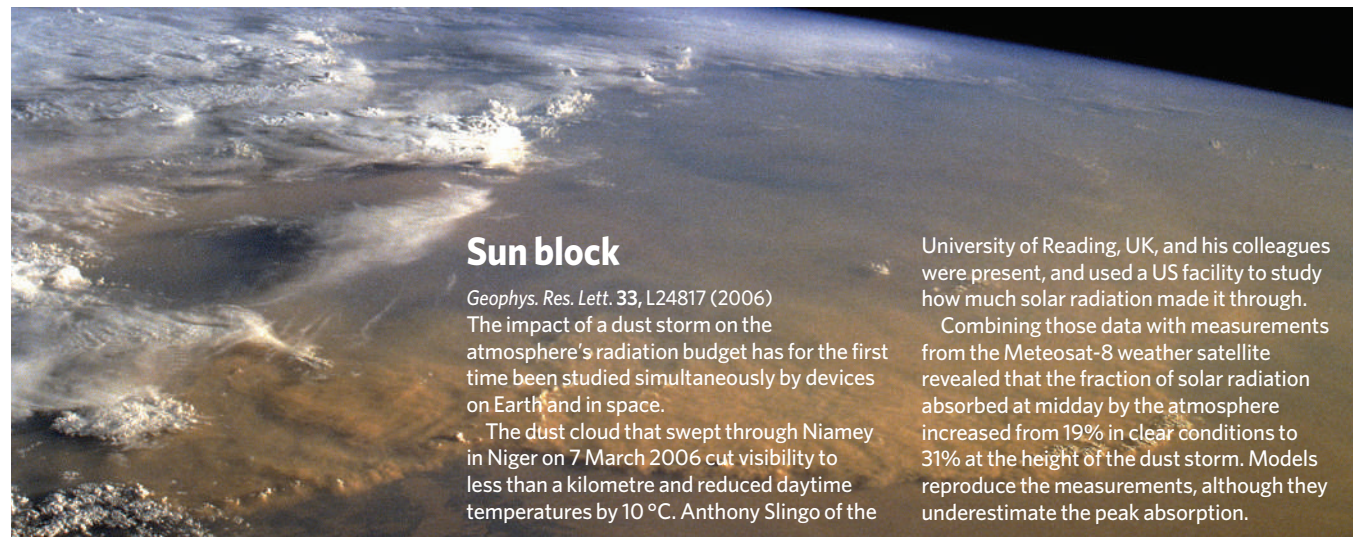


## RESEARCH HIGHLIGHTS



NASA

## Sun block

*Geophys. Res. Lett.* **33**, L24817 (2006)

The impact of a dust storm on the atmosphere's radiation budget has for the first time been studied simultaneously by devices on Earth and in space.

The dust cloud that swept through Niamey in Niger on 7 March 2006 cut visibility to less than a kilometre and reduced daytime temperatures by 10 °C. Anthony Slingo of the

University of Reading, UK, and his colleagues were present, and used a US facility to study how much solar radiation made it through.

Combining those data with measurements from the Meteosat-8 weather satellite revealed that the fraction of solar radiation absorbed at midday by the atmosphere increased from 19% in clear conditions to 31% at the height of the dust storm. Models reproduce the measurements, although they underestimate the peak absorption.

## PHYSIOLOGY

### Mighty mouse

*Cell Metabolism* **5**, 35–46 (2007)

A genetic tweak has converted mice into endurance runners by enriching a poorly understood form of muscle fibre. The discovery hints that 'type IIX' muscle fibres are an underappreciated contributor to athletic ability.

Bruce Spiegelman of Harvard Medical School in Boston, Massachusetts, and his team found that turning on a gene called PGC-1 $\beta$  in mice muscles transforms muscles that normally contain 15–20% type IIX fibres into ones with nearly 100%. This type of muscle fibre seems to have properties in between those of the better-known 'slow-twitch' and 'fast-twitch' varieties. The modified mice were able to run on a treadmill for 25% longer than normal before becoming exhausted.

