



COVER

An example of “art” by self-styled guerrilla artist Banksy, as seen in East London in November 2007. Human behavior that would be characterized as antisocial punishment can also be called art; prosocial institutions, most notably the campaign Keep Britain Tidy, refer to Banksy’s work as vandalism. See page 1362.

Photo: Chris Jackson/Getty Images

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SCIENCE EXPRESS

www.scienceexpress.org

CHEMISTRY

Linked Reactivity at Mineral-Water Interfaces Through Bulk Crystal Conduction

S. V. Yanina and K. M. Rosso

A current flow through a hematite crystal couples dissolution and growth reactions at different surfaces, a finding likely relevant to a broad range of semiconducting minerals.

10.1126/science.1154833

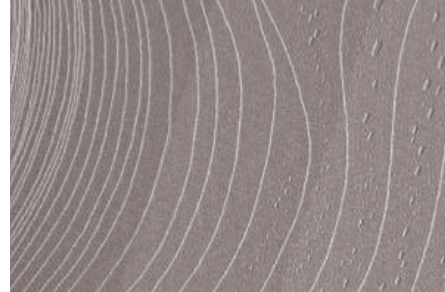
PHYSICS

Frequency Ratio of Al⁺ and Hg⁺ Single-Ion Optical Clocks; Metrology at the 17th Decimal Place

T. Rosenband et al.

Precise measurements of the frequency ratio of two optical clocks indicate that the fine-structure constant is fine and constant to an uncertainty of 10⁻¹⁷.

10.1126/science.1154622



MEDICINE

Oncogenic *CARD11* Mutations in Human Diffuse Large B Cell Lymphoma

G. Lenz et al.

One type of non-Hodgkin's lymphoma is caused by mutations in a scaffolding protein that inappropriately activate an inflammatory signaling pathway.

10.1126/science.1153629

NEUROSCIENCE

A Model for Neuronal Competition During Development

C. D. Deppmann et al.

Modeling and experiments show that neurons successfully innervate muscle when neuronal sensitization to survival signals outweighs antagonistic signals for cell death.

10.1126/science.1152677

TECHNICAL COMMENT ABSTRACTS

GEOCHEMISTRY

Comment on "Early Archaean Microorganisms Preferred Elemental Sulfur, Not Sulfate"

H. Bao, T. Sun, I. Kohl, Y. Peng

[full text at www.sciencemag.org/cgi/content/full/319/5868/1336b](http://www.sciencemag.org/cgi/content/full/319/5868/1336b)

Response to Comment on "Early Archaean Microorganisms Preferred Elemental Sulfur, Not Sulfate"

P. Philippot et al.

[full text at www.sciencemag.org/cgi/content/full/319/5868/1336c](http://www.sciencemag.org/cgi/content/full/319/5868/1336c)

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MEDICINE

An Oncogene-Induced DNA Damage Model for Cancer Development

T. D. Halazonetis, V. G. Gorgoulis, J. Bartek

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BREVIA

ECOLOGY

Dimethylsulfoniopropionate as a Foraging Cue for Reef Fishes

J. L. DeBose, S. C. Lema, G. A. Nevitt

Reef fish locate desirable feeding opportunities by recognizing dimethylsulfoniopropionate, which is released by coral reef algae in response to foraging by fish.

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RESEARCH ARTICLES

CLIMATE CHANGE

Long-Term Sea-Level Fluctuations Driven by Ocean Basin Dynamics

R. D. Müller, M. Sdrolias, C. Gaina, B. Steinberger, C. Heine

Considering changes in the shape of the ocean basins implies that global sea level fell by ~250 meters since 140 to 80 million years ago, a larger drop than implied in a recent study.

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PSYCHOLOGY

Antisocial Punishment Across Societies

B. Herrmann, C. Thöni, S. Gächter

Retaliation against those who enforce the social norms of civic cooperation and rule of law varies among cultures and is more pronounced where social norms are weaker.

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>> *Perspective p. 1345*

REPORTS

PHYSICS

Fiber-Optical Analog of the Event Horizon

T. G. Philbin et al.

An optical analog of the event horizon of a gravitational black hole can be produced with light pulses propagating along an optical fiber, providing a tractable experimental system.

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>> *News story p. 1321*

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MATERIALS SCIENCE

Stimuli-Responsive Polymer Nanocomposites Inspired by the Sea Cucumber Dermis 1370

J. R. Capadona et al.

A rubbery polymer coated with nanofibers that segregate upon addition of a solvent can rapidly stiffen and relax, like the inner skin of a sea cucumber.

CHEMISTRY

Heterogeneous Nucleation Experiments Bridging the Scale from Molecular Ion Clusters to Nanoparticles 1374

P. M. Winkler et al.

Experiments mimicking aerosol formation show that organic vapors tend to condense on any nanometer-scale particles, particularly negatively charged ones, rather than forming pure nuclei.

GEOLOGY

Age and Evolution of the Grand Canyon Revealed by U-Pb Dating of Water Table–Type Speleothems 1377

V. Polyak, C. Hill, Y. Asmerom

Dating of cave deposits that form at the water table implies that incision of the Grand Canyon began in the west 17 million years ago and only accelerated in the east recently. >> *Perspective p. 1343*

PLANETARY SCIENCE

The Dust Halo of Saturn’s Largest Icy Moon, Rhea 1380

G. H. Jones et al.

Observations of a large shadow in electrons and particles behind Rhea imply that it has a small ring system formed from dust lofted into orbit by impacts.

