RESEARCH HIGHLIGHTS

King of the swingers

Biol. Lett. doi:10.1098/rsbl.2007.0049 (2007)

Sumatran orangutans like to take it easy: new research has shown that the way they move from tree to tree by swaying branches saves them energy.

Susannah Thorpe of the University of Birmingham, UK, and her colleagues studied video footage of orangutans (*Pongo abelii*, pictured) moving through the forest canopy. To reach the branches of a neighbouring tree, the orangutans shifted their weight to set the branch they were clinging to swinging. Thorpe's team calculated that this maneouvre consumes half as much energy as the orangutan would take to jump the gap, and an order of magnitude less energy than climbing down, walking across to the next tree and climbing up again.

A. SHAH

CANCER BIOLOGY

Stop or grow

Nature Cell Biol. doi:10.1038/ncb1567 (2007)

A gene that has confused cancer biologists through seeming to have two opposing roles — causing cells either to proliferate or to permanently stop dividing — works in a dose-dependent way. The finding, which applies to the *Ras* gene, comes from Lewis Chodosh and his colleagues at the University of Pennsylvania in Philadelphia.

The researchers made a transgenic mouse in which they could control the activity level of *Ras* in mammary cells. At high levels of activation, the mammary cells stopped dividing. But at low levels, the cells multiplied into a precancerous state. If these low *Ras* levels persisisted for many days, tumours developed.

The team proposes that *Ras*-induced tumorigenesis occurs when mutations arise that block the pathway that would usually stop the cells' growth.

CHEMISTRY

Quantum brew

J. Am. Chem. Soc. doi:10.1021/ja063766t (2007)

The much-advertised health benefits of green tea rely on an esoteric quantum-mechanical process, say Àngels González-Lafont and her co-workers at the Autonomous University of Barcelona in Spain. They have used quantum-chemical calculations to deduce how catechol-containing compounds, the antioxidant flavonoids in tea, mop up damaging free radicals in the body.

Catechols defuse free 'peroxy' radicals by giving to them a hydrogen atom. The researchers say this switch happens by quantum-mechanical tunnelling — the hydrogen atoms hop through an energy barrier rather than over it, allowing the reaction to proceed quickly. Their calculations suggest that this occurs because the catechol forms a tightly bound complex with the radical, making the energy barrier narrow.

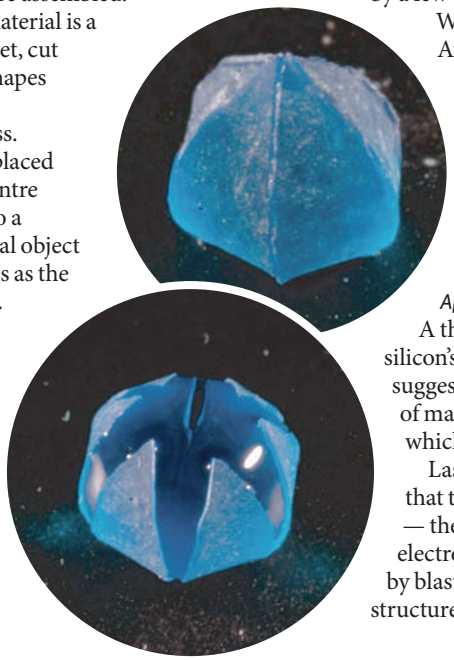
PHYSICS

Pull yourself together

Phys. Rev. Lett. **98,** 156103 (2007)

Wouldn't it be wonderful if flat-pack furniture came with one simple instruction: just add water? That's how the miniature boxes designed by Charlotte Py of the City of Paris Industrial Physics and Chemistry Higher Educational Institution (ESPCI) and her co-workers are assembled.

The starting material is a thin polymer sheet, cut into geometric shapes measuring a few millimetres across. A water droplet placed at each shape's centre pulls the film into a three-dimensional object by capillary forces as the water evaporates. Triangles are transformed into pyramids, crosses into cubes, and six-pointed flower shapes into approximate spheres (pictured right).



AM. PHYS. SOC.

ATMOSPHERIC SCIENCE

Winds of change

Geophys. Res. Lett. **34,** L08702 (2007)

Debate over the effect of global warming on hurricanes needs to factor in new data on wind shear.

Wind shear — the difference in wind speed between the top and bottom of the atmospheric layer in which tropical storms form — can tear apart storms before they intensify. Now, Gabriel Vecchi of the National Oceanic and Atmospheric Administration in Princeton, New Jersey, and Brian Soden of the University of Miami, Florida, have analysed data from 18 climate models to assess trends in wind shear up to 2100, assuming that global temperatures increase by a few degrees.

Wind shear in the tropical Atlantic Ocean is projected to increase, inhibiting hurricanes; that in the western Pacific Ocean is expected to decrease.

SOLID-STATE PHYSICS

Getting warmer

Appl. Phys. Lett. **90,** 142511 (2007)

A theoretical analysis of silicon's ability to superconduct has suggested a way to raise by an order of magnitude the temperature at which this property is seen.

Last year, researchers showed that they could turn cubic silicon — the form of silicon used in electronics — into a superconductor by blasting boron atoms into its structure. However, this property only

appeared when the material's temperature was within 0.3 degrees of absolute zero.

Emmanuel Bourgeois and Xavier Blase of the University of Lyon, France, calculate that silicon doped with aluminium instead of boron atoms could remain superconducting to nearly 3 degrees above absolute zero, because electrons in this system would be more strongly coupled to the material's vibrations.

