

## EDITORIAL

- 146 It's the Teachers  
John E. Burris

## NEWS OF THE WEEK

- 150 A roundup of the week's top stories

## NEWS & ANALYSIS

- 153 Tobacco Scientist's Election  
Tars Academy's Image
- 155 Pleading Poverty, NSF Delays Plans  
for Giant Telescope
- 156 A Quick (Partial) Fix for an Ailing  
Atmosphere  
>> *Research Article p. 183*
- 157 Top Indian Chemist Helps Make the Case  
for Science Windfall

## NEWS FOCUS

- 158 The Peopling of the Aleutians  
>> *Science Podcast*
- 162 Materials Research Society's  
Fall Meeting and Exhibit  
New Lease for Leftover Light  
Snapshots From the Meeting  
AI Bids to Vie With Li in Battery Wars

## LETTERS

- 165 Single-Sex Education: Results One-Sided  
O. A. Kalkus
- Single-Sex Education: Positive Effects  
H. Park et al.
- Single-Sex Education:  
Unequal to Segregation  
B. Ford
- Single-Sex Education:  
Parameters Too Narrow  
T. G. Palaima
- Response  
D. F. Halpern et al.

- 167 CORRECTIONS AND CLARIFICATIONS

- 167 TECHNICAL COMMENT ABSTRACTS

## BOOKS ET AL.

- 169 All the Fish in the Sea  
C. Finley, reviewed by C. Safina
- 170 Behind Closed Doors  
L. Stark, reviewed by C. W. Lidz

## EDUCATION FORUM

- 171 Better Research Needed on the  
Impact of Charter Schools  
J. R. Betts and R. C. Atkinson

## PERSPECTIVES

- 173 SWEET! The Pathway Is Complete  
D. M. Braun  
>> *Report p. 207*
- 174 Biodiversity and Ecosystem Function  
G. F. Midgley  
>> *Report p. 214*
- 175 Gamma-Ray Binaries Revealed  
I. F. Mirabel  
>> *Report p. 189*
- 177 A Composite Matter of Alignment  
P. Fratzl  
>> *Report p. 199*
- 178 An Elusive Intermediate Gets Caught  
G. Marston  
>> *Report p. 204*
- 179 Sheddase Gets Guidance  
S. F. Lichtenthaler  
>> *Reports pp. 225 and 229*
- 181 Retrospective: Paul Mead Doty  
(1920–2011)  
M. Meselson

CONTENTS continued >>



page 158



page 169

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



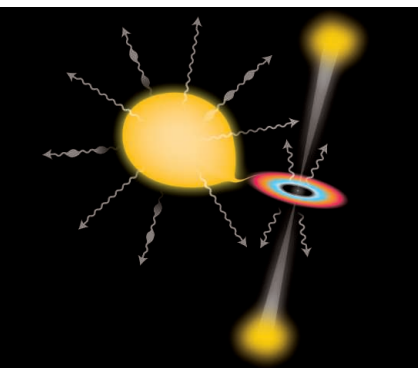
## COVER

A young wandering albatross (*Diomedea exulans*) glides smoothly over the Southern Ocean swell during a calm day. Albatrosses take advantage of ocean winds to travel more efficiently. Recent changes in Southern Ocean wind conditions have allowed wandering albatrosses to travel more rapidly and shift their foraging range southward, with positive influences on reproduction and potential contributions to albatross conservation. See page 211.

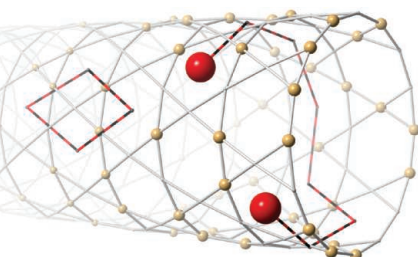
Photo: Paul Tixier

## DEPARTMENTS

- 144 This Week in *Science*
- 147 Editors' Choice
- 148 *Science* Staff
- 239 New Products
- 240 *Science* Careers



pages 175 &amp; 189



page 193



pages 174 &amp; 214

**BREVIA**

- 182** Bubblegrams Reveal the Inner Body of Bacteriophage  $\phi$ KZ  
*W. Wu et al.*  
Radiation damage is used to locate proteins embedded in dense DNA in a megavirus.

