RESEARCH HIGHLIGHTS

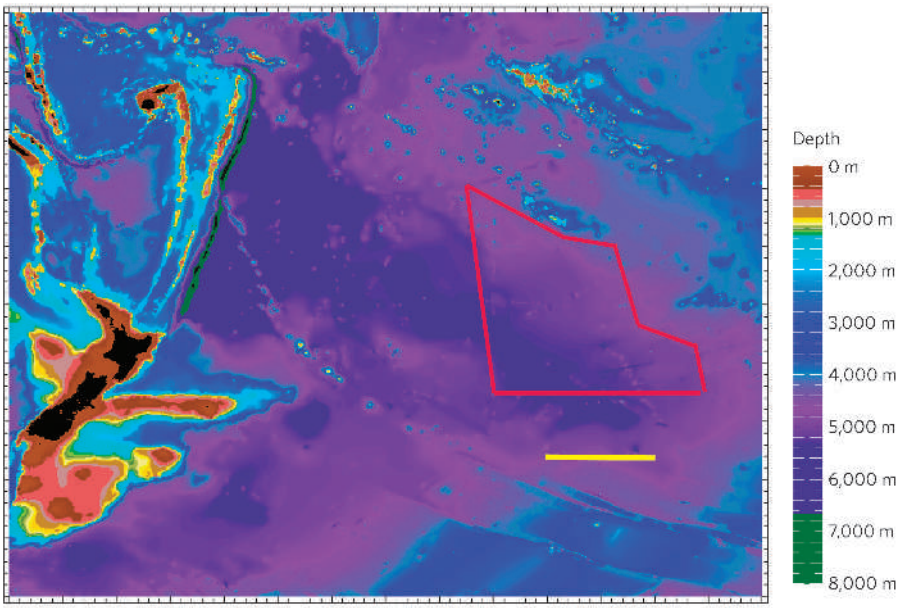
Laid bare

Geology **34,** 873–876 (2006)

In the central South Pacific Ocean lies a swath of sea floor as big as western Europe that is bare of sediment, researchers report.

David Rea of the University of Michigan and his colleagues made the surprising discovery after taking seismic profiles of a little-studied area of sea floor during a research cruise in 2005. The bare zone (indicated by red lines) apparently experiences all the factors — including low biological productivity and a lack of dust input — that prevent sediment from piling up.

Rocks in the bare zone may interest marine geologists studying how seawater interacts with ocean crust. But for those who made the discovery, the absence of sediment is ironic: the team was scouting regions where they might collect sediment cores to learn about past climate. This effort is part of the Integrated Ocean Drilling Program.



REA *ET AL.*/NOAA

VIROLOGY

Crossbred virus

Science **314,** 95 (2006)

A hybrid virus that is part HIV and part SIV has been created by researchers in the United States, and may lead to better animal models of the human disease.

HIV is picky and only replicates in human cells, so AIDS researchers working with non-human primates have had to use SIV, the monkey equivalent. This does not fully mimic the human disease.

Paul Bieniasz at the Aaron Diamond AIDS Research Center in New York and his colleagues replaced two proteins in HIV — one that encapsulates the viral RNA, another that is essential for replication — and allowed the engineered virus to adapt to macaque cells. The hybrid virus contains a genome that is 88% HIV.

ATMOSPHERIC SCIENCE

Vortex threatens ozone

Geophys. Res. Lett. **33,** L18811 (2006)

Swirling winds above the Arctic forced abnormally high amounts of ozone-destroying nitrous oxides (NO_x) into the stratosphere in early 2006, say Cora Randall of the University of Colorado in Boulder and her colleagues.

Measurements showed that NO_x levels in the stratosphere were unusually high during this period, but that the mechanism that produces NO_x in the upper reaches of the atmosphere was not particularly active. Instead, the team argues, extraordinary weather was to blame. The polar vortex — a persistent, large-scale cyclone near the Earth's pole — was surprisingly strong, and this drew more NO_x down into the stratosphere.

