

## EDITORIAL

- 427 An Education That Inspires  
*Bruce Alberts*

## NEWS OF THE WEEK

- 432 After Red Mud Flood, Scientists Try to Halt Wave of Fear and Rumors
- 433 First Goldilocks Exoplanet May Not Exist
- 434 How Wet the Moon? Just Damp Enough to Be Interesting  
>> *Research Article p. 463; Reports pp. 468–486*
- 435 Rinderpest, Deadly for Cattle, Joins Smallpox as a Vanquished Disease
- 436 1.3 Billion Divided by 6.5 Million, and Watch That Floating Decimal
- 437 From *Science's* Online Daily News Site
- 438 Iraq Banks on Peer Review to Rebuild Its Research Base
- 439 Reanalysis of French Cave Could Deal Setback to Neandertal Smarts
- 439 From the *Science* Policy Blog

## NEWS FOCUS

- 440 Immune Therapy Steps Up the Attack  
>> *Science Podcast*
- 444 Radio Astronomers Take Arms Against a Sea of Signals

## LETTERS

- 446 Who Pays the Price for Shared Social Responsibility?  
*D. A. Cleveland*  
Response  
*A. Gneezy et al.*
- Nuclear Waste: Thorium's Potential  
*A. Cannara*
- Nuclear Waste: Progress with Public Engagement  
*L. Hamilton and B. Scowcroft*  
Response  
*E. A. Rosa et al.*

- 448 CORRECTIONS AND CLARIFICATIONS

## BOOKS ET AL.

- 450 Never Pure  
*S. Shapin, reviewed by R. E. Kohler*
- 451 WeltWissen [World Knowledge]  
*J. Hennig, curator, reviewed by M. D. Laubichler*

## POLICY FORUM

- 453 Politics and Parthenotes  
*C. Tingen et al.*

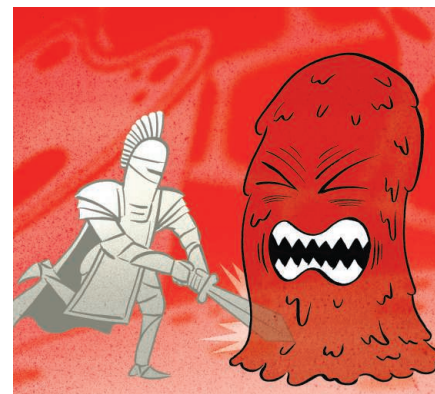
## PERSPECTIVES

- 454 Flipping the Light Switch  
*N. Vogt and C. Desplan*  
>> *Report p. 499*
- 455 Creating Ligands with Multiple Personalities  
*R. H. Crabtree*
- 456 The Flu's Proton Escort  
*G. Fiorin et al.*  
>> *Reports pp. 505 and 509*
- 458 Chaos in the Gulf  
*J.-L. Thiffeault*  
>> *Report p. 486*
- 459 The Long-Term Benefits of Self-Rejection  
*S. I. Wright and S. C. H. Barrett*  
>> *Report p. 493*
- 460 Environment and Disease Risks  
*S. M. Rappaport and M. T. Smith*  
>> *Science Podcast*

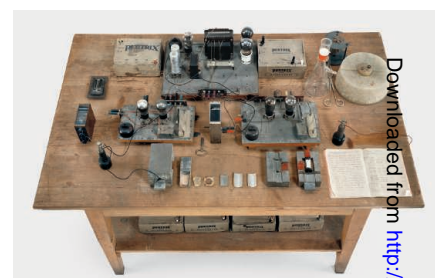
## BREVIA

- 462 Neutrino Spectroscopy Can Probe the Dark Matter Content in the Sun  
*I. Lopes and J. Silk*  
Dark matter in the center of the Sun would affect its internal structure and lead to a distinctive neutrino emission pattern.

