

EDITORIAL

- 624 Ensuring Integrity in Science
Ralph J. Cicerone

NEWS OF THE WEEK

- 628 Science Spared From Domestic Spending Freeze—for Now
Obama Shakes Up Satellite Programs for Clearer Picture of Earth
>> *Science Podcast*
- 630 New Korean Science City Caught in Political Crossfire
- 631 Publications and Expats Warn of Russia's Dangerous Decline
- 631 From the *Science* Policy Blog
- 632 Big Battle Brewing Over Elephants at Upcoming CITES Meeting
- 633 'Toadness' a Key Feature for Global Spread of These Amphibians
>> *Report p. 679*
- 633 From *Science's* Online Daily News Site

NEWS FOCUS

- 634 Relief Among the Rubble
The Long Battle Against a Horrific Disease
- 638 From the Bottom Up
- 640 Greening Haiti, Tree by Tree

LETTERS

- 642 Predators Could Help Save Pollock
B. Wright
Religiosity Tied to Socioeconomic Status
G. S. Paul
Savannas Need Protection
C. E. R. Lehmann
Taking Our Lumps
Q. Wheeler
Response
J. Endersby

- 644 TECHNICAL COMMENT ABSTRACTS
- 644 CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.

- 645 The New Foundations of Evolution
J. Sapp, reviewed by W. P. Hanage
- 646 Atomic Obsession
J. Mueller, reviewed by D. Holloway

POLICY FORUM

- 647 Gene Doping and Sport
T. Friedmann et al.

PERSPECTIVES

- 649 Tinkering Inside the Organelle
F. Alcock et al.
- 650 Splitting Spin States on a Chip
G. Burkard
>> *Report p. 669*
- 652 Seeing Quantum Fractals
G. A. Fiete and A. de Lozanne
>> *Report p. 665*
- 653 An Ensemble View of Allostery
V. J. Hilser
>> *Report p. 685*
- 654 Iron and the Carbon Pump
W. G. Sunda
>> *Report p. 676*

REVIEW

- 656 Development of Monocytes, Macrophages, and Dendritic Cells
F. Geissmann et al.

BREVIA

- 662 100-GHz Transistors from Wafer-Scale Epitaxial Graphene
Y.-M. Lin et al.
The maximum switching frequency of these devices exceeds that of silicon transistors with similar gate-electrode dimensions.
>> *Science Podcast*

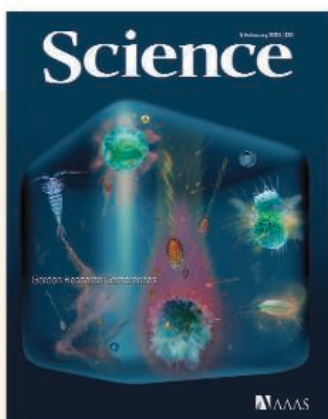
CONTENTS continued >>



page 640



page 647



COVER

A milliliter of seawater. Motile marine bacteria can take advantage of highly heterogeneous landscapes of dissolved organic carbon, resulting from zooplankton excretions (left), leakage by phytoplankton (top) and marine snow particles (bottom), and phytoplankton lysis (right). The Gordon Research Conference on Marine Microbes will be held 4 to 9 July 2010 at Tilton School, Tilton, NH. See page 708 for a preliminary conference schedule.

Image: Roman Stocker (*romans@mit.edu*), Justin Seymour, Glynn Gorick

DEPARTMENTS

- 621 This Week in *Science*
- 625 Editors' Choice
- 626 *Science* Staff
- 627 Random Samples
- 708 Gordon Research Conferences
- 734 New Products
- 735 *Science* Careers

REPORTS

- 663** Detection of Gamma-Ray Emission from the Vela Pulsar Wind Nebula with AGILE
A. Pellizzoni et al.

Pulsar wind nebulae could account for some of the yet unidentified galactic gamma-ray sources.

- 665** Visualizing Critical Correlations Near the Metal-Insulator Transition in $\text{Ga}_{1-x}\text{Mn}_x\text{As}$
A. Richardella et al.

Scanning tunneling microscopy reveals the import role of electron-electron interactions in a dilute magnetic semiconductor.
>> *Perspective p. 652*

- 669** A Coherent Beam Splitter for Electronic Spin States
J. R. Petta et al.

A series of electrical pulses is used to demonstrate quantum control of a double quantum dot system.
>> *Perspective p. 650*

- 672** Water Freezes Differently on Positively and Negatively Charged Surfaces of Pyroelectric Materials
D. Ehre et al.