**RESEARCH ARTICLE**

- 183** Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security  
*D. Shindell et al.*  
Reducing anthropogenic emissions of methane and black carbon would have multiple climate and health benefits.  
>> *News story p. 156; Science Podcast*

**REPORTS**

- 189** Periodic Emission from the Gamma-Ray Binary 1FGL J1018.6–5856  
*The Fermi LAT Collaboration*  
A new type of a gamma ray–emitting binary object was not previously detected by x-ray emission.  
>> *Perspective p. 175*
- 193** Universal Signatures of Fractionalized Quantum Critical Points  
*S. V. Isakov et al.*  
Numerical simulations directly demonstrate a fractionalized quantum critical point in a triangular kagome lattice of bosons.
- 196** Bistability in Atomic-Scale Antiferromagnets  
*S. Loth et al.*  
Atomically engineered antiferromagnets consisting of a few atoms exhibit stable magnetic states at low temperature.
- 199** Composites Reinforced in Three Dimensions by Using Low Magnetic Fields  
*R. M. Erb et al.*  
Iron oxide–coated rods and platelets can reinforce a polymer composite through alignment with magnetic fields.  
>> *Perspective p. 177*
- 204** Direct Kinetic Measurements of Criegee Intermediate ( $\text{CH}_2\text{OO}$ ) Formed by Reaction of  $\text{CH}_2\text{I}$  with  $\text{O}_2$   
*O. Welz et al.*  
An elusive intermediate implicated in atmospheric oxidation chemistry has been identified in the laboratory.  
>> *Perspective p. 178*
- 207** Sucrose Efflux Mediated by SWEET Proteins as a Key Step for Phloem Transport  
*L.-Q. Chen et al.*  
Transporters hand off sucrose from production cell to transport cell.  
>> *Perspective p. 173*
- 211** Changes in Wind Pattern Alter Albatross Distribution and Life-History Traits  
*H. Weimerskirch et al.*  
Changing wind patterns in the Southern Ocean have improved foraging conditions for wandering albatrosses.
- 214** Plant Species Richness and Ecosystem Multifunctionality in Global Drylands  
*F. T. Maestre et al.*  
Plant species richness is positively related to ecosystem multifunctionality in drylands at a global scale.  
>> *Perspective p. 174*
- 218** A DOC2 Protein Identified by Mutational Profiling Is Essential for Apicomplexan Parasite Exocytosis  
*A. Farrell et al.*  
An evolutionarily conserved  $\text{Ca}^{2+}$ -binding protein promotes parasite invasion.
- 221** Cytoplasmic Dynein Moves Through Uncoordinated Stepping of the AAA+ Ring Domains  
*M. A. DeWitt et al.*  
The molecular motor dynein moves each of its two heads independently along the microtubule.
- 225** Tumor Necrosis Factor Signaling Requires  $\text{iRhom}2$  to Promote Trafficking and Activation of TACE  
*C. Adrain et al.*
- 229**  $\text{iRhom}2$  Regulation of TACE Controls TNF-Mediated Protection Against *Listeria* and Responses to LPS  
*D. R. McIlwain et al.*  
A pseudoprotease is required for the proteolytic cleavage of the proinflammatory cytokine tumor necrosis factor.  
>> *Perspective p. 179*
- 233** Widespread Genetic Switches and Toxicity Resistance Proteins for Fluoride  
*J. L. Baker et al.*  
A fluoride-sensing riboswitch regulates the expression of putative fluoride channels in prokaryotes.
- 235** Erasure of a Spinal Memory Trace of Pain by a Brief, High-Dose Opioid Administration  
*R. Drdla-Schutting et al.*  
Opioid administration turns down a pain amplifier by reversing synaptic long-term potentiation in spinal nociceptive pathways.

## SCIENCEONLINE

## SCIENCEEXPRESS

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

**Female Leadership Raises Aspirations and Educational Attainment for Girls: A Policy Experiment in India**

*L. Beaman et al.*

The effects of female leaders on girls occur via policy changes in the short run and parental aspirations in the longer run.

10.1126/science.1212382

>> [Science Podcast](#)

**Innate Response Activator B Cells Protect Against Microbial Sepsis**

*P. J. Rauch et al.*

A specialized population of B lymphocytes is important for controlling bacterial infections and preventing sepsis.

10.1126/science.1215173

**Revealing the Superfluid Lambda Transition in the Universal Thermodynamics of a Unitary Fermi Gas**

*M. J. H. Ku et al.*

Thermodynamic quantities for the superfluid transition of a strongly interacting atomic Fermi gas were measured.