The ability to modify muscle type could one day be useful in the treatment of muscle-wasting diseases.

## STEM CELLS

### Degrees of flexibility

*Nature Biotech.* doi:10.1038/nbt1274 (2007)

Stem cells derived from amniotic fluid could have just the right properties for use in future therapies, says a group led by Anthony Atala at Wake Forest University in Winston-Salem, North Carolina.

The researchers pulled cells with a stem-cell marker out of amniotic fluid left over from fetal diagnostic procedures. These stem cells could differentiate into many lineages — including bone and brain cells that functioned in live mice. And unlike stem cells derived from human embryos, the amniotic-fluid-

derived stem cells did not form cancerous masses when left to grow on their own.

But the cells may not be able to differentiate into every cell type of the body and they share some characteristics with adult stem cells. This suggests that they might occupy a middle ground between embryonic and adult stem cells: not too flexible, nor too rigid, but just plastic enough to be useful in the clinic.

## PALAEONTOLOGY

### Turning over an old leaf

*Proc. Natl Acad. Sci. USA* **104**, 565–569 (2007)

The first example of a 'leaf insect' from the fossil record is presented by Sonja Wedmann of the University of Bonn in Germany and her colleagues.

Recovered from 47-million-year-old sediments, the fossil insect is a remarkably well-preserved male (pictured below). In size and overall shape it resembles modern leaf insects of the Phasmatodea order, which includes stick insects. That it shares some

characteristics with today's stick insects supports the idea that leaf-mimickers descended from stick-insect-like ancestors.

The new species' name, *Eophyllium messeleensis*, derives from the era to which the fossil dates, the Eocene, and the place where it was found in Germany, known as the Messel Formation.

## CANCER BIOLOGY

### The X factor

*Science* doi:10.1126/science.1137509 (2007)

Genes on the X chromosome may play an unappreciated role in cancer, say researchers in the United States.

Daniel Haber of the Massachusetts General Hospital in Boston and his colleagues studied tumours from patients with a kidney cancer called Wilms' tumour. They identified a new gene, *WTX*, on the X chromosome, which was missing or faulty in a third of the tumours tested.

*WTX* is a 'tumour suppressor' gene, which helps to stop cells becoming cancerous. Until now, such genes have been found only on chromosomes that cells carry in pairs, meaning that both chromosomes' genes must be faulty to trigger cancer. But only one X chromosome is ever active in normal cells. This means that only one mutation is needed to inactivate a tumour suppressor on the X chromosome.

## ORGANIC CHEMISTRY

### An easy solution

*J. Am. Chem. Soc.* doi:10.1021/ja067487h (2007)

Chemists in the United States and Japan report the synthesis of two large, bowl-shaped organic molecules.



G. OLESCHINSKI, UNIV. BONN

The molecules are the polyarenes pentaindenocorannulene (C<sub>50</sub>H<sub>20</sub>) and tetraindenocorannulene (C<sub>44</sub>H<sub>18</sub>). Each consists of a sheet of carbon atoms arranged in hexagons, interspersed with pentagonal units that distort the sheet. The curvature around the central unit is greater than that seen in spherical carbon buckyballs, despite the presence of delocalized electrons, which typically act to flatten a molecule's structure.

Both molecules were made in solution. This suggests that nanotubes and buckyballs could be synthesized in solution using similar reaction steps, says the team led by Lawrence Scott of Boston College, Massachusetts. Currently, these structures have to be made by high-temperature gas-phase methods.

## IMMUNOLOGY

### Friend or foe?

*Nature Immunol.* doi:10.1038/ni1427 (2006)  
Immune cells that can't distinguish friend from foe are the targets of a newly discovered immune-control mechanism operating in the gut.

Most self-reactive immune cells are weeded out before they mature, but a few escape that filter. Shannon Turley of the Dana Farber Cancer Institute in Boston, Massachusetts, and her colleagues describe a population of lymph node cells that identify these rogue immune cells by expressing self-antigens characteristic of intestinal tissue. Immune cells that react with the antigens are inactivated.