Supercooled water on a surface can freeze upon heating in response to surface charge switching from negative to positive.

- 676** Effect of Ocean Acidification on Iron Availability to Marine Phytoplankton
D. Shi et al.

Ocean acidification caused by anthropogenic carbon dioxide is changing the chemistry and bioavailability of iron in seawater.
>> *Perspective p. 654*

- 679** Gradual Adaptation Toward a Range-Expansion Phenotype Initiated the Global Radiation of Toads
I. Van Bocklaer et al.

The range expansions and species radiations of toads required the evolution of an optimal dispersal phenotype.
>> *News story p. 633*

- 682** Flight Orientation Behaviors Promote Optimal Migration Trajectories in High-Flying Insects
J. W. Chapman et al.

Radar reveals that insects use high-altitude winds and correct for crosswind drift during long-range migrations.

- 685** Conformational Spread as a Mechanism for Cooperativity in the Bacterial Flagellar Switch
F. Bai et al.

The behavior of the bacterial flagellar switch is modeled by probabilistic conformational coupling of the protein.
>> *Perspective p. 653*

- 689** Cryo-EM Model of the Bullet-Shaped Vesicular Stomatitis Virus
P. Ge et al.

The structure of a negative-strand RNA virus suggests how bullet-shaped rhabdoviruses assemble.

- 693** Abundance of Ribosomal RNA Gene Copies Maintains Genome Integrity
S. Ide et al.

In eukaryotes, multiple copies of ribosomal DNA protect it from transcription-induced replication damage.

- 697** Evolutionary Dynamics of Complex Networks of HIV Drug-Resistant Strains: The Case of San Francisco
R. J. Smith? et al.

Modeling of data from the U.S. indicates the potential for an epidemic wave of antiretroviral-resistant HIV.

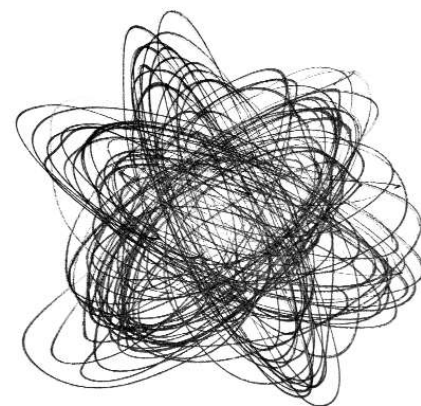
- 701** Optimal Localization by Pointing Off Axis
Y. Yovel et al.

Echolocating Egyptian fruit bats do not center their sonar clicks on a target, thereby maximizing localization of the target.
>> *Science Podcast*

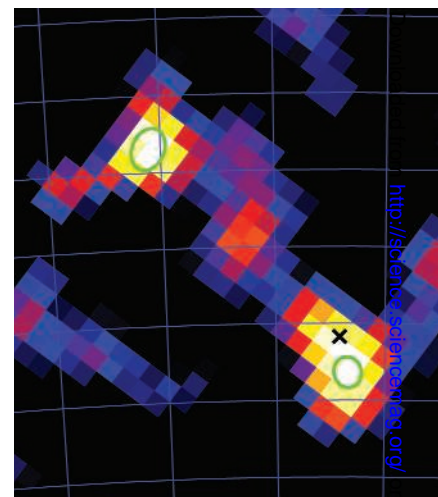
- 704** Axon Extension Occurs Independently of Centrosomal Microtubule Nucleation
M. Stiess et al.

Neuronal polarization and axon regeneration depend on decentralized microtubule assembly rather than a functional centrosome.

CONTENTS continued >>



page 646



page 663



page 701

SCIENCEONLINE

SCIENCEEXPRESS

www.scienceexpress.org

Reconstructing Past Seawater Mg/Ca and Sr/Ca from Mid-Ocean Ridge Flank Calcium Carbonate Veins

R. M. Coggon et al.

Calcium carbonate veins from the ocean crust can be used to reconstruct past ocean cation ratios.
10.1126/science.1182252

Regulation of Alternative Splicing by Histone Modifications

R. F. Luco et al.

Histone modifications regulate alternative splicing through physical cross talk with the splicing machinery.
10.1126/science.1184208

NMR Structure Determination for Larger Proteins Using Backbone-Only Data

S. Raman et al.

Protein structures can be determined by using the limited nuclear magnetic resonance information obtainable for larger proteins.
10.1126/science.1183649

