RESEARCH HIGHLIGHTS

ANIMAL BEHAVIOUR

Slow food

J. Mammal. 87, 790–798 (2006)

The sluggish lifestyle of the slow loris (*Nycticebus coucang*), a small primate weighing about two kilograms, is the product of a metabolism slow enough to rival that of the sloth. Now Frank Wiens of Bayreuth University in Germany and his colleagues have explained how the animal's diet causes its lack of energy.

Wien's team studied the feeding behaviour of lorises in West Malaysia and found that the animals actually eat plenty of sugary food all year round. The problem seems to be that the lorises also eat lots of toxic plant material. Glucose is needed to detoxify these substances, reducing the amount available for the animal's metabolism.

A. SHAH/NATUREPL.COM

BIOCHEMISTRY

Cell detectives

Anal. Chem. doi:10.1021/ac0607010 (2006)

A team from the University of Illinois in Urbana has used mass spectrometry to identify the signalling peptides in individual rat pituitary and brain cells.

To do so, Jonathan Sweedler and his colleagues had to overcome the difficulty of working with small and fragile mammal cells. They did this by soaking the cells in glycerol, which prevented them from leaking or drying out. Applying the latest generation of very sensitive mass spectrometers to cells should allow scientists to follow changes in signalling peptides in cells isolated during specific neural processes such as learning.

PLANT BIOLOGY

Tree of knowledge

Science 313, 1596–1604 (2006)

An international team of researchers has created the first sequence of a tree genome: *Populus trichocarpa*, or the black cottonwood (pictured below, left).

Gerald Tuskan of Oak Ridge National Laboratory, Tennessee, and colleagues used shotgun techniques to sequence the genome and identify more than 45,000 putative protein-coding genes.

They compared the sequence with that of *Arabidopsis*, a herbaceous plant, and found that *Populus* has undergone a complete genome duplication since diverging from *Arabidopsis*. This has created multiple versions of genes, which can be differently expressed.

Understanding how the tree's genes differ from those of smaller plants could enable manipulation of height, trunk diameter and canopy width for commercial purposes.

QUANTUM PHYSICS

Tele for two

Nature Phys. doi:10.1038/nphys417 (2006)

Teleporting a quantum state between photons is old hat. The same feat has been achieved between ions. But Qiang Zhang of the University of Heidelberg, Germany, and his colleagues have now teleported a polarization state between two pairs of photons, a step towards creating the quantum-teleportation technology that might one day power quantum computers.

The key to the advance is a tweaked high-intensity laser that can produce enough of the bursts of six photons that the process requires. The authors reproduced various initial two-photon states in a remote receiver in between 65% and 86% of cases — comfortably above the 40% maximum success rate that, according to the laws of quantum mechanics, could be achieved using other methods.

PALAEONTOLOGY

Early embryos

J. Paleontol. 80, 811–825 (2006)

Tiny fossil eggs and embryos from very early multicellular animals have been identified in northwestern Canada. The find shows that the creatures lived around the globe about 540 million years ago, in the period known as the Cambrian explosion when the main animal groups first appear in the fossil record.

The millimetre-sized fossils were identified by Leanne Pyle of the Geological Survey of Canada in Sidney, British Columbia, and her colleagues after a 2003 helicopter expedition into the remote Wernecke Mountains in the Yukon. Previously, such microfossils — phosphate mineral records of cells from different species — had been found only in China and Siberia.

The team now plans to use X-ray tomography to look inside the fossils.

D. GUAN/CORBIS

VIROLOGY

Follow that tag

Nature Meth. 3, 817–824 (2006)

Watching the HIV virus move around within cells is tricky, because attaching a large fluorescent tag to its proteins can change the behaviour of the virus. Pierre Charneau at the Pasteur Institute in Paris and his colleagues found a way around this. They used a small tag that lights up when mixed

with a fluorescent compound.

After the viral RNA is converted to DNA, the glowing protein shows how the DNA moves from the cell membrane to the wall of the nucleus and integrates into the cell's genome. The technique could be used to reveal how anti-HIV drugs might block these processes, or to examine other viruses.

NANOTECHNOLOGY

Dark secrets

Nano Lett. doi:10.1021/nl061493u (2006)

The ancient Greeks and Romans used nanoparticles to dye their hair black, say Phillippe Walter of the CNRS National Centre for Museum Research and Restoration in Paris and his colleagues.

The two-thousand-year-old recipe — which, going by the name Grecian Formula, is sold to this day as a remedy for greying hair — is a paste made from lead and water. On the hair, this reacts with sulphur in keratin protein to precipitate dark lead sulphide crystals. Walter and colleagues used X-ray diffraction and electron microscopy to show that these particles are just 5 nanometres across. Keratin fibres form a tiny matrix that contains the chemical reaction and controls the crystals' growth and arrangement.

