



COVER

The mirror-like surface of Anish Kapoor's sculpture "Cloud Gate" reflects the cityscape of Chicago. The theme of the AAAS Annual Meeting in Chicago, 12 to 16 February 2009, acknowledges the 150th anniversary of Charles Darwin's *On the Origin of Species*, and the meeting starts on his 200th birthday. See the preliminary program beginning on page 762.

Image: Paul Sampson

DEPARTMENTS

- 643 Science Online
- 645 This Week in *Science*
- 651 Editors' Choice
- 654 Contact *Science*
- 655 Random Samples
- 657 Newsmakers
- 696 AAAS News & Notes
- 761 New Products
- 762 AAAS Meeting Program
- 772 Science Careers

EDITORIAL

- 649 Science and China's Modernization
by Wen Jiabao

NEWS OF THE WEEK

- Scientists Plant Grass-Roots Effort for Obama in Final Days of Contest 658
- Eat, Drink, and Be Wary: A Sugar's Sour Side 659
- SCIENCESCOPE** 661
- Two Sets of Cave Bear DNA Uncover the Bear Facts 662
- U.K. Approves New Embryo Law 663

NEWS FOCUS

- You Say You Want a Revolution 664
>> *Science Podcast*
- More Than Skin Deep 667
Paul Klee, a Tragic Metamorphosis
- Society of Vertebrate Paleontology 68th Annual Meeting 670
Skulls Show Dinos Blew Their Horns
Two Legs Good
Snapshots From the Meeting

LETTERS

- Informed Consent in Social Science *P. Couture* 672
Response *J. A. List*
- Viewing NASA's Mars Budget with Resignation *A. Stern*
- Food Insecurity's Dirty Secret *R. Lal*
- CORRECTIONS AND CLARIFICATIONS** 674



664

BOOKS ET AL.

Political Science

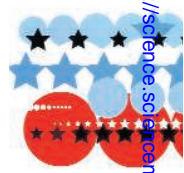
- Red State, Blue State, Rich State, Poor State** 676
Why Americans Vote the Way They Do
A. Gelman et al., reviewed by *T. N. Clark and C. Graziul*
- Electronic Elections** The Perils and Promises of Digital Democracy *R. M. Alvarez and T. E. Hall*, reviewed by *W. R. Mebane Jr.* 677
- BROWSINGS** 677
- The Hidden Costs of Clean Election Reform** 678
F. C. Schaffer, reviewed by *M. Johnston*
- The Persuadable Voter** Wedge Issues in Presidential Campaigns *D. S. Hillygus and T. G. Shields*, reviewed by *D. A. M. Peterson* 679
- Mathematics and Democracy** Designing Better Voting and Fair-Division Procedures *S. J. Brams*, reviewed by *I. McLean* 680
- Unequal Democracy** The Political Economy of the New Gilded Age *L. M. Bartels*, reviewed by *R. Grafstein* 681

EDUCATION FORUM

- PhET: Simulations That Enhance Learning *C. E. Wieman, W. K. Adams, K. K. Perkins* 682
- Genomics Education Partnership *D. Lopatto et al.* 684

PERSPECTIVES

- Assessing Ground Shaking *D. R. H. O'Connell* 686
>> *Report p. 727*
- Whither Hurricane Activity? *G. A. Vecchi et al.* 687
- Nanoscale Polymer Processing *C. L. Soles and Y. Ding* 689
>> *Report p. 720*
- Physiology and Climate Change *H. O. Pörtner and A. P. Farrell* 690



677

Downloaded from <http://science.sciencemag.org/> on June 12, 2021

CONTENTS continued >>



SCIENCE EXPRESS

www.sciencexpress.org

CHEMISTRY

Time-Resolved Dynamics in N₂O₄ Probed Using High Harmonic Generation
W. Li et al.

Electrons can be ejected from multiple orbitals of N₂O₄ by exploiting different stages in its excited vibrations, yielding an attosecond light probe of molecular dynamics.
10.1126/science.1163077

BIOCHEMISTRY

Structural Evidence for Common Ancestry of the Nuclear Pore Complex and Vesicle Coats

S. G. Brohawn et al.

The protein complex that controls entry and exit from the cell nucleus shares a structural element with vesicle coat proteins, suggesting that it is built around a lattice-like scaffold.
10.1126/science.1165886

LETTER: European Union and NIH Collaborate

E. A. Zerhouni and J. Potočnik

10.1126/science.1167667

MICROBIOLOGY

BREVIA: Bat White-Nose Syndrome: An Emerging Fungal Pathogen?

