

EDITORIAL

- 380 Teaching Real Science
Bruce Alberts
>> Essay p. 418

NEWS OF THE WEEK

- 384 A roundup of the week's top stories

NEWS & ANALYSIS

- 387 Flu Controversy Spurs Research Moratorium
Ron Fouchier: In the Eye of the Storm
>> Letter by R. A. M. Fouchier et al., p. 400
- 390 An Explosive Return of the 'Great Pox'
- 391 Worldwide Telescope Aims to Look Into Milky Way Galaxy's Black Heart
- 392 DOE Funding Crunch Threatens Future of Only U.S. Collider Still Running

NEWS FOCUS

- 394 What It'll Take to Go Exascale
>> Science Podcast
- 397 Ferreting Out the Hidden Cracks in the Heart of a Continent
- 398 Modernizing an Academic Monastery

LETTERS

- 400 Pause on Avian Flu Transmission Research
R. A. M. Fouchier et al.
>> News story p. 387
- Recognizing Existing Models
W. J. Rosenberg
- Portugal's Age of Enlightenment
N. C. Santos
- 401 CORRECTIONS AND CLARIFICATIONS
- 401 TECHNICAL COMMENT ABSTRACTS

BOOKS ET AL.

- 403 The Statues That Walked
T. Hunt and C. Lipo, reviewed by R. Torrence
- 404 Understanding Autism
C. Silverman, reviewed by B. A. Malow

POLICY FORUM

- 405 Mixed Messages on Prices and Food Security
J. Swinnen and P. Squicciarini

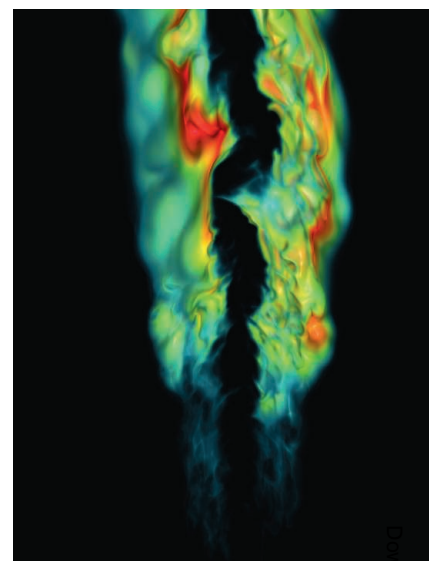
PERSPECTIVES

- 408 Antigen Feast or Famine
M. L. Dustin and M. Meyer-Hermann
>> Report p. 475
- 409 A Clearer View from Fuzzy Images
M. E. Herberstein and D. J. Kemp
>> Report p. 469
- 410 The Role of Coevolution
J. N. Thompson
>> Research Article p. 428
- 411 The Risk of Prion Zoonoses
J. Collinge
>> Report p. 472
- 413 Creating New Types of Carbon-Based Membranes
D. R. Paul
>> Reports pp. 442 and 444
- 415 Another Remembered Present
K. Meyer
- 416 The Inner Workings of a Dynamic Duo
H. Poulsen and P. Nissen
>> Research Articles pp. 432 and 436

SCIENCE PRIZE ESSAY

- 418 An Inquiry-Based Curriculum for Nonmajors
D. P. Jackson et al.
>> Editorial p. 380

