

## EDITORIAL

- 953 **Banning Nuclear Tests**  
*Pierce S. Corden*

## NEWS OF THE WEEK

- 958 **Synthetic Genome Brings New Life to Bacterium**  
>> *Science Express Research Article*  
*by D. G. Gibson et al.*
- 959 **Will Britain's Coalition Wield the Funding Ax?**
- 960 **From Science's Online Daily News Site**
- 960 **Former NIH Director Varmus to Head Cancer Institute**
- 960 **House Blocks Bill to Boost Research Spending**
- 961 **From the Science Policy Blog**
- 962 **Five Questions on the Spill**

## NEWS FOCUS

- 964 **Battle of the Titans**
- 969 **Animal Communication Helps Reveal Roots of Language**  
>> *Science Podcast*

## LETTERS

- 973 **Cretaceous Extinctions: Multiple Causes**  
*J. D. Archibald et al.*
- Cretaceous Extinctions: The Volcanic Hypothesis**  
*V. Courtillot and F. Fluteau*
- Cretaceous Extinctions: Evidence Overlooked**  
*G. Keller et al.*
- Response**  
*P. Schulte et al.*
- Honing the Test-and-Treat HIV Strategy**  
*T. D. Mastro and M. S. Cohen*
- 974 **CORRECTIONS AND CLARIFICATIONS**

## BOOKS ET AL.

- 977 **The Calculus of Selfishness**  
*K. Sigmund, reviewed by D. Krakauer*
- 978 **Identity Economics**  
*G. A. Akerlof and R. E. Kranton, reviewed by R. Sugden*

## POLICY FORUM

- 979 **The Smart Electricity Grid and Scientific Research**  
*J. Beyea*

## PERSPECTIVES

- 981 **Salmonella's Safety Catch**  
*R. J. Collier*  
>> *Report p. 1040*
- 982 **The Enigmatic Inner Core**  
*B. A. Buffett*  
>> *Reports pp. 1014 and 1018*
- 983 **Signaling Through Cooperation**  
*E. D. Levy et al.*  
>> *Report p. 1043*
- 985 **Following the Motions of Water Molecules in Aqueous Solutions**  
*J. L. Skinner*  
>> *Reports pp. 1003 and 1006*
- 986 **Weight Loss with Magnesium Alloys**  
*T. M. Pollock*
- 987 **Stochastic Emergence of Groupthink**  
*A. Prindle and J. Hasty*  
>> *Report p. 1021*

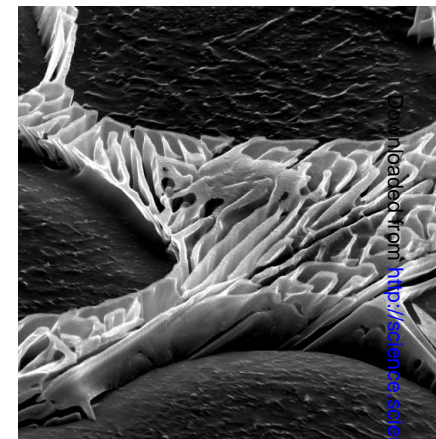
## REVIEW

- 989 **Primordial Gravitational Waves and Cosmology**  
*L. M. Krauss et al.*

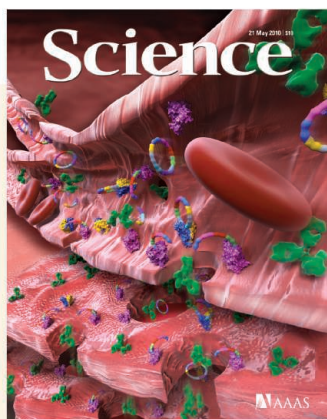
**CONTENTS continued >>**



page 969



page 986



## COVER

Tumor-penetrating transport of cancer drugs is activated by the peptide iRGD (multicolored ring), which binds to integrin receptors (blue and yellow) in tumor blood vessels, and is subsequently cleaved. The cleaved peptide then binds to neuropilin-1 receptors (purple), activating a transport system that carries coadministered drugs, such as antibodies (green), deeper into tumor tissue. See page 1031.

**Image:** *Peter Allen/University of California, Santa Barbara*

## DEPARTMENTS

- 949 **This Week in Science**
- 955 **Editors' Choice**
- 956 **Science Staff**
- 957 **Random Samples**
- 1047 **New Products**
- 1048 **Science Careers**

## BREVIA

- 993 **Adaptive Evolution of an sRNA That Controls *Myxococcus* Development**  
Y.-T. N. Yu et al.  
Mutation of a small noncoding RNA drives adaptive evolution in a social bacterium.

## RESEARCH ARTICLE

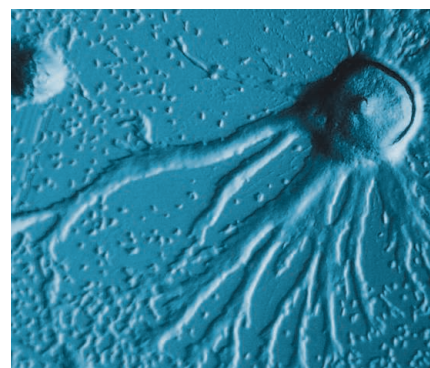
- 994 **A Catalog of Reference Genomes from the Human Microbiome**  
*The Human Microbiome Jumpstart Reference Strains Consortium*  
Standardized protocols and methods are being established for large-scale sequencing of the microorganisms living on humans.

