SPECIAL SECTION

Cell Signaling

INTRODUCTION
Getting Your Loops Straight

REVIEWS
Feedback Loops Shape Cellular Signals in Space and Time
O. Brandman and T. Meyer

Optical Switches for Remote and Noninvasive Control of
Cell Signaling
P. Gorostiza and E. Y. Isacoff

From Signals to Patterns: Space, Time, and Mathematics in
Developmental Biology
J. Lewis

For related online content, see page 339 or go to www.sciencemag.org/cellsignaling08/

DEPARTMENTS

339 Science Online
341 This Week in Science
348 Editors’ Choice
350 Contact Science
353 Random Samples
355 Newsmakers
465 New Products
466 Science Careers

EDITORIAL
345 U.S.-Cuban Scientific Relations
by Sergio Jorge Pastrana and
Michael T. Clegg

NEWS OF THE WEEK
Falsification Charge Highlights Image-Manipulation Standards
DNA Test for Breast Cancer Risk Draws Criticism
Hawaii Marine Lab Fights to Stay Afloat
Two Strikes and You’re Out, Grant Applicants Learn
Most Devastating Mass Extinction Followed Long Bout of Sea Sickness

SCIENCESCOPE
Skewed Symmetries Net Honors for Particle Theorists
Theorist Revolutionized Study of What Gets Made Where
Three Scientists Bask in Prize’s Fluorescent Glow

NEWS FOCUS
Q&A: China’s Scientist Premier
Paradoxical Effects of Tightly Controlled Blood Sugar
Biomolecular Archaeology Symposium
Tracing the First Tame Horses by Their Milk
Old Bones Reveal Signs of Scurvy
Hope for the Rhone’s Missing Sturgeon

www.sciencemag.org  SCIENCE  VOL 322  17 OCTOBER 2008  333
Published by AAAS

Downloaded from http://science.sciencemag.org/ on May 2, 2017

Cover: Detail from The Last Automat III by Max Ferguson. Sluggish operation of the reward circuitry in the brain may lead individuals to eat calorie-dense foods such as pie to try to compensate, placing them at risk for obesity. See page 449.

Image: The Last Automat III, 2003 (oil on panel); Max Ferguson/Bridgeman Art Library/Getty Images
Structure and Molecular Mechanism of a Nucleobase-Cation-Symport-1 Family Transporter
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.
10.1126/science.1164440

The Fermi Gamma-Ray Space Telescope Discovers the Pulsar in the Young Galactic Supernova Remnant CTA 1
G. Kanbach et al.
The Fermi Space Telescope has detected a gamma-ray pulsar associated with a young supernova remnant, implying that such stars may be unidentified gamma-ray sources.
10.1126/science.1165572

Quantifying Coauthor Contributions C. H. Sekercioglu
Biofuels: Clarifying Assumptions V. Khosla
Response T. D. Searchinger and R. A. Houghton

Fixing Climate What Past Climate Changes Reveal About the Current Threat—and How to Counter It
W. S. Broecker and R. Kunzig, reviewed by K. Caldeira

Earth: The Sequel The Race to Reinvent Energy and Stop Global Warming F. Krupp and M. Horn, reviewed by F. T. Manheim
Uncle Phil and the Atomic Bomb J. Abelson and P. H. Abelson, reviewed by C. T. Prewitt
La forêt danse (The Dancing Forest) B. Lainé

When Embryonic Stem Cell Lines Fail to Meet Consent Standards J. Sugarman and A. W. Siegel

It’s the Sequence, Stupid!
H. A. Coller and L. Kruglyak >> Report p. 434
In Praise of Pores P. Colombo
Toward Pore-Free Ceramics G. L. Messing and A. J. Stevenson
Transforming Light V. M. Shalaev

Conservation and Rewiring of Functional Modules Revealed by an Epistasis Map in Fission Yeast
A. Roguev et al.
Comparison of genetic wiring in two types of yeast reveals that protein complexes are conserved, but the interactions between them can change radically between species.

Current-Induced Spin-Wave Doppler Shift V. Vlaminck and M. Bailleul
A current-induced shift in the frequency of propagating spin waves provides a simple technique to probe spin-polarized currents in engineering spintronic devices. >> Perspective p. 386

Complex Patterning by Vertical Interchange Atom Manipulation Using Atomic Force Microscopy Y. Sugimoto et al.
Atoms of tin and silicon are reversibly and controllably exchanged between the tip of an atomic force microscope and a substrate, allowing atomic patterning of a surface.

Catalytic Conversion of Biomass to Monofunctional Hydrocarbons and Targeted Liquid-Fuel Classes E. L. Kunkes et al.
A set of two reactors, one that breaks down biomass sugars and a second that directs chain formation, can synthesize various hydrocarbon fuels.
Podcast

REPORTS CONTINUED...

