



## COVER

False-color image of a section of the Semarkona meteorite. The round objects are chondrules; the large one near the bottom center is about 2 millimeters across. Magnesium-rich minerals (olivine and pyroxene) appear red, sodium-rich glass appears yellow, and the iron-rich material surrounding the chondrules includes matrix (greenish) and sulfides, metal, and oxides (blue). The sodium in the glass suggests that the chondrules formed in extremely dusty environments in the early solar system. See page 1617.

*Image: Jeffrey Grossman/USGS*

## DEPARTMENTS

- 1557 Science Online
- 1559 This Week in *Science*
- 1564 Editors' Choice
- 1566 Contact *Science*
- 1569 Random Samples
- 1571 Newsmakers
- 1659 New Products
- 1660 Science Careers

## EDITORIAL

- 1563 Drugs, Industry, and Academia  
*by Garret A. FitzGerald*

## NEWS OF THE WEEK

- Louisiana Opens School Door for Opponents of Evolution 1572
- Canada Launches Massive Study of Adult Cancer Precursors 1572
- Senate Bill Would Alter Biosafety, Select Agent Rules 1573
- U.K. Ponders World's Biggest Tidal Power Scheme 1574
- Heinz Center Wants Feds to Build Ecosystem Indicator Partnership 1575

## SCIENCESCOPE

- Science Minister Drives Push to Strengthen Innovation 1576
- Alzheimer's Risk Factor Also Aids HIV 1577

## NEWS FOCUS

- An Unpredictably Violent Fault 1578  
*>> Science Podcast*
- Abuzz About Behavior 1581
- Out of Thin Air 1582
- Nano Science and Technology Institute Nanotech 2008 1584  
Membrane Makes Plastic Precursor Deliver More Bag for the Buck
- Don't Sweat the Small Stuff  
Solar Cells Gear Up to Go Somewhere Under the Rainbow



## LETTERS

- Environmental Revolution Starts at Home 1587  
*E. C. Ellis*
- A Graduate Student Oath *K. D. Davis et al.*  
Prized Programs Need Both Eyes and Ears  
*H. Loebner*
- Giving Samoan Healers Credit for Prostatin  
*P. A. Cox, H. E. Johnson, G. Tavana*

## CORRECTIONS AND CLARIFICATIONS 1588

## BOOKS ET AL.

- Reinventing the Sacred A New View of Science, Reason, and Religion 1590  
*S. A. Kauffman, reviewed by D. Noble*
- Microcosm *E. coli* and the New Science of Life 1591  
*C. Zimmer, reviewed by D. J. Rankin*
- A Taste of the Gonzo Scientist 1592  
*>> Online Feature p. 1557*

## POLICY FORUM

- The MPG Illusion 1593  
*R. P. Larrick and J. B. Soll >> Science Podcast*

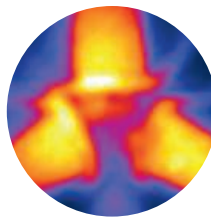
## PERSPECTIVES

- Sprucing Up Greenland 1595  
*E. J. Steig and A. P. Wolfe >> Report p. 1622*
- A Matter of Firn 1596  
*K. M. Cuffey >> Report p. 1626*
- Imaging Astrocyte Activity 1597  
*F. Wolf and F. Kirchhoff >> Report p. 1638*
- How Bacteria Change Gear 1599  
*R. M. Berry and J. P. Armitage >> Report p. 1636*
- What Drives Iron Isotope Fractionation in Magma? 1600  
*S. Weyer >> Report p. 1620*
- Diamond for Quantum Computing 1601  
*S. Prawer and A. D. Greentree*
- Retrospective: John Archibald Wheeler (1911–2008) 1603  
*K. S. Thorne*



1597 &  
1638

CONTENTS continued >>



## SCIENCE EXPRESS

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

### CLIMATE CHANGE

High-Resolution Greenland Ice Core Data Show Abrupt Climate Change Happens in Few Years

*J. P. Steffensen et al.*

Greenland's climate flipped to a different state within 1 to 3 years more than once during the last deglaciation.

10.1126/science.1157707

### IMMUNOLOGY

Censoring of Autoreactive B Cell Development by the Pre-B Cell Receptor

*R. A. Keenan et al.*

A protein that helps newly rearranged antibody chains arrive at the cell surface of immature immune cells is found to help delete cells with potential autoreactivity.

10.1126/science.1157533

### APPLIED PHYSICS

Control of Exciton Fluxes in an Excitonic Integrated Circuit

*A. A. High, E. E. Novitskaya, L. V. Butov, M. Hanson, and A. C. Gossard*

Coupled quantum-wells structures, patterned to create electron-hole circuits, can perform simple logic operations on optical input signals.