## REPORTS

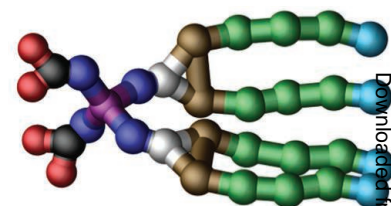
- 999 **Observation of Plasmarons in Quasi-Freestanding Doped Graphene**  
A. Bostwick et al.  
Doping of graphene introduces two new crossing points of the conduction and valence-electron bands.
- 1003 **Large Angular Jump Mechanism Observed for Hydrogen Bond Exchange in Aqueous Perchlorate Solution**  
M. Ji et al.  
Water molecules shift orientation between dissolved ions and the surrounding liquid by taking large, sudden steps.
- 1006 **Cooperativity in Ion Hydration**  
K. J. Tielrooij et al.  
When salts dissolve in water, the separated cations and anions can still collectively impact the liquid structure.  
>> *Perspective p. 985*
- 1009 **Self-Assembly of Janus Dendrimers into Uniform Dendrimersomes and Other Complex Architectures**  
V. Percec et al.  
Amphiphilic, spherically shaped polymers self-assemble into larger hollow complexes that could be used for drug delivery.
- 1014 **Lopsided Growth of Earth's Inner Core**  
M. Monnereau et al.  
The asymmetry of the inner core is explained by iron crystallization on one side and melting on the other.
- 1018 **Regional Variation of Inner Core Anisotropy from Seismic Normal Mode Observations**  
A. Deuss et al.  
Seismic data from the inner core reveal that anisotropic regions overlap with gravitational anomalies.  
>> *Perspective p. 982*

- 1021 **The Onset of Collective Behavior in Social Amoebae**  
T. Gregor et al.  
Stochastic pulsing of individual cells plays a critical role in initiating cyclic adenosine morophosphate pulses.  
>> *Perspective p. 987*
- 1025 **Structural Insights into the Assembly and Function of the SAGA Deubiquitinating Module**  
N. L. Samara et al.  
Structures give insight into how a regulator of eukaryotic gene expression achieves one of its chromatin-modifying functions.
- 1029 **Network Diversity and Economic Development**  
N. Eagle et al.  
Social diversity is associated with economic development.
- 1031 **Coadministration of a Tumor-Penetrating Peptide Enhances the Efficacy of Cancer Drugs**  
K. N. Sugahara et al.  
Anticancer drugs are more effective in mice when they are injected with a peptide that helps the drugs penetrate the tumor.
- 1036 **Five-Vertebrate ChIP-seq Reveals the Evolutionary Dynamics of Transcription Factor Binding**  
D. Schmidt et al.  
Binding of two liver-specific transcription factors in several vertebrate species reveals complex regulatory evolution.
- 1040 **pH Sensing by Intracellular *Salmonella* Induces Effector Translocation**  
X.-J. Yu et al.  
Intravacuolar *Salmonella* sense host cytosolic pH, resulting in degradation of a regulatory complex and effector translocation.  
>> *Perspective p. 981*
- 1043 **A Global Protein Kinase and Phosphatase Interaction Network in Yeast**  
A. Breitkreutz et al.  
Phosphorylation reactions in budding yeast reveal the regulatory architecture of a fundamental cellular control system.  
>> *Perspective p. 983*

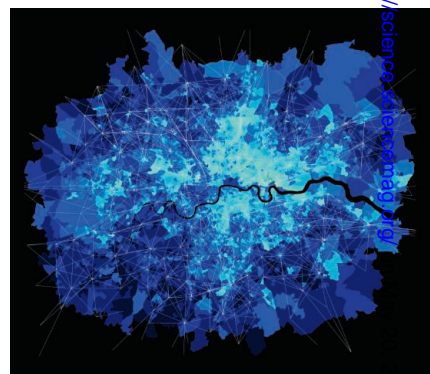
CONTENTS continued >>



pages 987 & 1021



page 1009



page 1029

## SCIENCEONLINE

## SCIENCEEXPRESS

[www.scienceexpress.org](http://www.scienceexpress.org)

### Creation of a Bacterial Cell Controlled by a Chemically Synthesized Genome

*D. G. Gibson et al.*

A synthetic *Mycoplasma mycoides* genome transplanted into *M. capricolum* was able to control the host cell.

10.1126/science.1190719

>> *News story p. 958; Science Podcast*

### ATP-Binding Cassette Transporters and HDL Suppress Hematopoietic Stem Cell Proliferation

*L. Yvan-Charvet et al.*

Pathways that reduce cholesterol in atherosclerosis also suppress increased immune cell numbers associated with the disease.