**CONTENTS** continued >>

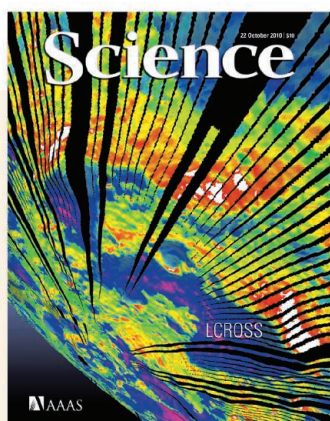


page 440



page 451

Downloaded from <http://science.sciencemag.org/> on May 26, 2019



## COVER

Surface temperature map of the south polar region of the Moon acquired by the Lunar Reconnaissance Orbiter Diviner Lunar Radiometer Experiment. Blue and violet areas are intensely cold impact craters. The Lunar Crater Observation and Sensing Satellite (LCROSS) spacecraft struck one of these craters (near the center of the frame), revealing the presence of water ice and other frozen volatiles. See the six research papers beginning on page 463.

*Image: David A. Paige/UCLA/JPL/GSFC/NASA*

## DEPARTMENTS

- 424 This Week in *Science*
- 428 Editors' Choice
- 430 *Science* Staff
- 431 Random Samples
- 526 New Products
- 527 *Science* Careers

## RESEARCH ARTICLE

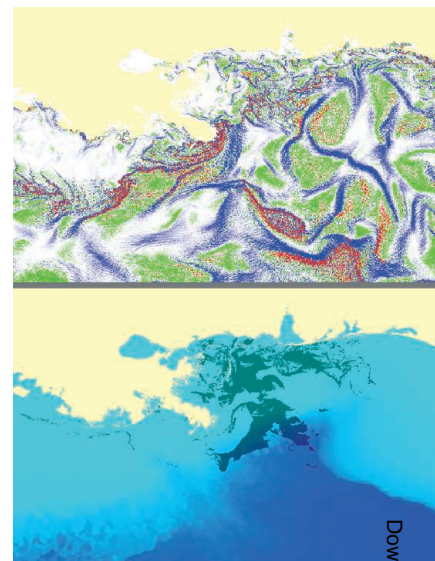
- 463 **Detection of Water in the LCROSS Ejecta Plume**  
A. Colaprete et al.  
A controlled spacecraft impact into a crater in the lunar south pole plunged through the lunar soil, revealing water and other volatiles.  
>> *News story p. 434; Reports pp. 468–486; Science Podcast*

## REPORTS

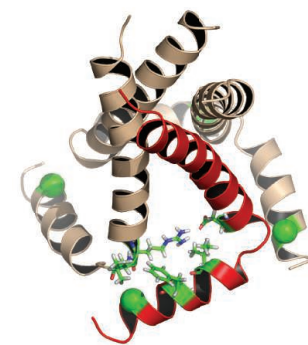
- 468 **The LCROSS Cratering Experiment**  
P. H. Schultz et al.
- 472 **LRO-LAMP Observations of the LCROSS Impact Plume**  
G. R. Gladstone et al.
- 477 **Diviner Lunar Radiometer Observations of the LCROSS Impact**  
P. O. Hayne et al.
- 479 **Diviner Lunar Radiometer Observations of Cold Traps in the Moon's South Polar Region**  
D. A. Paige et al.
- 483 **Hydrogen Mapping of the Lunar South Pole Using the LRO Neutron Detector Experiment LEND**  
I. G. Mitrofanov et al.  
A controlled spacecraft impact into a crater in the lunar south pole plunged through the lunar soil, revealing water and other volatiles.  
>> *News story p. 434; Research Article p. 463*
- 486 **A New Mixing Diagnostic and Gulf Oil Spill Movement**  
I. Mezić et al.  
An ocean model can account for the trajectory and fragmentation of the recent Gulf of Mexico oil spill.  
>> *Perspective p. 458*
- 489 **Oscillatory Mass Transport in Vapor-Liquid-Solid Growth of Sapphire Nanowires**  
S. H. Oh et al.  
High-resolution transmission electron microscopy is used to identify oscillatory growth of a sapphire nanowire.
- 493 **Species Selection Maintains Self-Incompatibility**  
E. E. Goldberg et al.  
Self-incompatibility in a family of plants is associated with appreciably higher rates of speciation.  
>> *Perspective p. 459*
- 496 **Impeding *Xist* Expression from the Active X Chromosome Improves Mouse Somatic Cell Nuclear Transfer**  
K. Inoue et al.  
Efficiency of mouse nuclear transfer was improved by correcting aberrant gene expression on the active X chromosome.