10.1126/science.1157845

### IMMUNOLOGY

Modulation of Gene Expression via Disruption of NF- $\kappa$ B Signaling by a Bacterial Small Molecule

*V. V. Kravchenko et al.*

A small molecule produced by a common pathogenic bacterium inhibits the activity of a key immune transcription factor.

10.1126/science.1156499

## TECHNICAL COMMENT ABSTRACTS

### PLANETARY SCIENCE

Comment on "Athabasca Valles, Mars: A Lava-Draped Channel System" 1588

*D. P. Page*

[full text at www.sciencemag.org/cgi/content/full/320/5883/1588b](http://www.sciencemag.org/cgi/content/full/320/5883/1588b)

Response to Comment on "Athabasca Valles, Mars: A Lava-Draped Channel System"

*W. L. Jaeger et al.*

[full text at www.sciencemag.org/cgi/content/full/320/5883/1588c](http://www.sciencemag.org/cgi/content/full/320/5883/1588c)

## REVIEW

### ECONOMICS

Policies Designed for Self-Interested Citizens May Undermine "The Moral Sentiments": Evidence from Economic Experiments 1605

*S. Bowles*

## BREVIA

### PLANT SCIENCE

Auxin Gradients Are Associated with Polarity Changes in Trees 1610

*E. M. Kramer et al.*

In quaking aspen trees that have been injured, gradients of the hormone auxin redirect the wood grain as the wound heals.

## REPORTS

### ASTRONOMY

Strong Limit on a Variable Proton-to-Electron Mass Ratio from Molecules in the Distant Universe 1611

*M. T. Murphy, V. V. Flambaum, S. Muller, C. Henkel*

Absorbed radio emissions from a distant quasar provide an estimate of a fundamental constant, the proton/electron mass ratio, over time and limit its possible variations.

### PHYSICS

Single-Cycle Nonlinear Optics 1614

*E. Goulielmakis et al.*

Ionizing neon atoms with light pulses generates shorter light bursts, less than 100 attoseconds long, that can be used to test electron interactions and strong-field theories.

### METEORITICS

The Formation Conditions of Chondrules and Chondrites 1617

*C. M. O'D. Alexander, J. N. Grossman, D. S. Ebel, F. J. Ciesla*

The high sodium content of grains from the early solar system implies that they formed in parts of the solar nebula with unexpectedly high densities of dust, limiting volatilization.

### GEOCHEMISTRY

Iron Isotope Fractionation During Magmatic Differentiation in Kilauea Iki Lava Lake 1620

*F.-Z. Teng, N. Dauphas, R. T. Helz*

Iron isotopes fractionated between crystals and melt during crystallization of a lava lake, despite temperatures exceeding 1000° Celsius, perhaps influenced by differing iron oxidation.

>> *Perspective p. 1600*



1595 & 1622

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CONTENTS continued >>

## REPORTS CONTINUED...

### CLIMATE CHANGE

Natural Variability of Greenland Climate, Vegetation, and Ice Volume During the Past Million Years 1622

*A. de Vernal and C. Hillaire-Marcel*

A 1-million-year pollen record shows that the southern part of the Greenland ice sheet melted enough during some past warm episodes so that forests grew.

>> *Perspective p. 1595*

### CLIMATE CHANGE

Elevation Changes in Antarctica Mainly Determined by Accumulation Variability 1626

*M. M. Helsen et al.*

Satellite data since 1995, corrected for the conversion of snow to denser ice, imply that ice sheets grew slowly in the East Antarctic but decreased around the Amundsen Sea.

>> *Perspective p. 1596*

### EVOLUTION

Natural Selection Shapes Genome-Wide Patterns of Copy-Number Polymorphism in *Drosophila melanogaster* 1629

*J. J. Emerson, M. Cardoso-Moreira, J. O. Borevitz, M. Long*

A high-resolution analysis of gene copy number in *Drosophila* species shows that most variations are deleterious but a few for resistance to toxins are being positively selected.

### EVOLUTION

Phylogeny-Aware Gap Placement Prevents Errors in Sequence Alignment and Evolutionary Analysis 1632

*A. Löytynoja and N. Goldman*

An algorithm that treats insertions and deletions as distinct events in genomic data improves sequence alignments, allowing more accurate phylogenetic studies.

### CELL BIOLOGY

A Molecular Clutch Disables Flagella in the *Bacillus subtilis* Biofilm 1636

*K. M. Blair et al.*

One bacterial protein synthesized during the production of a biofilm matrix acts as a clutch to disable the flagellum while the microbe is constrained in the biofilm.

>> *Perspective p. 1599; Science Podcast*

### NEUROSCIENCE

Tuned Responses of Astrocytes and Their Influence on Hemodynamic Signals in the Visual Cortex 1638

*J. Schummers, H. Yu, M. Sur*

Astrocytes in the visual cortex respond to visual stimuli, showing receptive field properties (response kinetics, orientation, and localization) similar to those of neurons.