D. S. Blehert et al.

Bats that died en masse in New York state while they were hibernating were infected with a cold-tolerant fungus.

10.1126/science.1163874

CHEMISTRY

High Harmonic Generation from Multiple Orbitals in N₂

B. K. McFarland, J. P. Farrell, P. H. Bucksbaum, M. Gühr

Electron ejection from multiple N₂ orbitals, controlled by the molecule's orientation relative to a laser, produces attosecond light spectra that can reveal molecular dynamics.

10.1126/science.1162780

PERSPECTIVES CONTINUED...

Aneuploidy Advantages? 692

E. Hernando >> *Research Article p. 703*

A New Glance at Glia 693

A. Reichenbach and T. Pannicke >> *Report p. 744*

Retrospective: George E. Palade (1912–2008) 695

R. W. Schekman

TECHNICAL COMMENT ABSTRACTS

PHYSIOLOGY

Comment on "Differential Rescue of Light- and Food-Entrainable Circadian Rhythms" 675

R. E. Mistlberger et al.

[full text at www.sciencemag.org/cgi/content/full/322/5902/675a](http://www.sciencemag.org/cgi/content/full/322/5902/675a)

Response to Comment on "Differential Rescue of Light- and Food-Entrainable Circadian Rhythms"

P. M. Fuller, J. Lu, C. B. Saper

[full text at www.sciencemag.org/cgi/content/full/322/5902/675b](http://www.sciencemag.org/cgi/content/full/322/5902/675b)

REVIEW

BIOCHEMISTRY

Structural Insights into a Circadian Oscillator 697

C. H. Johnson, M. Egli, P. L. Stewart

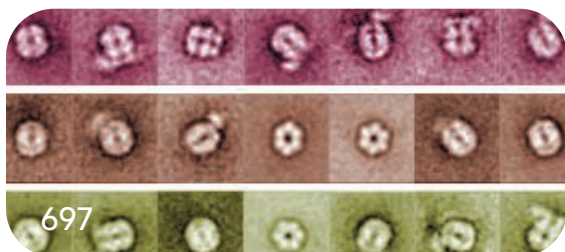
BREVIA

MICROBIOLOGY

Wolbachia and Virus Protection in Insects 702

L. M. Hedges, J. C. Brownlie, S. L. O'Neill, K. N. Johnson

An endosymbiotic bacterium survives and spreads in populations of *Drosophila* because it protects its insect hosts from death caused by certain RNA viruses. >> *Science Podcast*



RESEARCH ARTICLES

CELL BIOLOGY

Aneuploidy Affects Proliferation and Spontaneous Immortalization in Mammalian Cells 703

B. R. Williams et al.

Mouse cell lines carrying extra copies of one of four chromosomes all show less cell proliferation and higher gene expression, but vary in how fast they become cancer-like cells. >> *Perspective p. 692*

BIOCHEMISTRY

Structure and Molecular Mechanism of a Nucleobase–Cation–Symport-1 Family Transporter 709

S. Weyand et al.

The structure of a membrane transporter in an open state suggests that in- and out-facing cavities reciprocally open and close coordinated by two transmembrane segments.

REPORTS

PLANETARY SCIENCE

Magnetism on the Angrite Parent Body and the Early Differentiation of Planetesimals 713

B. P. Weiss et al.

A type of primitive meteorite from the earliest small bodies in the solar system preserves remnant magnetism, implying that these planetesimals had a convecting metallic core.

PHYSICS

The Role of Impulse on the Initiation of Particle Movement Under Turbulent Flow Conditions 717

P. Diplas et al.

Entrainment of sediment grains from, say, a stream bed, by turbulent flow depends not just on the magnitude of the applied fluid forces but also on their duration.

MATERIALS SCIENCE

Molecular Confinement Accelerates Deformation of Entangled Polymers During Squeeze Flow 720

H. D. Rowland et al.

When polymers are squeezed at nanometer scales, the longest chains unexpectedly flow more easily, even though in theory they should be the most entangled. >> *Perspective p. 689*

CONTENTS continued >>

REPORTS CONTINUED...

