

UK, report that people with two copies of the 'tall' variant are on average almost a centimetre taller than those with a double copy of the 'short' version. The precise function of *HMGA2* is not yet clear, although it is involved in unravelling the chromatin in which chromosomes are packaged, suggesting that it may influence cell growth and division.

## CHEMISTRY

### A simple solution

*Science* 317, 1189–1192 (2007)

Our understanding of how molecules will react is usually gleaned from experiments carried out with organic solvents available in standard chemistry labs. For natural products that come from water-living organisms, it might help to think about things differently.

Timothy Jamison and Ivan Vilotijevic at Massachusetts Institute of Technology in Cambridge have synthesized the core piece of a famously hard-to-make marine molecule by working in neutral water. The molecule, which causes the toxicity associated with 'red tide' algal blooms, has a ladder-like arrangement of rings. It was thought that this structure might assemble through a cascade of reactions, but not until Jamison and Vilotijevic tried it in water did the molecule zip together with ease.

## QUANTUM PHYSICS

### Up in the air

*New J. Phys.* 9, 254 (2007)

Although the Casimir force is generally regarded as attractive, theory predicts that this force, which acts between two closely spaced surfaces because of quantum fluctuations, can be made repulsive. This effect could be useful in nanoengineering (see *Nature* 447, 772–774; 2007). Ulf Leonhardt and Thomas Philbin

of the University of St Andrews in Scotland suggest one way to turn the pull into a push.

They argue that a 'left-handed metamaterial' — comprising an array of electrical and magnetic components that bend light the 'wrong' way — placed between two mirrors may make the Casimir force repulsive. The researchers estimate that the repulsion should be strong enough, with metamaterials within experimental reach, to levitate a 0.5-micrometre thick aluminium foil in a vacuum.

## IMMUNOLOGY

### Itchy and scratchy

*Nature Immunol.* doi:10.1038/ni1503 (2007)

Mast cells, a type of proinflammatory immune cell, have been unjustly accused of exacerbating the blistering itch of poison ivy (pictured below) and sunburn, say researchers.



Mast cells have been shown to increase short-term swelling in response to skin irritation. But Stephen Galli and his co-workers at Stanford University School of Medicine in California have found that instead of making the itch worse, mast cells reduce long-term inflammation by secreting a protein known as interleukin-10. Furthermore, chemical irritants elicited a more severe response in mice engineered either to lack mast cells, or to lack interleukin-10, than they did in normal mice. The results could spur development of novel anti-inflammatory therapies.

## METHODS

### Caught in the act

*Nature Biotechnol.* doi:10.1038/nbt1328 (2007)

A new proteomics technique can screen drugs for activity against hundreds of protein kinases at once. The technique has revealed two previously unidentified targets of imatinib, a cancer treatment that inhibits the BCR-ABL kinase and some other proteins.

Developed by Gerard Drewes and Bernhard Kuster at Cellzome in Heidelberg, Germany, and their colleagues, the approach relies on chemically coated beads that latch onto the hundreds of kinases, kinase-bound proteins and related purine-binding proteins found in cells. The kinases and other proteins can't attach to the beads if they are bound to a drug, so comparison of beads exposed to the contents of normal cells with those exposed to drug-treated cells shows which molecules the drug has blocked.

The bead-bound proteins are detected by mass spectrometry. This can also measure whether the drug has induced phosphorylation of the enzymes, a chemical modification that affects their activity.

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## JOURNAL CLUB

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**A biological engineer searches for simplicity.**

Several years ago, a good colleague suggested that I read about a discussion held in 1864 on nuts and bolts (*J. Franklin Inst.* 77, 344–351; 1864). The focus was a paper by one William Sellers that argued for the adoption of a uniform system of screw threads — 60° angles, squared off along the edges.

Machinists across the United States eventually started producing nuts and bolts according to Sellers' scheme. As a result, hardware stores now offer a wide selection of standardized parts that can be used in combination and behave as expected.

Inspired by this example and others, I have been studying how synthetic biological parts might be made as regular and easy to use as Sellers' nuts and bolts.

The starting complexity of nature has led some distinguished researchers to doubt such work is practical. But given that there

has been little research on manufactured bio-simplicity, this seems premature.

And there are examples: a team at the California Institute of Technology in Pasadena recently developed a uniform system for engineering simple biological switches made from ribonucleic acids (M. N. Win and C. D. Smolke *Proc. Natl Acad. Sci. USA* doi:10.1073/pnas.0703961104; 2007).

The 'nuts and bolts' of the switches are RNA sensor and actuator domains. The method for combining any sensor domain to

an actuator domain through a third communication domain provides the 'uniform screw threads'. Because such switches are produced by a standard process, many switches could be quickly programmed to control diverse cellular functions in response to myriad molecular inputs, from small molecules, to peptides, to nucleic acids.

I suspect that further efforts to engineer biological simplicity will have similarly powerful results.

Discuss this paper at <http://blogs.nature.com/nature/journalclub>