

Grover Swartzlander at the Rochester Institute of Technology in New York and his colleagues shone a weakly focused laser beam through the roughly semi-cylindrical rods, which refracted the light rays. This refraction changed the direction of the rays' momentum, causing an equal and opposite momentum change on the rods themselves. Because of the rods' asymmetrical shape, the momentum shift was directed more towards one side, driving the rods upwards at around 2.5 micrometres per second.

The researchers suggest that the technique could be used to transport microscopic machines through liquids and to help to steer solar sails in spacecraft.

Nature Photon. doi:10.1038/nphoton.2010.266 (2010)

For a longer story on this research, see go.nature.com/ye4zid.

NEUROSCIENCE

Enzyme helps pain persist

Pain perception in mice is maintained for several days by augmented activity of a particular enzyme in a brain area associated with chronic pain. Blocking the enzyme, PKM ζ , with a peptide inhibitor alleviates the pain.

Bong-Kiun Kaang at Seoul National University, Min Zhuo at the University of Toronto in Canada and their colleagues show that in the days following a nerve injury, mice had higher levels of PKM ζ in a brain region known as the anterior cingulate cortex (ACC). Injecting the PKM ζ inhibitor into the ACC led to a drop in synaptic activity, or neuronal communication, in that region, as well as a decrease in pain responses.

The authors suggest that PKM ζ mediates chronic pain by boosting synaptic transmission in the ACC. **Science** 330, 1400–1404 (2010)

ECOLOGY

Reptiles rose after forests died

The disappearance of vast tracts of tropical forest some 305 million years ago led to an explosion in the global diversity of reptiles and amphibians, thanks to the emergence of many new, fragmented habitats.

Howard Falcon-Lang at Royal Holloway, University of London, in Surrey, UK, and his colleagues compared the distribution and diversity of these animals in the fossil record. During the period they studied, climate change dried up equatorial rainforests in the land mass that later became Europe and North America.

Many of the species that lived across these forests became extinct, and were replaced by a wealth of different types of reptile and amphibian that were particular to isolated habitats. Amphibians, which depend on aquatic environments, fared less well than reptiles, which were able to adapt to a drier world.

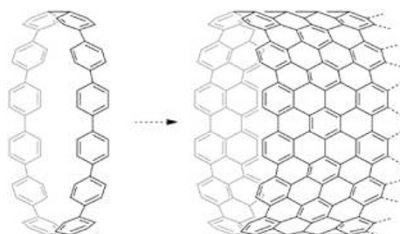
Geology 38, 1079–1082 (2010)

CHEMISTRY

Ring-a-ring o' benzene

Loops of interconnected benzene rings have long fascinated chemists, who have now developed a more flexible way to string the rings together.

Kenichiro Itami and his co-workers at Nagoya University in Japan created the loop, or cycloparaphenylene (CPP, **pictured** below left), by first coupling L-shaped and linear molecules to form U-shaped ones. They then combined two of these



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CANCER

Full immunity needed to fight cancer

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Certain targeted cancer drugs shrink tumours by shutting down key genes. But researchers report that this may not be enough to vanquish cancer — a functional immune system is also a pre-requisite.

Immune cells are known to be important in restricting tumour formation, but less is known about their role in tumour regression. Dean Felsher at Stanford University in California and his team switched off genes required for tumour growth in mouse models of lymphoma and leukaemia. They found that the rate of tumour shrinkage fell when the mice lacked an intact immune system — to up to one-thousandth of the normal speed — and the frequency of tumour recurrence rose.

The team discovered that immune cells called CD4⁺ T cells are needed to shut down blood-vessel growth and to trigger tumour-cell senescence. Moreover, a protein produced by the T cells called thrombospondin 1, which blocks blood-vessel formation, seems to be key to fending off tumours.

Cancer Cell 18, 485–498 (2010)

molecules to form the desired O-shaped CPP.

This modular approach has potential for producing specific CPPs of any size greater than 13 benzene rings. The loops could be useful for fabricating single-walled carbon nanotubes of specific diameter, by growing the loops horizontally (**pictured** right).

Angew. Chem. Int. Edn
doi:10.1002/anie.201005734 (2010)

EVOLUTION

Speaking in borrowed tongues

Languages evolve in a similar way to biological organisms, with ancestral languages splitting into descendent ones. In language evolution, 'lexical borrowing', whereby a word is transferred from one language to another, is also common. Linguists have struggled to distinguish between words that have descended and those that have been borrowed.

Tal Dagan at the Heinrich Heine University in Düsseldorf, Germany, and her

colleagues looked for instances of borrowing by analysing the relationships between 2,346 words of basic vocabulary with similar meanings from 84 Indo-European languages. By studying networks of related words, the researchers found that, on average, 8% of the basic vocabulary in each of the languages is borrowed. Basic vocabulary was previously assumed to be fairly immune to borrowing.

Proc. R. Soc. B doi: 10.1098/rspb.2010.1917 (2010)

CORRECTION

In "The source of sour taste" (*Nature* 468, 603; 2010), the mice with tagged bitter, sweet and umami taste cells were tested by Liman *et al.* but engineered by another lab. Furthermore, in response to acids, sour-taste cells did not conduct sodium ions, which were previously thought to mediate sour sensing.

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