GEOCHEMISTRY

Peptides Enhance Magnesium Signature in Calcite: Insights into Origins of Vital Effects 724

A. E. Stephenson et al.

A simple hydrophilic peptide helps to regulate the magnesium content of calcite in marine organisms, explaining a complication in using this as an ocean thermometer.

GEOPHYSICS

Trampoline Effect in Extreme Ground Motion 727

S. Aoi, T. Kunugi, H. Fujiwara

Upward ground acceleration in a recent earthquake in Japan reached about four times that of gravity, as if the upper soil layer were bouncing on a trampoline in the ground below.

>> *Perspective p. 686*

ATMOSPHERIC SCIENCE

Tracing the Origin and Fate of NO_x in the Arctic Atmosphere Using Stable Isotopes in Nitrate 730

S. Morin et al.

Measurements of N and O isotopes show that nitrate in the high Arctic is produced when spring sunlight oxidizes pollutants brought from lower latitudes since the past summer.

ANTHROPOLOGY

Ages for the Middle Stone Age of Southern Africa: Implications for Human Behavior and Dispersal 733

Z. Jacobs et al.

Dating of the first use of symbols and jewelry in South Africa shows that the emergence of modern human behavior was not influenced by just environmental factors.

EVOLUTION

Energy Uptake and Allocation During Ontogeny 736

C. Hou et al.

A model of how developing animals assimilate food and allocate and store energy for maintenance, growth, and activity accurately predicts data from mammals and birds.

ECOLOGY

Experimental Evidence for Spatial Self-Organization and Its Emergent Effects in Mussel Bed Ecosystems 739

J. van de Koppel et al.

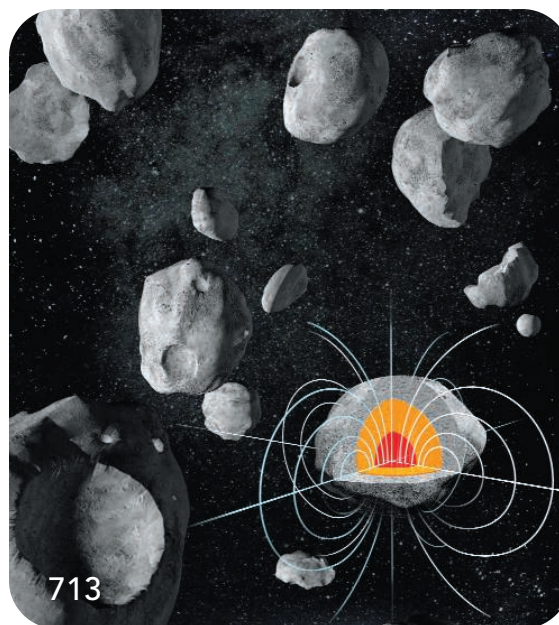
Interactions among individual mussels result in large-scale spatial patterns in mussel beds that are beneficial to the population—by promoting secondary production, for example.

ECOLOGY

Natal Homing and Connectivity in Atlantic Bluefin Tuna Populations 742

J. R. Rooper et al.

Isotopes in the ear bones of tuna reveal that two populations—from the Gulf of Mexico and the Mediterranean—mingle in the Atlantic as adolescents but return home to breed.



NEUROSCIENCE

Glia Are Essential for Sensory Organ Function in *C. elegans* 744

T. Bacaj, M. Tevlin, Y. Lu, S. Shaham

Nonneural glial cells are required for the normal operation of the main sensory organ of a nematode, influencing neuronal shape and function, as well as behavior. >> *Perspective p. 693*

GENETICS

HARP Is an ATP-Driven Annealing Helicase 748

T. Yusufzai and J. T. Kadonaga

The gene deleted in a complex genetic disease is a reverse helicase, a motor-like enzyme that uses adenosine triphosphate to zip up separated strands of DNA.

MOLECULAR BIOLOGY

Polycomb Proteins Targeted by a Short Repeat RNA to the Mouse X Chromosome 750

J. Zhao, B. K. Sun, J. A. Erwin, J.-J. Song, J. T. Lee

A small RNA cleaved from a larger precursor recruits silencing proteins to the X chromosome to inactivate it in female mammals, which have an extra copy.

IMMUNOLOGY

Deletion of *Trpm7* Disrupts Embryonic Development and Thymopoiesis Without Altering Mg²⁺ Homeostasis 756

J. Jin et al.

A cation channel that conducts both Ca²⁺ and Mg²⁺ is unexpectedly required for normal mouse development, specifically for proper maturation of the thymus and T cells.