10.1126/science.1189731

### Covering a Broad Dynamic Range: Information Processing at the Erythropoietin Receptor

*V. Becker et al.*

Modeling and experiments help to explain responsiveness of red blood cell precursors to very large changes in a proliferative signal.

10.1126/science.1184913

### Identification of Germline Stem Cells in the Ovary of the Teleost Medaka

*S. Nakamura et al.*

Ongoing follicle production is maintained by stem cells in an adult fish ovary.

10.1126/science.1185473

### Measurement of the Instantaneous Velocity of a Brownian Particle

*T. Li et al.*

An optically trapped silica bead in solution is used to probe assumptions underlying statistical theories of Brownian motion.

10.1126/science.1189403

>> *Science Podcast*

### Closing Loopholes: Getting Illegal Fishing Under Control

*S. Flothmann et al.*

10.1126/science.1190245

## SCIENCE NOW

[www.sciencenow.org](http://www.sciencenow.org)

Highlights From Our Daily News Coverage

### Golden Years Truly Are Golden

Massive phone survey reveals that people are happier after age 50.

### The Scent That Makes Mice Run Scared

Mice are hard-wired to detect urinary proteins secreted by a wide variety of predators.

### Vision Cells Help Set the Body's Clock

Research could lead to new therapies for depression and insomnia.

## SCIENCE SIGNALING

[www.sciencesignaling.org](http://www.sciencesignaling.org)

The Signal Transduction Knowledge Environment

### RESEARCH ARTICLE: TREM2- and DAP12-Dependent Activation of PI3K Requires DAP10 and Is Inhibited by SHIP1

*Q. Peng et al.*

The inositol phosphatase SHIP1 binds to a receptor-adaptor complex on osteoclasts to prevent recruitment of PI3K and inhibit receptor signaling.

### RESEARCH ARTICLE: c-mip Impairs Podocyte Proximal Signaling and Induces Heavy Proteinuria

*S. Zhang et al.*

Overexpression of the protein c-mip in mice produces phenotypes similar to various idiopathic kidney disorders.

### PERSPECTIVE: Gyrate—CCM3 Dances with a Different Angiogenic Partner

*L. A. Dyer et al.*

CCM3 is a key regulator of a major signaling pathway involved in vascular development.

## SCIENCE CAREERS

[www.sciencereers.org/career\\_magazine](http://www.sciencereers.org/career_magazine)

Free Career Resources for Scientists

### Hard Work and Drive Propels a Scientist From China to the United States

*R. Meja*

A passion for learning led virologist Fenyong Liu into top American labs.

### Tooling Up: The Medical Writing and Corporate Intelligence Career Tracks

*D. Jensen*

Jim Gardner follows a career as a medical writer with another as a corporate sleuth.

### GrantsNet Funding News

*D. Adams*

Learn about the latest research and training grants for students, postdocs, and faculty.

## SCIENCE TRANSLATIONAL MEDICINE

[www.sciencetranslationalmedicine.org](http://www.sciencetranslationalmedicine.org)

Integrating Medicine and Science

### EDITORIAL: On Board with the Cures Acceleration Network

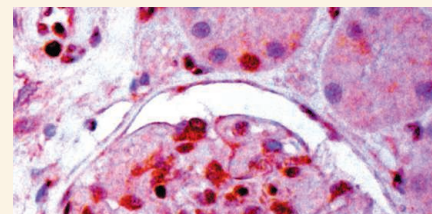
*E. G. Nabel*

The new U.S. health care legislation includes funding mechanisms to accelerate the development of "high-need cures."

### REVIEW: Deciphering Genetic Disease in the Genomic Era—The Model of GnRH Deficiency

*G. P. Sykiotis et al.*

Elucidation of the genetic causes of human disease requires unbiased, patient-oriented investigations.



## SCIENCE SIGNALING

New target for kidney disease.

### RESEARCH ARTICLE: Androgen Receptor Promotes Hepatitis B Virus-Induced Hepatocarcinogenesis Through Modulation of Hepatitis B Virus RNA Transcription

*M.-H. Wu et al.*

Targeting the androgen receptor may prevent hepatitis B virus-induced liver cancer.

### RESEARCH ARTICLE: Tryptophan Catabolism by Indoleamine 2,3-Dioxygenase 1 Alters the Balance of T<sub>H</sub>17 to Regulatory T Cells in HIV Disease

*D. Favre et al.*

### PERSPECTIVE: Insights into Therapy—Tryptophan Oxidation and HIV Infection

*M. F. Murray*

New findings link tryptophan breakdown to immune cell imbalance and chronic inflammation associated with HIV/AIDS.

## SCIENCE PODCAST

[www.sciencemag.org/multimedia/podcast](http://www.sciencemag.org/multimedia/podcast)

Free Weekly Show

Download the 21 May *Science* Podcast to hear about bacterial cells controlled by a synthetic genome, instantaneous Brownian velocity, the evolution of language, and more.

## SCIENCE INSIDER

[news.sciencemag.org/scienceinsider](http://news.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

**328 (5981)**

*Science* **328** (5981), 949-1047.

**ARTICLE TOOLS**

<http://science.sciencemag.org/content/328/5981>

**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.