>> *Perspective p. 1597*

### MOLECULAR BIOLOGY

Proliferating Cells Express mRNAs with Shortened 3' Untranslated Regions and Fewer MicroRNA Target Sites 1643

*R. Sandberg et al.*

Dividing immune cells tend to synthesize messenger RNAs with shorter 3' regulatory regions, possibly because less control is required over RNA functions.

### MICROBIOLOGY

Evolution of Mammals and Their Gut Microbes 1647

*R. E. Ley et al.*

Genomic sampling of the microbes in the feces of 60 mammals show that herbivores harbor the most diversity and that individuals of the same species have the same flora.

### MICROBIOLOGY

Ankyrin Repeat Proteins Comprise a Diverse Family of Bacterial Type IV Effectors 1651

*X. Pan, A. Lührmann, A. Satoh, M. A. Laskowski-Arce, C. R. Roy*

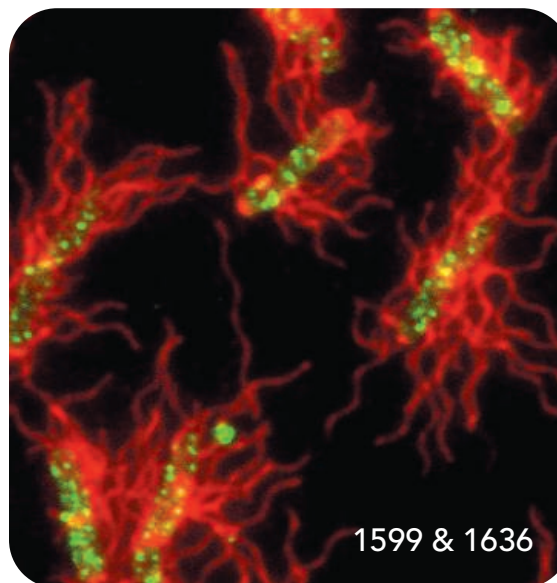
A microbial protein containing ankyrin repeats is injected into host cells through a specialized secretion system where it prevents microtubule-dependent vesicular fusion.

### CELL BIOLOGY

Bora and the Kinase Aurora A Cooperatively Activate the Kinase Plk1 and Control Mitotic Entry 1655

*A. Seki, J. A. Coppinger, C.-Y. Jang, J. R. Yates III, G. Fang*

Mitosis begins in mammalian cells when a protein accumulates between cell divisions and interacts with a second protein to initiate a cascade of kinase activation.



1599 & 1636



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CONTENTS continued >>



A heterotrimeric G protein.

## SCIENCE SIGNALING

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THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

### REVIEW: Dissociation of Heterotrimeric G Proteins in Cells

*N. A. Lambert*

G proteins may function as activated heterotrimers, as well as dissociated subunits.

### PERSPECTIVE: Does Contractile Ca<sup>2+</sup> Control Calcineurin-NFAT Signaling and Pathological Hypertrophy in Cardiac Myocytes?

*S. R. Houser and J. D. Molkenin*

Are calcium signaling pathways in the heart regulated by bulk cytoplasmic calcium or by calcium in specialized microdomains?

### PERSPECTIVE: A Cunning Stunt—An Alternative Mechanism of Eukaryotic Translation Initiation

*S. J. Morley and M. J. Coldwell*

Translation of cellular inhibitor of apoptosis 2 transcripts appears to involve a ribosome shunting mechanism, permitting translation in periods of stress.



## SCIENCE ONLINE FEATURE

### THE GONZO SCIENTIST: Slaying Monsters for Science

An article and video highlight the first scientific conference held in Azeroth, the online universe of the role-playing game World of Warcraft.

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HIGHLIGHTS FROM OUR DAILY NEWS COVERAGE

### How Is a Lizard Like a Motorcycle?

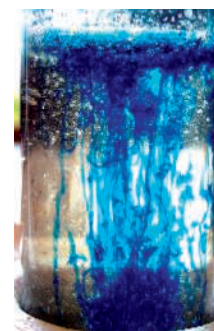
Study answers century-old mystery of why lizards “pop a wheelie” while running.

### Life Cooked Up in Outer Space?

Meteorite fragments contain makings of DNA.

### The Importance of Being Frightened

Wide eyes and flared nostrils may have saved our ancestors on more than one occasion.



Finding opportunities in toxins.

## SCIENCE CAREERS

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### In Toxicology, Opportunities Abound

*B. Vastag*

Toxicology encompasses a wide range of disciplines and offers a wide range of jobs.

### Tooling Up: What Really Matters in a Job Talk

*D. Jensen*

The key to giving a good job talk is giving what your audience is looking for.

### Training in Academia—and Industry

*E. Pain*

Physicist Sylvain Schwartz has won acclaim from both the private sector and the ivory tower.

### Held-Over Feature: Sustaining Forests in a Changing World

*E. Pain*

*Science Careers* reviews career opportunities in forest ecology.

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