- 499 **Two Pairs of Neurons in the Central Brain Control *Drosophila* Innate Light Preference**  
Z. Gong et al.  
A neural circuit connects perceptual inputs to behavioral outputs.  
>> *Perspective p. 454*
- 502 **Fast Vesicle Fusion in Living Cells Requires at Least Three SNARE Complexes**  
R. Mohrmann et al.  
Membrane fusion proteins cooperate to promote rapid secretory vesicle exocytosis from neuroendocrine cells.
- 505 **Mechanisms of Proton Conduction and Gating in Influenza M2 Proton Channels from Solid-State NMR**  
F. Hu et al.  
Histidine side-chain dynamics regulate proton conduction in an influenza proton channel.
- 509 **Insight into the Mechanism of the Influenza A Proton Channel from a Structure in a Lipid Bilayer**  
M. Sharma et al.  
A tetrameric cluster of histidine and tryptophan residues, through its unique chemistry, shepherds protons through the M2 channel.  
>> *Perspective p. 456*
- 512 **Widespread Divergence Between Incipient *Anopheles gambiae* Species Revealed by Whole Genome Sequences**  
M. K. N. Lawniczak et al.  
Gene flow among African malaria vectors is more restricted than previously thought.
- 514 **SNP Genotyping Defines Complex Gene-Flow Boundaries Among African Malaria Vector Mosquitoes**  
D. E. Neafsey et al.  
Populations of African malaria vectors show signs of selective sweeps and ongoing speciation in their genomes.
- 517 **ATM Activation by Oxidative Stress**  
Z. Guo et al.  
The protein kinase ATM is a sensor for reactive oxygen species.
- 521 **The Ligase PIAS1 Restricts Natural Regulatory T Cell Differentiation by Epigenetic Repression**  
B. Liu et al.  
A ligase regulates repression of the *Foxp3* promoter to restrict differentiation of natural regulatory T cells.

CONTENTS continued &gt;&gt;



pages 458 &amp; 486



pages 456, 505, &amp; 509

## SCIENCEONLINE

## SCIENCEEXPRESS

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

**Fate Mapping Analysis Reveals That Adult Microglia Derive from Primitive Macrophages**  
*F. Ginhoux et al.*

The developmental origins of adult microglia are revealed.

10.1126/science.1194637

**Peripherally Applied A $\beta$ -Containing Inoculates Induce Cerebral  $\beta$ -Amyloidosis**

*Y. S. Eisele et al.*

Amyloid-containing brain extracts can "infect" susceptible Alzheimer's disease model animals.

10.1126/science.1194516

**Kinetic Scaffolding Mediated by a Phospholipase C- $\beta$  and G $_q$  Signaling Complex**

*G. L. Waldo et al.*

A crystal structure shows how the two components of a central signaling complex regulate each other.

10.1126/science.1193438

**Efficient Atmospheric Cleansing of Oxidized Organic Trace Gases by Vegetation**

*T. Karl et al.*

Deciduous trees enzymatically remove oxygenated volatile organic compounds from the atmosphere.

10.1126/science.1192534

**Glacial Silicic Acid Concentrations in the Southern Ocean**

*M. J. Ellwood et al.*

Silicon isotope distributions in sponges contain the signature of ocean nutrient distributions during the last glacial period.

