

## COVER

Single cobalt atoms (cones) on a stepped platinum substrate (blue), with attached stripes of one atomic layer of cobalt, magnetized up (yellow) or down (red), as imaged by spin-polarized scanning tunneling microscopy. Recording such images at successive magnetic fields enables measurement of the magnetic properties of individual atoms. See page 82.

*Image: F. Meier et al.*  
*(illustration: F. Marcinowski)*

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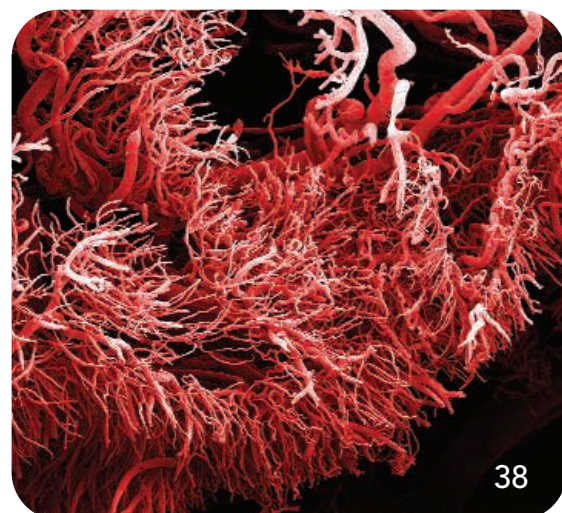
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## SCIENCE EXPRESS

www.scienceexpress.org

## ANTHROPOLOGY

## DNA from Pre-Clovis Human Coprolites in Oregon, North America

M. T. P. Gilbert et al.

Fossil human feces from an Oregon cave predate the Clovis culture by about 1000 years, and DNA from the feces marks the presence of Native Americans in North America.

&gt;&gt; News story p. 37

10.1126/science.1154116

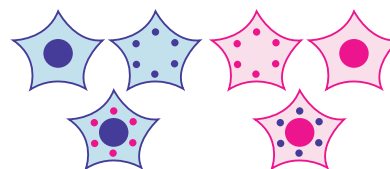
## PHYSICS

## BREVIA: Fine Structure Constant Defines Visual Transparency of Graphene

R. R. Nair et al.

The transparency of sheets of graphene is quantized in a way that allows a simple determination of the fine structure constant, which relates light and relativistic electrons.

10.1126/science.1156965



## MEDICINE

## ROS-Generating Mitochondrial DNA Mutations Can Regulate Tumor Cell Metastasis

K. Ishikawa et al.

Mutations in mitochondrial DNA that cause enhanced production of reactive oxygen species can increase the propensity of tumor cells to metastasize.

10.1126/science.1156906



## REVIEW

## DEVELOPMENTAL BIOLOGY

## Stochasticity and Cell Fate

R. Losick and C. Desplan

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## BREVIA

## ECOLOGY

## Bats Limit Insects in a Neotropical Agroforestry System

K. Williams-Guillén, I. Perfecto, J. Vandermeer

Enclosure experiments show that bats contribute to the reduction of insects on coffee plants more than has been appreciated and to a comparable degree as birds.

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## ECOLOGY

## Bats Limit Arthropods and Herbivory in a Tropical Forest

M. B. Kalka, A. R. Smith, E. K. V. Kalko

In a lowland tropical forest, bats consume insect herbivores on understory plants at least as much as birds do, thereby also indirectly limiting damage to the plants.

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## RESEARCH ARTICLES

## ARCHAEOLOGY

## Aztec Arithmetic Revisited: Land-Area Algorithms and Acolhua Congruence Arithmetic

B. J. Williams and M. del Carmen Jorge y Jorge

Analysis of ancient property records shows that the Aztecs used common algorithms and a distance standard for calculating land area and specific symbols to represent fractions.

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## BIOCHEMISTRY

## Crystal Structure of a Self-Spliced Group II Intron

N. Toor, K. S. Keating, S. D. Taylor, A. M. Pyle

The autocatalytic group II intron contains a network of unusual tertiary RNA interactions that form a metalloribozyme active site with parallels to eukaryotic spliceosomes.

&gt;&gt; Perspective p. 56

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## REPORTS

## APPLIED PHYSICS

## Revealing Magnetic Interactions from Single-Atom Magnetization Curves

F. Meier, L. Zhou, J. Wiebe, R. Wiesendanger

A scanning tunneling microscope with a spin-polarized tip can characterize the magnetic properties of single atoms on a nonmagnetic surface.

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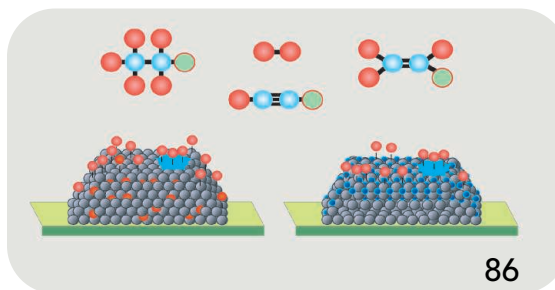
## CHEMISTRY

## The Roles of Subsurface Carbon and Hydrogen in Palladium-Catalyzed Alkyne Hydrogenation

D. Teschner et al.

The population of hydrogen and carbon within a palladium catalyst governs the hydrogenation of alkynes on its surface.