CONTENTS continued >>

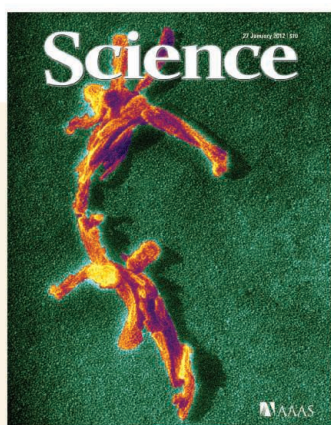


page 394



pages 409 & 469

Downloaded from <http://science.sciencemag.org/> on October 1, 2020



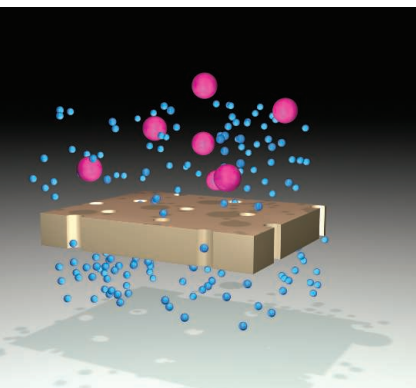
COVER

False-colored transmission electron micrograph of a prion [average dimensions: ~150 nanometers (nm) long, 10 nm thick], the infectious protein responsible for deadly brain diseases in animals and humans. Although cross-species prion transmission may show no detectable sign of disease in the brain, lymphoid tissue is much more susceptible to infection. This discovery may be relevant when assessing the public health risks of exposure to animal prions and silent carriers of prion disease. See page 472.

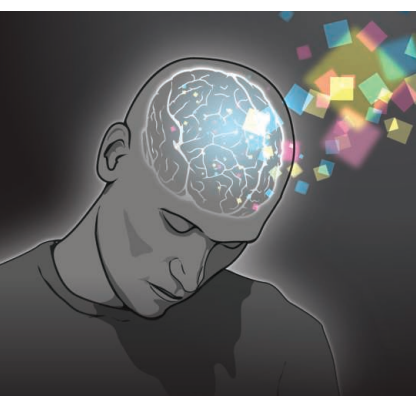
Image: Eye of Science/Photo Researchers, Inc.

DEPARTMENTS

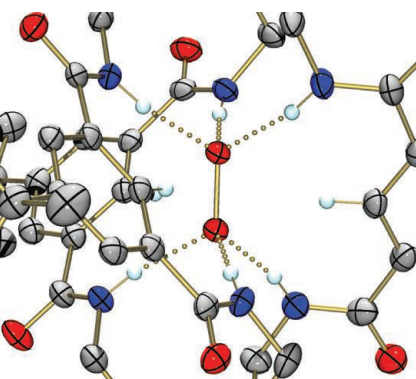
- 377 This Week in *Science*
381 Editors' Choice
383 *Science* Staff
420 AAAS News & Notes
481 New Products
482 *Science* Careers



pages 413, 442, & 444



page 415



page 450

REVIEW

- 422 The Centrosome in Cells and Organisms
M. Bornens

BREVIA

- 427 Broadband Light Bending with Plasmonic Nanoantennas
X. Ni et al.
A plasmonic antenna array is used to control the propagation of a light beam across an interface.