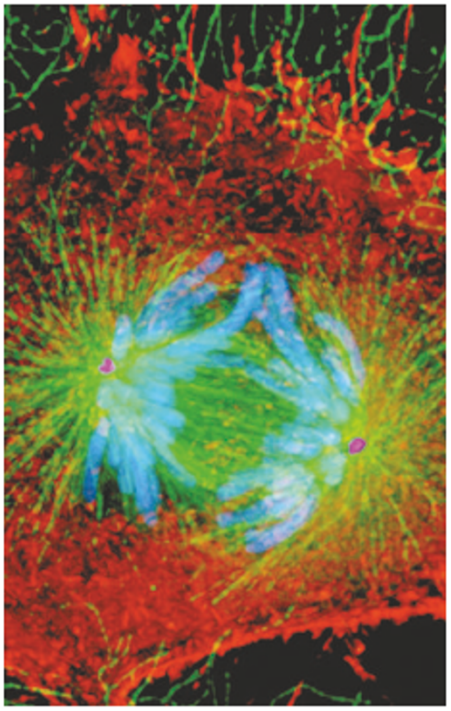
CELL BIOLOGY

Pole to pole

Nature Cell Biol. doi:10.1038/ncb1474 (2006)

When a cell divides, it hauls its chromosomes apart with a set of molecular ropes called a spindle. Researchers now report a protein that supports the two opposing ends of the spindle against the strain.

Tadashi Yamamoto and his colleagues at the University of Tokyo studied structures called



A. KHODJAKOV/SPL

centrosomes, which seed the formation of the spindle and anchor its two ends (see picture, above). They discovered a protein, which they gave the name Kizuna, that braces the centrosome against the tension generated by the spindle as it forms. Cells lacking Kizuna could still divide, but had malformed nuclei.

COSMOLOGY

Illuminating dark energy

Astrophys. J. 648, 884–889 (2006)

Astronomers have devised a method for studying uncertainties in measurements of dark energy, the mysterious force thought to be pulling the Universe apart.

Dark energy was discovered when studies of the brightness of supernovae — used to measure the objects' distance — showed the expansion of the universe was accelerating. But some suspect that uncertainties in measurements of the supernovae may be distorting the effect.

Adam Riess and Mario Livio of the Space Telescope Science Institute in Baltimore, Maryland, suggest that studies of Type 1a supernovae from 9 billion to 11 billion years ago, before dark energy became dominant, could reveal how other factors, such as mass and composition, might affect the objects' brightness. But such studies will require the next generation of cameras on the Hubble Space Telescope and other space-based instruments.

CANCER BIOLOGY

Radical measures

Cancer Cell 10, 241–252 (2006)

Cancer cells produce abnormally high levels of reactive oxygen species, which seem to sustain cancerous growth. Peng Huang from the University of Texas and his colleagues have now found a way to turn these substances against cancer cells.

Very high levels of reactive oxygen species are usually toxic to cells, so cancer cells depend on antioxidant systems that counteract these effects. Huang and colleagues found that β-phenylethyl isothiocyanate, a molecule found in vegetables such as watercress, killed cancer cells *in vitro* by disabling the cells' antioxidant systems. Normal cells were spared, probably because, the researchers conjecture, they contain a low baseline level of reactive oxygen species. When mice with cancers were treated with β-phenylethyl isothiocyanate they survived nearly twice as long as untreated mice.

JOURNAL CLUB

Lynn J. Rothschild
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A microbiologist explodes the myth of the unculturables.

A surprising new trait has emerged as the darling of researchers who study bacteria and archaea. It has a binary simplicity, and the weight of references (47,000 hits on Google, 1,670 on Google Scholar) suggest that it is important. This irks me immensely.

The trait is the label 'unculturable'. There's no one paper to pin the blame on — it's widely assigned, from papers in prestigious journals such as *Applied and Environmental Microbiology* to student presentations (although any of my students using the term get berated). The fact that an organism is, as yet, uncultured is of interest to others. But since when did a human failing, the inability to culture an organism, become a trait?

Sadly, many seem to have stopped trying to culture. The introductory remarks to many papers repeat, like a mantra, "it is well known that 99.9% of all organisms are unculturable, and thus sequencing was used to assess community diversity". Perhaps you have even written this yourself.

Now, DNA sequencing is a quick way to compare or count species. But as a technique, it is prone to contamination, and reveals little about the biology or ecology of the organisms identified.

What is to be done? I think that a two-pronged approach is called for. In the long run, we should hold in higher esteem those with a microbial 'green thumb'. In the hands of the late greats and today's few wizards, perhaps as many as 80% of organisms are culturable.

Second, I would like papers and presentations to be honest. People should say that culturing was not successful or not attempted, not that organisms are intrinsically unculturable. It is, after all, well known that 99.9% of the time, candour is the best antiseptic.