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GEOCHEMISTRY

The Electrical Conductivity of Post-Perovskite in Earth's D" Layer 89  
*K. Ohta et al.*

A major silicate mineral deep in Earth's mantle has a high electrical conductivity, causing a sufficiently strong coupling with the core to explain variations in Earth's rotation.

ASTRONOMY

Graphite Whiskers in CV3 Meteorites 91  
*M. Fries and A. Steele*

Graphite whiskers, a naturally occurring allotrope of carbon, have been found in primitive grains in several meteorites and may explain spectral features of supernovae.

>> *Perspective p. 61*

CLIMATE CHANGE

Covariant Glacial-Interglacial Dust Fluxes in the Equatorial Pacific and Antarctica 93  
*G. Winckler et al.*

A 500,000-year record shows that more dust, which provides iron and other nutrients, was blown into the equatorial Pacific during glacial periods than during warm periods.

MOLECULAR BIOLOGY

Selective Blockade of MicroRNA Processing by Lin-28 97  
*S. R. Viswanathan, G. Q. Daley, R. I. Gregory*

A protein necessary for reprogramming skin fibroblasts to pluripotent stem cells is an RNA-binding protein that normally inhibits microRNA processing in embryonic cells.

>> *Perspective p. 58*

MICROBIOLOGY

Bacteria Subsisting on Antibiotics 100  
*G. Dantas et al.*

A wide range of bacteria in the environment, many related to human pathogens, are both resistant to antibiotics and consume them as their only source of carbon for growth.

>> *News story p. 33*

CELL BIOLOGY

Reversible Compartmentalization of de Novo Purine Biosynthetic Complexes in Living Cells 103  
*S. An, R. Kumar, E. D. Sheets, S. J. Benkovic*

The enzymes needed for purine biosynthesis cluster in the cytoplasm when cells are depleted of purine but dissociate when the demand for purine is low.

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Single-Molecule DNA Sequencing of a Viral Genome 106  
*T. D. Harris et al.*

The M13 viral genome has been resequenced by a single-molecule method that allows simultaneous sequencing of 280,000 DNA strands of 25 bases with 100 percent coverage.

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*P. Lakatos et al.*

In monkeys that are paying attention to a rhythmic stimulus, brain oscillations become tuned to the stimulus so that the response in the visual cortex is enhanced.

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Episodic-Like Memory in Rats: Is It Based on When or How Long Ago? 113  
*W. A. Roberts et al.*

Unlike humans, who can place past events within a temporal framework, rats can only remember when an event happened by tracking the time elapsed since its occurrence.





Gorgeous trains get no love from peahens.

## SCIENCE NOW

[www.sciencenow.org](http://www.sciencenow.org) DAILY NEWS COVERAGE

### Peacock Feathers: That's So Last Year

Some female birds have lost interest in flashy males.

### Traffic Jams Happen, Get Used to It

Physics helps explain bunch-ups on the highway.

### Organics in the Mist

Astronomers find an amino acid precursor lurking in an interstellar cloud.



Networking among polar scientists.

## SCIENCE CAREERS

[www.sciencereaders.org/career\\_development](http://www.sciencereaders.org/career_development)

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### Taken for Granted: Help Is on the Way (for Some)

*B. Benderly*

A flurry of activity on workforce issues in early March did little to ease the problems of young scientists.

### A Competitive Fellowship

*J. Mervis*

Next year, NSF officials hope to launch a novel training program connected to the president's American Competitiveness Initiative.

### Networking Group Seeks to Bridge the Poles

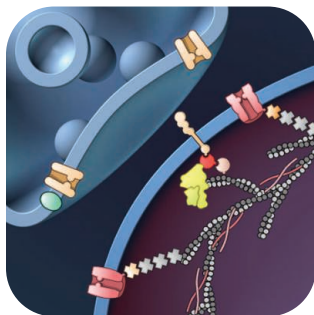
*C. Reed*

A fledgling organization connects polar scientists.

### April 2008 Funding News

*J. Fernández*

Learn about the latest in research funding opportunities, scholarships, fellowships, and internships.



Calpain cleaves postsynaptic proteins.

## SCIENCE SIGNALING

[www.stke.org](http://www.stke.org) THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

### REVIEW: Calpain in the CNS—From Synaptic Function to Neurotoxicity

*J. Liu, M. Cheng Liu, K. K. W. Wang*

Physiological activation of calpains may play a role in memory, whereas pathological activation leads to cell death.

### PODCAST

*E. M. Adler and J. F. Foley*

Mutations in the IGF-1 receptor are associated with longer life span in humans.

## SCIENCE PODCAST

Download the 4 April *Science* Podcast to hear about DNA evidence of pre-Clovis people in the Americas, bacteria subsisting on antibiotics, Aztec arithmetic, and more.

[www.sciencemag.org/about/podcast.dtl](http://www.sciencemag.org/about/podcast.dtl)



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