The other known mechanism for weeding out such escapees involves specialized cells that harvest self-antigens from neighbouring tissues. The researchers suggest that the new system, which provides an additional barrier to autoimmune attack, may also operate for other tissues.

## ASTRONOMY

### Stellar heavyweights

*Astrophys. J.* **654**, L143-L146 (2007)

The spectacular nebula NGC 6334 (pictured below) is studded with massive stars which, in some regions, are still forming. Luis Rodríguez of the Centre for Radioastronomy and Astrophysics in Morelia, Mexico, and his team may have caught a glimpse of this process.

The researchers used the Very Large Array telescope to image a region of the nebula known as NGC 6334 I(N). Their millimetre-wavelength pictures revealed four clumps of



dust many times wider than our own Solar System, with masses a few times that of our Sun. The team interprets these as disks from which stars are forming. The star or stars at the disks' centres are too obscured to see, but theory suggests they will grow by accretion into great monsters.

## GENETICS

### Spot the difference

*Nature Genet.* doi:10.1038/ng1955 (2007)

The genetic underpinnings of traits that differ between ethnic groups are giving themselves up to modern analysis techniques, a new

study demonstrates.

A group led by Vivian Cheung and Richard Spielman of the University of Pennsylvania, Philadelphia, compared cells from caucasian individuals with those from Japanese and Chinese people. Nearly 25% of the more than 4,000 genes they analysed were expressed at different levels in the two groups. The team then combed through the HapMap, which documents single-nucleotide polymorphisms, or SNPs, across various ethnic groups and identified genetic variations that seemed to account for the differences. The group concludes that genetically controlled variation in gene regulation is responsible for the phenotypic differences in the cell type they studied.

## PHYSICS

### No nanobubbles

*Proc. Natl Acad. Sci. USA* **103**, 18401-18404 (2006) and *Phys. Rev. Lett.* **97**, 266101 (2006)  
Two independent teams say they have resolved a controversy about how water interacts with hydrophobic surfaces.

Past experiments have presented conflicting results: some showing that a low-density layer of water forms where water meets the hydrophobic surface; others finding no such layer; and a handful suggesting that dissolved gases emerge to form 'nanobubbles' at the interface.

Now two teams have used X-rays to examine the junction between water and a layer of octadecylsilane in detail. One team collected data at the Argonne National Laboratory, Illinois, the other at the European Synchrotron Radiation Facility in Grenoble, France. Each team observed a 'depletion layer' of reduced density at the interface, which is in line with theoretical predictions; neither saw 'nanobubbles'.

## JOURNAL CLUB

**John Cowan**  
University of Oklahoma,  
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**An astronomer invites you to contemplate the history of some of the oldest stars in the Universe.**

Much of my work is an attempt to determine what kinds of stars formed and what types of element synthesis occurred when our Galaxy was very young. This means that I am particularly

interested in a class of stars referred to as 'carbon-enhanced metal-poor'.

The composition of a star reflects the properties of the interstellar medium at the time it formed, which evolves as generations of stars come and go. Metal-poor stars were born early in the history of our Galaxy, before dying stars enriched the interstellar medium with heavy elements. The fact that some of these metal-poor stars are carbon-enhanced provides insight into the types of stars

that came before them.

Recently, one group reported that around 20% of metal-poor stars are carbon-enhanced (S. Lucatello *et al. Astrophys. J.* **652**, L37-L40; 2006). A previous study had produced a lower figure (J. Cohen *et al. Astrophys. J.* **633**, L109-L112; 2005), prompting a battle between the competing groups. But both papers agree that more metal-poor stars are carbon-enhanced than are younger, high-metallicity stars.

To me, this is one of the most interesting and compelling results

to come from the study of such stars. Massive stars — with at least ten times the mass of the Sun — produce carbon efficiently, so this gives us a clear indication that massive stars, although very rare today, were much more common early in the history of the Universe.

The differences between the studies' numbers may lie in how the authors define a carbon-enhanced star, or could be a matter of statistics. I look forward to future papers that address these issues — and perhaps continuing the controversy.