>> *News story p. 1325*

BOTANY

TOPLESS Mediates Auxin-Dependent Transcriptional Repression During *Arabidopsis* Embryogenesis 1384

H. Szemenyei, M. Hannon, J. A. Long

A transcriptional co-repressor is part of the protein complex that inhibits developmental gene activation in *Arabidopsis* until the growth hormone auxin triggers its degradation.

BIOCHEMISTRY

De Novo Computational Design of Retro-Aldol Enzymes 1387

L. Jiang et al.

A computationally designed enzyme acts as a retro-aldolase that splits a carbon-carbon bond in a nonnatural substrate.

MICROBIOLOGY

A Cholesterol Biosynthesis Inhibitor Blocks *Staphylococcus aureus* Virulence 1391

C.-I. Liu et al.

A drug for controlling cholesterol may be useful as an antibiotic for multi-drug-resistant *Staphylococcus* because of unexpected structural similarities among critical proteins.

GENETICS

High-Resolution Mapping of Crossovers Reveals Extensive Variation in Fine-Scale Recombination Patterns Among Humans 1395

G. Coop, X. Wen, C. Ober, J. K. Pritchard, M. Przeworski

High-density genotyping of individuals from 82 families shows unexpected variation in the number of meiotic crossovers and in the relative activity of recombination hotspots.

GENETICS

Sequence Variants in the *RNF212* Gene Associate with Genome-Wide Recombination Rate 1398

A. Kong et al.

A variant of a human gene associated with high rates of recombination in males and low rates in females is an ortholog of a nematode gene essential for recombination.

CELL SIGNALING

Hepatic Glucose Sensing via the CREB Coactivator CRTC2 1402

R. Dentin, S. Hedrick, J. Xie, J. Yates III, M. Montminy

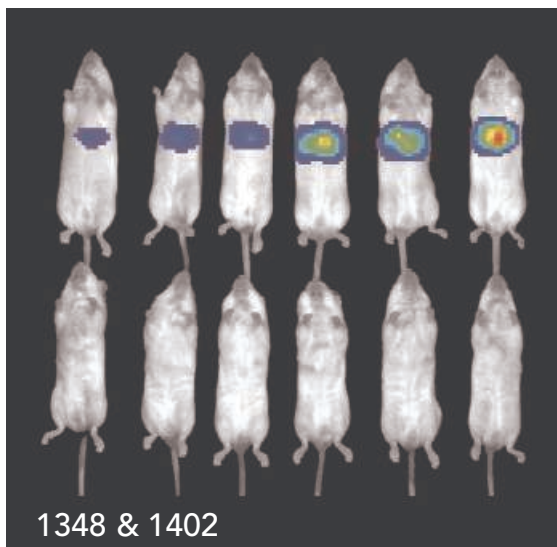
Competing glycosylation and phosphorylation of a single amino acid in a transcriptional coactivator regulate nutrient- and energy-sensing pathways and may contribute to diabetes. >> *Perspective p. 1348*

MICROBIOLOGY

Coiled-Coil Irregularities and Instabilities in Group A *Streptococcus* M1 Are Required for Virulence 1405

C. McNamara et al.

Mutating a cell-surface virulence protein on strep bacteria stabilizes its structure, minimizing its inflammatory side effects and potentially making it a better vaccine.



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A child with progeria.

SCIENCE NOW

www.sciencenow.org DAILY NEWS COVERAGE

Too Old, Too Fast

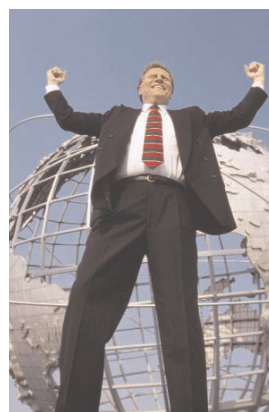
Stem cell identity crisis might explain “accelerated aging” disease.

How Weeds Take to Cities

A clever experiment shows one way to adapt to life in the concrete jungle.

Physicists Successfully Store and Retrieve Nothing

Researchers trap a peculiar state of the vacuum.



Professional science master’s grads are in high demand.

SCIENCE CAREERS

www.sciencereers.org CAREER RESOURCES FOR SCIENTISTS

Mastering the Job Market?

B. Benderly

Graduates of professional science master’s programs often get multiple job offers.

Getting Women Scientists to the Top

C. Wald

Programs in Europe aim to ensure that excellent junior-level women become senior-level scientists.

Your Career in a Number

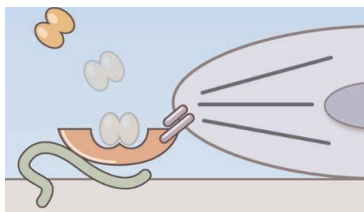
G. Bjorn

Measures of research impact are gaining popularity, but they have limitations with early-career faculty.

March 2008 Funding News

J. Fernández

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



Mechanical tension causes TGF- β release.

SCIENCE SIGNALING

www.stke.org THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

PERSPECTIVE: Matrix Elasticity, Cytoskeletal Tension, and TGF- β : The Insoluble and Soluble Meet

R. G. Wells and D. E. Discher

Extracellular matrix stiffness regulates the equilibrium between storage and release of matrix-bound transforming growth factor- β .

GLOSSARY

Find out what MVE, SFRP, and LCR mean in the world of cell signaling.



SCIENCE PODCAST

Download the 7 March *Science* Podcast to hear about new insights on long-term sea-level change, widespread antisocial punishment, asteroids and comets looming near Earth, and more.

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