FERTILITY

Scrambled eggs

Dev. Biol. doi:10.1016/j.ydbio.2007.03.006 (2007)

Recent work suggesting that bone-marrow stem cells can migrate to mouse ovaries and generate new eggs there has been controversial because it challenges the long-standing idea that mammals are born with a limited stock of eggs.

Now researchers led by David Keefe of the University of South Florida in Tampa and his colleague Lin Liu, who also holds a post at Sun Yat-Sen University in Guangzhou, China, say they can find no evidence for generation of new eggs in women. They searched fruitlessly for markers of stem cells or of meiotic cell division in ovarian cells biopsied from 12 women aged between 28 and 53. It remains possible that new eggs might be generated at younger ages.

COSMOLOGY

Wanted: gravity waves

Astrophys. J. **659,** 918–930 (2007)

For gravitational waves, LIGO is the long arm of the law. Its 4-kilometre-long detectors, at two sites in the United States, are Earth's best bet for catching the elusive ripples.

So far, the detectors have yet to find any hard evidence for gravitational waves. But the latest results from LIGO — the Laser Interferometer Gravitational-Wave Observatory — do set a new limit on the strength of the gravitational-wave background. This background is the sum of gravitational waves produced by distant, cataclysmic events, such as stellar explosions and merging black holes, and perhaps even by the Universe's own beginning. The new limit, 13 times lower than before, tightens constraints on cosmological models.

PLANT BIOLOGY

Border control

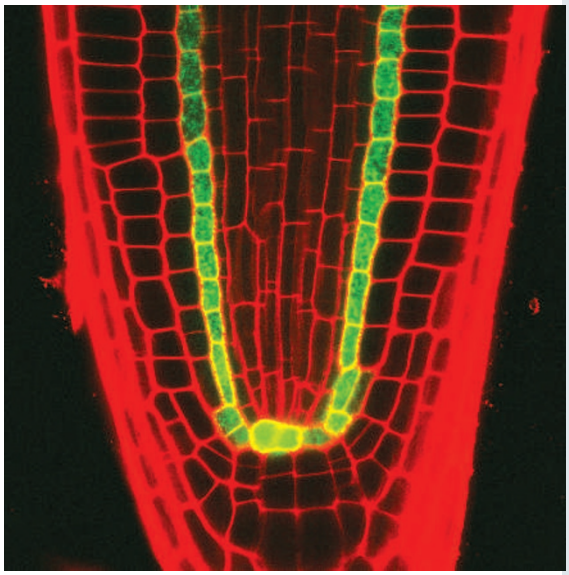
Science **316,** 421–425 (2007)

Researchers have discovered a mechanism by which plant roots limit the endodermis — which contains cells that are important for nutrient uptake — to a single layer of cells (pictured below).

Specialization of root cells into endodermis requires a protein called SHORTROOT (SHR). SHR is mobile but travels only one cell layer away from its site of production in the centre of the root. What stops it?

Philip Benfey of Duke University in Durham, North Carolina, and his colleagues show that a protein called SCARECROW (SCR), expressed in the endodermis, tethers SHR in the cells' nuclei and thus prevents SHR movement beyond this layer. Formation of the complex boosts SCR production, further ensuring that SHR does not escape.

The team also found that analogous proteins in rice behave in a similar way.



H. CUI

IMMUNOLOGY

HIV plays hide and seek

J. Cell Biol. doi:10.1083/jcb.200609050 (2007)

Researchers in the United Kingdom have uncovered new details of how HIV-1 replicates in immune cells.

In lymphocytes, viruses assemble at the cell's external plasma membrane. But in macrophages, and possibly dendritic cells also, assembly is often seen in compartments within the cell, which previous work had suggested were endosomes.

Mark Marsh and his colleagues of the Medical Research Council Laboratory for Molecular Cell Biology in London, building on recent results that show HIV is produced at the plasma membrane even in macrophages, now report that the intracellular virus assembly sites are plasma-membrane domains connected to the cell surface. The function of these domains is unknown, but the way the virus hides in cells may have implications for vaccine design.

JOURNAL CLUB

David M. Wilkinson
Liverpool John Moores University, UK

An ecologist enjoys a smelly experiment on a neglected link in the food web.

I have long been fascinated by an idea from the 1970s about rotting food. Daniel Janzen, now at the University of Pennsylvania in Philadelphia, suggested then that many of the noxious chemicals secreted by microbes in decaying food are produced to fend off large animals, allowing the microbes to keep the resource for themselves.

It's an intuitively appealing hypothesis. Our own experience is to be repulsed by putrid food, and several studies have shown that birds prefer fresh over rotted fruit. Most recently, a careful study in the seas off the southeasten United States provided further support for Janzen's idea (D. E. Burkepile *et al*. *Ecology* **87,** 2821–2831; 2006).

In what must have been a gloriously smelly experiment, the researchers baited crab traps with dead fish, either rotten or fresh. The microbe-laden carrion was four times less likely to be consumed by scavengers than the fresh fish.

This provides clear evidence that microbes compete for food with larger animals, something that has been largely overlooked in the huge ecological literature on food webs and feeding relationships. But it doesn't tell us how the chemicals evolved.

Last year, I published with colleagues a theoretical analysis of the evolutionary implications of Janzen's idea (T. N. Sherratt *et al*. *Ecol. Modell.* **192,** 618–626; 2006). Our model suggested that the chemicals cannot have evolved solely to protect against large animals, because the temptation for microbes to 'cheat' by free-riding on toxin production by others undermines the system.

The experiments done by Burkepile *et al*. show that the effect is real, but perhaps these chemicals first evolved for other reasons, such as inter-microbe competition?