The implication is that if changes in global climate can affect the strength of the polar vortex, this will change the amount of ozone that is destroyed in the already patchy area over the Arctic.

CELL BIOLOGY

How eggs yolk sperm

Nature Cell Biol. **8,** 1143–1148 (2006)

The eggs of *Caernorhabditis elegans* worms attract sperm with the help of fatty molecules stored in their yolk, say US researchers.

Michael Miller of the University of Birmingham at Alabama and his colleagues showed that eggs needed to contain polyunsaturated fatty acids, or PUFAs, for sperm to crawl towards them.

In mammals, PUFAs are converted into signalling molecules known as eicosanoids, which attract immune cells. The team suggests that, in worms and mammals, PUFAs may have a general role as precursors of signals that summon motile cells to target tissues.

COSMOLOGY

Deep, dark picture

Mon. Not. R. Astron. Soc. **372,** 28–32 (2006)

Scientists who pooled data on two types of cosmic explosion have revealed new constraints on the make-up of the Universe.

In 1998, observations of exploding stars known as type 1a supernovae revealed that the expansion of the Universe is accelerating, driven by an unknown force termed 'dark energy'. But these supernovae aren't sufficiently bright to shine from the earliest times of the Universe. Astronomers hoping to probe the properties of dark energy further back in time have therefore turned to a brighter class of event, known as gamma-ray bursts.

Building on earlier work that proposed a way to calibrate the data, Claudio Firmani of the Brera Astronomical Observatory in Merate, Italy, and his colleagues combined measurements of 115 supernovae and 19 gamma-ray bursts. Their results suggest that the density of dark energy has remained unchanged over about 10 billion years.

ANALYTICAL CHEMISTRY

Blast it

Angew. Chem. Int. Ed. doi:10.1002/anie.200602449 (2006)

Blasting ionized molecules out of a sample is an effective way of making microscopic compositional maps of biological tissues, according to R. Graham Cooks and his colleagues at Purdue University in Indiana. They have adapted a relatively new method of mass spectrometry, known as desorption electrospray ionization (DESI), to create an imaging technique with a resolution of less than 0.5 millimetres.

DESI uses a jet of charged solvent droplets to expel molecular ions and measure their mass, and thus chemical formulae. The researchers scanned the spray nozzle over

slices of rat brain and characterized the various lipid ions ejected from each pixel area. The resolution is lower than for related ionization imaging methods, but the sample needs no pretreatment and the images are obtained under ambient conditions, making *in vivo* use a possibility.

NANOTECHNOLOGY

Doubled up

Nano Lett. doi:10.1021/nl061898e (2006)
Fibres made with two semiconductors running side-by-side could be efficient devices for degrading organic pollutants, researchers report.

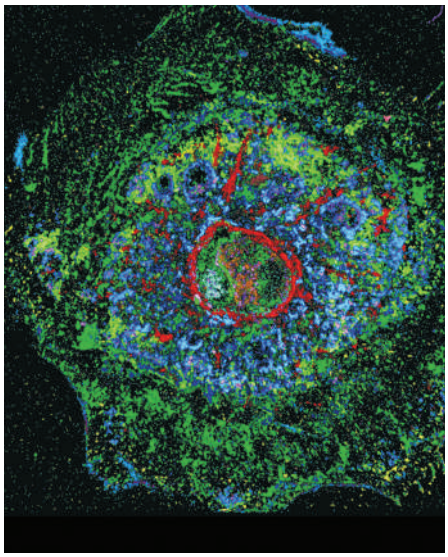
Zhaoyang Liu and Darren Delai Sun of Nanyang Technological University in Singapore and their colleagues used a technique known as electrospinning to make fibres about 100 nanometres wide that contained two thinner threads fused together. One of these was made from titanium dioxide (TiO_2), the other tin dioxide (SnO_2).

