and devoted field botanist, who spent the summers of 1952 and 1953 surveying the chalk grasslands of England.

What I admire most about his work is his precise and accurate recording of site locations and methods. This made it possible for others to repeat his survey half a century later (J. Bennie *et al. J. Ecol.* 94, 355–368; 2006).

Chalk grasslands are in steep decline as a result of changes in land use. Even the nitrogenous compounds in air pollution represent a subtle threat. Their input increases soil fertility, encouraging aggressive grasses at the expense of the sensitive, slow-growing plants typical of chalk habitats. In our patchwork planet, fragments of chalk grassland are also at risk of invasion by the productive species around their extended edges.

The new survey shows that only the toughest, most inhospitable sites with steep slopes, shallow soils and south-facing aspects have effectively resisted the seemingly unstoppable advance of fecundity.

This publication should ring alarm bells about the need to fund long-term monitoring programmes in all threatened habitats.