CHEMISTRY
Accurate Temperature Imaging Based on Intermolecular Coherences in Magnetic Resonance
G. Galiana, R. T. Branco, E. R. Jenista, W. S. Warren
The shift of water nuclear magnetic resonance peaks relative to those of lipids provides an accurate thermometer of internal temperatures, for example, in a mouse.

CHEMISTRY
Molecular Layering of Fluorinated Ionic Liquids at a Charged Sapphire (0001) Surface
M. Mezger et al.
Reflections of high-energy x-rays reveal that when in contact with a sapphire surface, and likely other surfaces, an ionic liquid forms alternating layers of cations and anions.

MATERIALS SCIENCE
Evolution of Block Copolymer Lithography to Highly Ordered Square Arrays
C. Tang et al.
The addition of hydrogen bonding units to two block copolymers leads to a template with square patterns that can be used for manufacturing integrated circuits.

PLANETARY SCIENCE
The Extreme Kuiper Belt Binary 2001 QW$_{322}$
J.-M. Petit et al.
Two small, weakly bound objects in the outer solar system orbit each other more than 100,000 kilometers apart. A distance that challenges ideas for how such binaries form.

GENETICS
Species-Specific Transcription in Mice Carrying Human Chromosome 21
M. D. Wilson et al.
An aneuploid mouse carrying a human chromosome shows that genetic sequence can dominate epigenetic, cellular, and organismal effects in determining transcriptional regulation and gene expression.

CHEMISTRY
Surface Sites for Engineering Allosteric Control in Proteins
J. Lee et al.
Two allosterically regulated proteins can be engineered to interact so that when light activates one, it triggers the enzymatic output (dihydrofolate reductase) of the other.

BIOCHEMISTRY
A Stochastic Single-Molecule Event Triggers Phenotype Switching of a Bacterial Cell
P. J. Choi, L. Cai, K. Frieda, X. S. Xie
A stochastic process, in which a regulatory repressor dissociates from either one or two DNA sites, determines which of two phenotypes is seen in genetically identical bacteria.

BIOCHEMISTRY
Remeasuring the Double Helix
R. S. Mathew-Fenn, R. Das, P. A. B. Harbury
Pieces of DNA in solution are much softer than DNA under tension and unexpectedly stretch large amounts over several helical turns.

NEUROSCIENCE
Relation Between Obesity and Blunted Striatal Response to Food Is Moderated by TaqIA A1 Allele
E. Stice, S. Spoor, C. Bohon, D. M. Small
Individuals whose reward centers of the brain respond sluggishly after eating prefer calorie-dense foods, which may account for their greater propensity to gain weight. >> Science Podcast

CELL BIOLOGY
Phosphorylation Networks Regulating JNK Activity in Diverse Genetic Backgrounds
C. Bakal et al.
Data from an RNA interference screen, combined with genetic interaction analysis, allow construction of a comprehensive kinase cellular signaling network in Drosophila.

CELL BIOLOGY
Higher-Order Cellular Information Processing with Synthetic RNA Devices
M. N. Win and C. D. Smolke
The intrinsic ribosome of a simple RNA-based Boolean logic device that can be engineered into cells is activated when it is bound by two particular molecules. >> Perspective p. 387

IMUNOLOGY
Innate Immunity in Caenorhabditis elegans Is Regulated by Neurons Expressing NPR-1/GPCR
K. L. Styer et al.
In the worm Caenorhabditis elegans, sensory neurons surprisingly can inhibit innate immune responses, in part through the mitogen-activated protein kinase (MAPK) signaling pathway.
VILIP1 interacts with P2X2 receptors in dendrites.

**SCIENCE SIGNALING**

www.sciencesignaling.org

THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

**RESEARCH ARTICLE:** Regulation of P2X2 Receptors by the Neuronal Calcium Sensor VILIP1

S. Chaumont, V. Compan, E. Toulme, E. Richler, G. D. Housley, F. Rassendren, B. S. Khakh

Optics and electrophysiology reveal the dynamics of an ATP-gated ion channel signaling complex.

**RESEARCH ARTICLE:** BDNF Selectively Regulates GABA<sub>A</sub> Receptor Transcription by Activation of the JAK/STAT Pathway


Brain-derived neurotrophic factor regulates a GABA receptor subunit through the repressor ICER.

**PERSPECTIVE:** Acetylation of MKP-1 and the Control of Inflammation

H. Chi and R. A. Flavell

Toll-like receptor signaling is inhibited by acetylated MKP-1, a mitogen-activated protein kinase phosphatase.

**PREVIEW**

Get a sneak peek at articles coming up in the 21 October issue related to this week’s *Science* special issue on cell signaling.

[>> Cell Signaling section p. 389 and www.sciencemag.org/cellsignaling08/](http://www.sciencemag.org/cellsignaling08/)

---

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

This copy is for your personal, non-commercial use only.

**Article Tools**  Visit the online version of this article to access the personalization and article tools:  
http://science.sciencemag.org/content/322/5900

**Permissions**  Obtain information about reproducing this article:  
http://www.sciencemag.org/about/permissions.dtl