SnO_2 enhances the photocatalytic activity of TiO_2, which oxidizes organic materials using the energy from ultraviolet light. The twin fibre also has a greater surface area on which reactions can occur than other composite structures, such as bilayer films.

MICROBIOLOGY

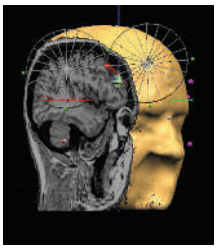
Unclogging severe malaria

PLoS Pathogens **2,** e100 (2006)
Researchers in Sweden may have found a way to eliminate the nasty side effects of the malaria drug heparin. These side effects, which stem from the drug's anticoagulant activity, stopped its use.



Severe malaria occurs when red blood cells infected with the parasite *Plasmodium falciparum* stick to each other and to vascular walls. This causes a host of problems, including anaemia and respiratory difficulties. Heparin disrupts this binding, but can also cause severe bleeding.

A team led by Mats Wahlgren of the Karolinksa Institute in Stockholm has now shown that treating heparin with the compound periodate destroys its anticoagulant activity but retains its malaria-fighting properties. In tests on macaques, the modified drug was able to unstick infected cells and restore blood flow.



C. EISENEGGER

NEUROSCIENCE

Fair game

Science doi:10.1126/science.1129156 (2006)
Researchers have identified a brain region that has a critical role in our desire to punish unfair behaviour.

Daria Knoch and Ernst Fehr of the University of Zurich and their colleagues studied people playing the ultimatum game, in which one participant decides how to share a sum of money with a fellow player. If that player feels the offer is unfair, they can prevent the other participant from keeping any money by choosing to forfeit their own share.

When magnetic stimulation was used to inhibit activity in the brain's right dorsolateral prefrontal cortex, players become more likely to accept unfair offers.

PROTEOMICS

Mapping togetherness

Nature Biotechnol. doi:10.1038/nbt1250 (2006)
A method to map a hundred or more proteins in a single cell or tissue slice has been developed by Walter Schubert of the University of Magdeburg, Germany, and his colleagues.

They designed robotic workstations to carry out repeated rounds of antibody labelling and fluorescent imaging, identifying different proteins in sequence. A novel algorithm then analysed the images, pixel-by-pixel, to provide a map of protein networks in the cell or tissue (pictured left). The scientists applied the technique to compare protein distributions in diseased and healthy tissues.

It is hoped that such methods will help to unravel how the hundreds of thousands of proteins in a cell interact with each other, eventually in real time.

JOURNAL CLUB

Brent R. Stockwell
Columbia University, New York, USA

A chemical biologist is drawn to a new way of validating cancer drug targets.

I am interested in translating basic research into cancer therapies, so I am always looking for new approaches to selecting drug targets. Recently, I read of a technique that promises to help us cope with changing ideas about the types of target we should go after.

Typically, researchers have concentrated on finding proteins that trigger the genesis of tumours; the products of oncogenes. Some subsets of these 'oncoproteins' can be targeted by a class of drug known as small molecules.

My lab's drug-discovery strategy involves the use of synthetic lethal screens. We screen small molecules to identify those that are lethal to tumour cells with a specific oncogene.

I have noticed that, in tumour cells, effective small molecules often target proteins that are not products of oncogenes. These other proteins are not involved in tumorigenesis, but seem to be required for tumour maintenance.

In May, researchers reported a way of testing such 'tumour maintenance' genes in mice (K. Politi *et al. Genes Dev.* **20,** 1496–1510; 2006).

They used a switch known as an inducible promoter to turn a classic oncogene on and off. The oncogene, a mutant epidermal growth factor receptor (EGFR), triggers lung cancer by causing excessive cell proliferation. Turning off the gene in existing tumours in mice tested whether the mutant EGFR was also required for the tumour's maintenance. The team found that it was.

Although oncogenes are crucial to tumour formation, it is the tumour maintenance genes that we should target with therapeutic drugs. Here, we have a way to validate such targets that I encourage my colleagues in the translational cancer field to adopt.