RESEARCH ARTICLES

- 428 Repeatability and Contingency in the Evolution of a Key Innovation in Phage Lambda
J. R. Meyer et al.
A receptor shift required four mutations that accumulated by natural selection and with the host's coevolution.
>> *Perspective p. 410; Science Podcast*
- 432 Crystal Structure of the Human Two-Pore Domain Potassium Channel K2P1
A. N. Miller and S. B. Long
- 436 Crystal Structure of the Human K2P TRAAK, a Lipid- and Mechano-Sensitive K⁺ Ion Channel
S. G. Brohawn et al.
Structural features provide a basis for understanding gating and ion conduction of these channels.
>> *Perspective p. 416*
- 450 Reversible Reduction of Oxygen to Peroxide Facilitated by Molecular Recognition
N. Lopez et al.
The highly reactive peroxide dianion (O₂²⁻) can be captured and stabilized by hydrogen bonding in a molecular box.
- 453 A Long-Lived Lunar Core Dynamo
E. K. Shea et al.
Analysis of a lunar basalt sample suggests that a lunar core dynamo existed between 4.2 and 3.7 billion years ago.
- 457 The Molecular Diversity of Adaptive Convergence
O. Tenaillon et al.
Replicate *Escherichia coli* lines show multiple convergent adaptations via different mutations in response to high temperature.
- 461 Centrosome Loss in the Evolution of Planarians
J. Azimzadeh et al.
Analysis of centriole assembly in planaria gives insight into the evolution and function of the centrosome in animal cells.
- 464 Global Correlations in Tropical Tree Species Richness and Abundance Reject Neutrality
R. E. Ricklefs and S. S. Renner
Comparison of species numbers between forests shows that patterns of diversity are dominated by deterministic processes.
- 467 Heavy Livestock Grazing Promotes Locust Outbreaks by Lowering Plant Nitrogen Content
A. J. Cease et al.
High-protein plants inhibit locust swarming, which explains why grazed systems are more prone to outbreaks.
>> *Science Podcast*
- 469 Depth Perception from Image Defocus in a Jumping Spider
T. Nagata et al.
To jump exact distances to capture prey, spiders, like computers, use defocus as a major cue for depth perception.
>> *Perspective p. 409*
- 472 Facilitated Cross-Species Transmission of Prions in Extraneural Tissue
V. Béringue et al.
Lymphoid tissue is more permissive than the brain to foreign prions.
>> *Perspective p. 411*
- 475 Asymmetric Segregation of Polarized Antigen on B Cell Division Shapes Presentation Capacity
O. Thauinat et al.
Antigen distribution across activated B cells influences B-T lymphocyte interactions.
>> *Perspective p. 408*

REPORTS

- 442 Unimpeded Permeation of Water Through Helium-Leak-Tight Graphene-Based Membranes
R. R. Nair et al.
Graphite oxide membranes are impermeable to many liquids, vapors, and gases, including He, but allow evaporation of water.
- 444 Ultrafast Viscous Permeation of Organic Solvents Through Diamond-Like Carbon Nanosheets
S. Karan et al.
Membranes made from diamond-like carbon are used to rapidly separate organic compounds.
>> *Perspective p. 413*
- 447 An All-Silicon Passive Optical Diode
L. Fan et al.
A silicon-based device is developed that allows the asymmetric propagation of light.

SCIENCEONLINE

SCIENCEEXPRESS

www.sciencexpress.org

Lithium Isotope History of Cenozoic Seawater: Changes in Silicate Weathering and Reverse Weathering

S. Misra and P. N. Froelich

Historical changes in the lithium isotope ratio in seawater imply episodes of tectonic uplift and carbon dioxide drawdown.

10.1126/science.1214697

Mountains, Weathering, and Climate

A. Paytan

10.1126/science.1218342

Epithelial Nitration by a Peroxidase/NOX5 System Mediates Mosquito Antiplasmodial Immunity

G. de Almeida Oliveira et al.

Expression of nitric oxide synthase followed by peroxidase activity makes *Plasmodium* visible to the insect's complement system.

10.1126/science.1209678

Unique Processing During a Period of High Excitation/Inhibition Balance in Adult-Born Neurons

A. Marin-Burgin et al.

A specific set of functional properties can be attributed to immature granule cells developing in the hippocampus.

10.1126/science.1214956

Evolutionarily Assembled cis-Regulatory Module at a Human Ciliopathy Locus

J. H. Lee et al.

Mutation in either of a pair of neighboring, coordinately expressed genes causes indistinguishable human disease.

10.1126/science.1213506

Unraveling the Spin Polarization of the $\nu = 5/2$ Fractional Quantum Hall State

L. Tiemann et al.

Nuclear magnetic resonance shows that an exotic state of matter may have the properties necessary for error-free quantum computing.

10.1126/science.1216697

TECHNICALCOMMENTS

Comment on "Dynamics of Dpp Signaling and Proliferation Control"

G. Schwank et al.

Full text at www.sciencemag.org/cgi/content/ful/335/6067/401-b

Response to Comment on "Dynamics of Dpp Signaling and Proliferation Control"

O. Wartlick et al.

Full text at www.sciencemag.org/cgi/content/ful/335/6067/401-c

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Embryonic Stem Cells Appear Safe, May Help Eye Disease

The first published results for a clinical trial using stem cells give this field a boost.