SCIENCE (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals Mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2008 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership and subscription (51 issues): \$144 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$770; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery) \$85. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request, GST #1254 88122. Publications Mail Agreement Number 1069624. SCIENCE is printed on 30 percent post-consumer recycled paper. Printed in the U.S.A.

Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to AAAS, P.O. Box 96178, Washington, DC 20090-6178. Single-copy sales: \$10.00 current issue, \$15.00 back issue prepaid includes surface postage; bulk rates on request. Authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that \$20.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for Science is 0036-8075. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.



Printed on
30% post-consumer
recycled paper.

CONTENTS continued >>>

SCIENCE NOW

www.sciencenow.org

HIGHLIGHTS FROM OUR DAILY NEWS COVERAGE

Viagra Stands Firm Against Muscular Dystrophy

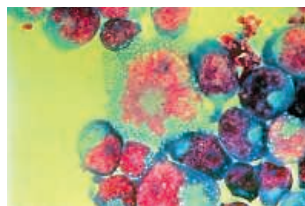
Famous anti-impotence pill might compensate for muscle-weakening enzyme deficiency.

Thanks for Erasing the Memories

Combination of genetic engineering and drugs wipes out specific memories in mice.

Not Your Garden-Variety Tomato

Researchers engineer cancer-fighting purple tomatoes.



Enthusiasm for virology.

SCIENCE CAREERS

www.sciencereers.org/career_development

FREE CAREER RESOURCES FOR SCIENTISTS

The Pathways to Independence Award: Early Returns

S. Carpenter

NIH's new transition awards program seems to be achieving its goal.

The Other Life Sciences Industry

C. Mintz

The medical devices and diagnostics industry is underappreciated as a life sciences career destination.

A Virologist With a Contagious Enthusiasm

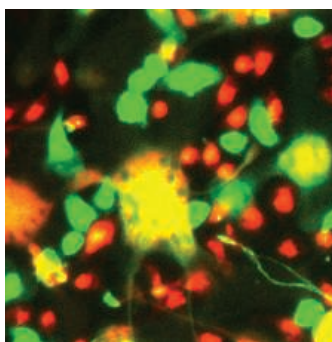
E. Pain

French virologist Ali Saib is praised for his research achievements and efforts to attract a diversity of people to science.

From the Archives: Lab Dynamics—Science at the Balcony

C. M. Cohen and S. L. Cohen

How you discuss content or data can be as important as the content or data itself.



Programming macrophages to fuse.

SCIENCE SIGNALING

www.sciencesignaling.org

THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

RESEARCH ARTICLE: Essential Role of DAP12 Signaling in Macrophage Programming into a Fusion-Competent State

L. Helming, E. Tomasello, T. R. Kyriakides, F. O. Martinez, T. Takai, S. Gordon, E. Vivier

Signaling through the DAP12 adaptor triggers a gene expression profile that makes macrophages competent to fuse and form multinucleated giant cells.

PROTOCOL: High-Resolution Imaging of Redox Signaling in Live Cells Through an Oxidation-Sensitive Yellow Fluorescent Protein

G. Maulucci, V. Labate, M. Mele, E. Panieri, G. Arcovito, T. Galeotti, H. Østergaard, J. R. Winther, M. De Spirito, G. Pani

Measure and visualize intracellular changes in the redox state.

JOURNAL CLUB: The HIF-1 α -C/EBP α Axis

H. P. Janardhan

Interactions between HIF-1 α and C/EBP α may mediate reciprocal functional effects.

PODCAST

R. Linding and A. M. VanHook

Rune Linding explains how combining NetPhorest with a genetic screen enables researchers to gain insight into the relationships among the identified players.

SCIENCE PODCAST

www.sciencemag.org/multimedia/podcast

FREE WEEKLY SHOW

Download the 31 October *Science* Podcast to hear about how the bacterium *Wolbachia* protects insects from virus-induced death, academic freedom in China, and more.



Separate individual or institutional subscriptions to these products may be required for full-text access.

Science

322 (5902)

Science **322** (5902), 645-778.

ARTICLE TOOLS

<http://science.sciencemag.org/content/322/5902>

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. The title *Science* is a registered trademark of AAAS.

Copyright © 2008 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.