Retromer Is Required for Apoptotic Cell Clearance by Phagocytic Receptor Recycling

D. Chen et al.

An intracellular membrane-sorting machinery participates in cellular corpse clearance.
10.1126/science.1184840

Plumage Color Patterns of an Extinct Dinosaur

Q. Li et al.

Comparison of melanosome shape and density between fossil feathers and modern ones reveals the appearance and color of a theropod.
10.1126/science.1186290

TECHNICALCOMMENTS

Comment on "Unexpected Epoxide Formation in the Gas-Phase Photooxidation of Isoprene"

M. Claeys

full text at www.sciencemag.org/cgi/content/full/327/5966/644-b

Response to Comment on "Unexpected Epoxide Formation in the Gas-Phase Photooxidation of Isoprene"

F. Paulot et al.

full text at www.sciencemag.org/cgi/content/full/327/5966/644-c

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Foster Care for Chimps

Researchers say adoptions in the wild show evidence of altruism.

The Ape That Never Grows Up

Could a slow-to-mature brain explain the bonobo's social nature?

How Carnations Conquered Europe

Rapid diversification of flower suggests continent may have been an evolutionary hot spot.

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

RESEARCH ARTICLE: Noncoding RNA Gas5 Is a Growth Arrest- and Starvation-Associated Repressor of the Glucocorticoid Receptor

T. Kino et al.

Gas5 is a noncoding RNA that acts as a decoy glucocorticoid response element to inhibit glucocorticoid-mediated transcription.

MEETING REPORT: BMPs—From Bone to Body Morphogenetic Proteins

D. Obradovic Wagner et al.

Discussion at a meeting in Berlin, Germany, showed that BMPs have essential functions in organs and tissues besides bone.

PODCAST

T. Kino and A. M. VanHook

A noncoding RNA competes with DNA for binding to the glucocorticoid receptor.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

SPECIAL MARRIED-WITH-CHILDREN ISSUE

A Husband and Wife Play Science on the Same Team

C. Wald

Michael Crickmore and Dragana Rogulja have similar research interests but keep their professional identities separate.

Making Science and Family Fit

E. Pain

A mother of three, Michal Sharon has managed to have both a family and a scientific career.

Taken for Granted: Where Two Issues Stand

B. L. Benderly

Lab safety slowly advances, while University of California postdoc contract negotiations stall.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

PERSPECTIVE: Engineered Proteins

Pull Double Duty

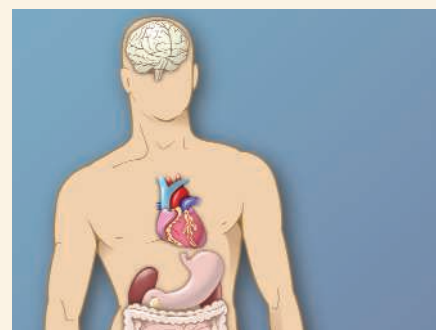
J. R. Cochran

Single proteins that hit two targets enhance therapeutic effects.

COMMENTARY: Bioethical and Clinical Dilemmas of Direct-to-Consumer Personal Genomic Testing—The Problem of Misattributed Equivalence

C. Eng and R. R. Sharp

What are the challenges associated with direct-to-consumer genomic tests compared with validated clinical genetic tests?



SCIENCE SIGNALING
Sites of BMP action.

RESEARCH ARTICLE: Identification of Therapeutic Targets for Quiescent, Chemotherapy-Resistant Human Leukemia Stem Cells

Y. Saito et al.

CD32, a molecule specifically found in human leukemia stem cells, is a promising target for therapy.

RESEARCH ARTICLE: Inducing CTLA-4-Dependent Immune Regulation by Selective CD28 Blockade Promotes Regulatory T Cells in Organ Transplantation

N. Poirier et al.

An improved method of immunosuppression enhances the survival of transplanted organs in nonhuman primates.

SCIENCEPODCAST

www.sciencemag.org/multimedia/podcast
Free Weekly Show

Download the 5 February *Science* Podcast to hear about high-frequency graphene transistors, bat echolocation strategies, the 2011 U.S. science budget, and more.

SCIENCEINSIDER

blogs.sciencemag.org/scienceinsider
Science Policy News and Analysis

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 © 2010 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): \$146 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$910; 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. **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.



ADVANCING SCIENCE. SERVING SOCIETY

Science

327 (5966)

Science **327** (5966), 621-734.

ARTICLE TOOLS

<http://science.sciencemag.org/content/327/5966>

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. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.