<http://scim.ag/Eye-Disease>

Mapping the Psychedelic Brain

The active ingredient in magic mushrooms disrupts communication between brain regions.

<http://scim.ag/Psychedelic-Brain>

Stem Cells Build a Better Rat Penis

A new approach could help men with injuries or deformities.

<http://scim.ag/Stem-Cells>

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

24 January issue: <http://scim.ag/ss012412>

RESEARCH ARTICLE: A Phosphorylated Pseudokinase Complex Controls Cell Wall Synthesis in Mycobacteria

C. L. Gee et al.

PERSPECTIVE: A Pseudokinase Debut at the Mycobacterial Cell Wall

D. F. Warner and V. Mizrahi

A serine-threonine kinase targets a pseudokinase to control the synthesis of the cell wall of the bacterium that causes tuberculosis.

RESEARCH ARTICLE: Extracellular Ca^{2+} Acts as a Mediator of Communication from Neurons to Glia

A. Torres et al.

PERSPECTIVE: Depletion of Extracellular Ca^{2+} Prompts Astroglia to Moderate Synaptic Network Activity

D. A. Rusakov

Local decreases in extracellular calcium trigger signaling events in astrocytes that activate inhibitory neurotransmission.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

25 January issue: <http://scim.ag/stm012512>

COMMENTARY: Triggers for Research Ethics Consultation

M. Havard et al.

Research ethics consultation services can help scientists to address ethical and societal issues that go beyond the purview of existing regulatory frameworks.

COMMENTARY: A Virtual National Laboratory for Reengineering Clinical Translational Science

D. M. Dilts et al.

The CTSA Consortium has developed a national testbed that can be used for evaluating approaches aimed at reducing wasted efforts and speeding clinical trial completion.

RESEARCH ARTICLE: Molecular Diagnosis of Infantile Mitochondrial Disease with Targeted Next-Generation Sequencing

S. E. Calvo et al.

Applying next-generation sequencing to 42 infants with mitochondrial disease highlights both the potential and the challenge of using this technology in clinical diagnosis.

RESEARCH ARTICLE: Surgical Stress Resistance Induced by Single Amino Acid Deprivation Requires *Gcn2* in Mice

W. Peng et al.

A protein-free diet or one missing certain amino acids can protect against kidney and liver damage due to ischemia in mice.

RESEARCH ARTICLE: Teplizumab Induces Human Gut-Tropic Regulatory Cells in Humanized Mice and Patients

F. Waldron-Lynch et al.

Humanized mice can be successfully used as a preclinical testing platform to identify the mechanism of action of immunotherapies in humans.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

Your Voice: Your Passport to Authority

S. Louët

An authoritative voice can be a definite asset in a scientific career.

<http://scim.ag/VoiceCoach>

HHMI's International Early-Career Scientists

E. Pain

Three awardees discuss how HHMI support will help them pursue their careers in China, Spain, and Portugal.

http://scim.ag/HHMI_International

Experimental Error: The Top 10 Worst Things About Working in a Lab

A. Ruben

Lab work left you feeling dissatisfied? Our Experimental Error columnist feels your pain.

http://scim.ag/EE_WorstThings

SCIENCEPODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show

On the 27 January *Science* Podcast: repeatability in natural selection, livestock grazing and locust outbreaks, new frontiers in supercomputing, and more.

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 © 2012 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): \$149 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$990; 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 \$30.00 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

335 (6067)

Science **335** (6067), 377-481.

ARTICLE TOOLS

<http://science.sciencemag.org/content/335/6067>

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. The title *Science* is a registered trademark of AAAS.

Copyright © 2012 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.