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

SPECIAL SECTION

Cell Signaling

INTRODUCTION
Getting Your Loops Straight 389

REVIEWS
Feedback Loops Shape Cellular Signals in Space and Time
O. Brandman and T. Meyer 390
Optical Switches for Remote and Noninvasive Control of
Cell Signaling
P. Gorostiza and E. Y. Isacoff 395
From Signals to Patterns: Space, Time, and Mathematics in
Developmental Biology
J. Lewis 399

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

NEWS OF THE WEEK
Falsification Charge Highlights Image-Manipulation Standards 356
DNA Test for Breast Cancer Risk Draws Criticism 357
Hawaii Marine Lab Fights to Stay Afloat 358
Two Strikes and You’re Out, Grant Applicants Learn 358
Most Devastating Mass Extinction Followed Long Bout of Sea Sickness 359

SCIENCESCOPE 359
Skewed Symmetries Net Honors for Particle Theorists 360
Theorist Revolutionized Study of What Gets Made Where 360
Three Scientists Bask in Prize’s Fluorescent Glow 361

NEWS FOCUS
Q&A: China’s Scientist Premier 362
Paradoxical Effects of Tightly Controlled Blood Sugar 365
Biomolecular Archaeology Symposium 368
Tracing the First Tame Horses by Their Milk 368
Old Bones Reveal Signs of Scurvy 368
Hope for the Rhone’s Missing Sturgeon 368

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

Downloaded from http://science.sciencemag.org/ on June 16, 2017
BIOCHEMISTRY
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

ASTRONOMY
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

LETTERS
Quantifying Coauthor Contributions C. H. Sekercioglu 371
Biofuels: Clarifying Assumptions V. Khosla
Response T. D. Searchinger and R. A. Houghton

CORRECTIONS AND CLARIFICATIONS
375

BOOKS ET AL.
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

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

PERSPECTIVES
It’s the Sequence, Stupid! H. A. Coller and L. Kruglyak 380
In Praise of Pores P. Colombo
Toward Pore-Free Ceramics G. L. Messing and A. J. Stevenson
Transforming Light V. M. Shalaev
A New Spin on the Doppler Effect R. D. McMichael and M. D. Stiles 386
RNA Computing in a Living Cell E. Shapiro and B. Gil 387

CELL BIOLOGY
Detection of GTP-Tubulin Conformation in Vivo Reveals a Role for GTP Remnants in Microtubule Rescues
A. Dimitrov, M. Quesnoit, S. Moutel, I. Cantaloube, C. Poüs, F. Perez
GTP-bound tubulin is found at microtubule ends in living cells and also within microtubules, where it may promote repolymerization and avert microtubule collapse.
10.1126/science.1165401

ASTRONOMY
Observation of Pulsed γ-Rays Above 25 GeV from the Crab Pulsar with MAGIC
The MAGIC Collaboration
The MAGIC telescope has detected higher-energy, pulsed gamma rays from the Crab pulsar and a threshold suggesting that they are emitted from the outer magnetosphere.
10.1126/science.1164718

BREVIA
GEOCHEMISTRY
The Miller Volcanic Spark Discharge Experiment
A. P. Johnson et al.
Reanalysis of archived samples of an experiment simulating production of organic molecules in volcanic gases by lightning shows that they contain many amino acids. >> Science Podcast

GENETICS
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.

PHYSICS
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

APPLIED PHYSICS
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.

CHEMISTRY
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.
REPORTS CONTINUED...

CHEMISTRY
Accurate Temperature Imaging Based on Intermolecular Coherences in Magnetic Resonance
G. Galiana, R. T. Branca, 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.

BIOCHEMISTRY
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 (dihydrolipoamide 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 TaqI 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

IMMUNOLOGY
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.

CONTENTS continued >>
Separate individual or institutional subscriptions to these products may be required for full-text access.
Science 322 (5900), 341-465.