10.1126/science.1194614

## SCIENCENOW

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

Highlights From Our Daily News Coverage

**Caribbean Coral Die-Off Could Be Worst Ever**  
Warm waters are bleaching reefs throughout the islands.

**Politicians, Watch Your Grammar**  
Sentence phrasing influences whether voters feel a candidate is electable.

**The Cavemen's Complex Kitchen**  
Our ancestors ground flour as early as 30,000 years ago.

## SCIENCE SIGNALING

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

The Signal Transduction Knowledge Environment

**RESEARCH ARTICLE: Single-Cell Analysis Reveals That Insulation Maintains Signaling Specificity Between Two Yeast MAPK Pathways with Common Components**

*J. C. Patterson et al.*

Yeast cells can respond simultaneously to pheromone and hyperosmotic stress.

**PERSPECTIVE: Nuclear Emancipation—A Platelet Tour de Force**

*S. L. Spinelli et al.*

Transcription factors find new functions in these anucleated cells.

**JOURNAL CLUB: Role of Syntaxin 4 in Activity-Dependent Exocytosis and Synaptic Plasticity in Hippocampal Neurons**

*P. Mohanasundaram and M. M. Shanmugam*

Exocytosis at syntaxin-4-enriched membrane domains is important for long-term potentiation.

**NETWATCH: Albert Lasker Basic Medical Research Award 2010 Winners**

The researchers who discovered leptin are recognized for their achievement; in Awards and Announcements.

**NETWATCH: Lasker-DeBaKey Clinical Medical Research Award 2010 Winner**

The scientist who discovered VEGF and a therapy targeting VEGF is recognized for his contribution to clinical science; in Awards and Announcements.

## SCIENCE CAREERS

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

Free Career Resources for Scientists

**Experimental Error: Electile Dysfunction**

*A. Ruben*

Over tea, our columnist considers what the congressional elections might mean for the prospects of science and scientists.

**Making a Difference in the Classroom and on the Stage**

*E. Ben-Ari*

Molecular biologist Jeff Polish loves an audience, whether they are sitting at desks or on chairs.

## SCIENCE TRANSLATIONAL MEDICINE

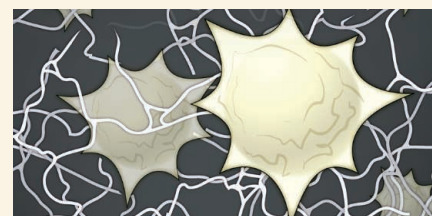
[www.sciencetranslationalmedicine.org](http://www.sciencetranslationalmedicine.org)

Integrating Medicine and Science

**PERSPECTIVE: Metabolic Syndromes and Malignant Transformation—Where the Twain Shall Meet**

*N. Bhagwat and R. L. Levine*

Some patients with a rare metabolic disorder have a germline mutation resembling somatic mutations in certain cancers.



SCIENCE SIGNALING  
Controlling platelet activation.

**RESEARCH ARTICLE: Reversal of Depressed Behaviors in Mice by p11 Gene Therapy in the Nucleus Accumbens**

*B. Alexander et al.*

**PERSPECTIVE: p11 and Gene Therapy for Severe Psychiatric Disorders—A Practical Goal?**  
*G. Chen et al.*

Decreased expression of the p11 protein in the brain's nucleus accumbens correlates with depression.

**RESEARCH ARTICLE: An Integrated Genomic and Epigenomic Approach Predicts Therapeutic Response to Zebularine in Human Liver Cancer**

*J. B. Andersen et al.*

An epigenetic signature predicts whether liver cancer patients will respond to an epigenome-targeting drug.

## SCIENCE PODCAST

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

Download the 22 October Science Podcast to hear about detection of water on the Moon, environmental exposure and disease risk, advances in cancer immunotherapy, 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

**330 (6003)**

*Science* **330** (6003), 424-526 .

ARTICLE TOOLS

<http://science.sciencemag.org/content/330/6003>

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.