10.1126/science.1214987

**High-Latitude Forcing of the South American Summer Monsoon During the Last Glacial**

*L. C. Kanner et al.*

High-latitude processes in the Northern and Southern Hemispheres both influence the South American Summer Monsoon.

10.1126/science.1213397

## TECHNICALCOMMENTS

**Comment on "Late Mousterian Persistence near the Arctic Circle"**

*N. Zwyns et al.*

Full text at [www.sciencemag.org/cgi/content/full/335/6065/167-b](http://www.sciencemag.org/cgi/content/full/335/6065/167-b)

**Response to "Comment on Late Mousterian Persistence near the Arctic Circle"**

*L. Slimak et al.*

Full text at [www.sciencemag.org/cgi/content/full/335/6065/167-c](http://www.sciencemag.org/cgi/content/full/335/6065/167-c)

## SCIENCENOW

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

Highlights From Our Daily News Coverage

**New CO<sub>2</sub> Sucker Could Help Clear the Air**

A plastic sponge may eventually make its way into artificial trees.

<http://scim.ag/Clear-Air>

**A Guide to the Dark Side**

Astronomers create the largest-ever map of dark matter.

[http://scim.ag/Dark\\_Matter](http://scim.ag/Dark_Matter)

**Meat-Eating Plant Traps Victims Underground**

A Brazilian species catches worms with leaves buried in the sand.

<http://scim.ag/Plant-Worms>

## SCIENCE SIGNALING

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

The Signal Transduction Knowledge Environment

**10 January issue: <http://scim.ag/ss011012>**

**EDITORIAL GUIDE: Focus Issue—Wnt and  $\beta$ -Catenin Signaling in Development and Disease**

*N. R. Gough*

Research reveals new functions for Wnt in cancer, tooth development, and neuronal pathfinding.

**RESEARCH ARTICLE: Wnt/ $\beta$ -Catenin Signaling and AXIN1 Regulate Apoptosis Triggered by Inhibition of the Mutant Kinase BRAF<sup>V600E</sup> in Human Melanoma**

*T. L. Biechele et al.*

## PODCAST

*T. L. Biechele et al.*

Exploiting crosstalk between signaling pathways may lead to more effective melanoma therapies.

**RESEARCH ARTICLE: A Wnt-Bmp Feedback Circuit Controls Intertissue Signaling Dynamics in Tooth Organogenesis**

*D. J. O'Connell et al.*

Computational and genetic analyses reveal a Wnt and Bmp circuit in developing teeth in mice.

**PROTOCOL: A Dual Array-Based Approach to Assess the Abundance and Posttranslational Modification State of Signaling Proteins**

*K. Luckert et al.*

Combining two strategies enables simultaneous quantification of multiple signaling proteins.

**PRESENTATION: Wnt-Induced Calcium Signaling Mediates Axon Growth and Guidance in the Developing Corpus Callosum**

*B. I. Hutchins et al.*

Wnt-mediated axon repulsion requires the calcium- and calmodulin-dependent protein kinase II.

## SCIENCE TRANSLATIONAL MEDICINE

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

Integrating Medicine and Science

**11 January issue: <http://scim.ag/stm011112>**

**PERSPECTIVE: Magnetic Resonance Metabolic Imaging of Glioma**

*P. Metellus and D. Figarella-Branger*

Noninvasive spectroscopic imaging of mutated enzymes and their metabolites could represent a new paradigm in glial tumor management.

**RESEARCH ARTICLE: Detection of 2-Hydroxyglutarate in IDH-Mutated Glioma Patients by In Vivo Spectral-Editing and 2D Correlation Magnetic Resonance Spectroscopy**

*O. C. Andronesi*

A metabolite overproduced in IDH-mutated brain tumors can be detected noninvasively in patients by spectroscopic imaging.

**RESEARCH ARTICLE: Magnetic Resonance of 2-Hydroxyglutarate in IDH1-Mutated Low-Grade Gliomas**

*A. Elkhaled et al.*

Metabolites can be detected ex vivo in biopsy tissue from IDH1-mutant gliomas using proton NMR spectroscopy.

**RESEARCH ARTICLE: Alcohol Consumption Induces Endogenous Opioid Release in the Human Orbitofrontal Cortex and Nucleus Accumbens**

*J. M. Mitchell et al.*

Endogenous opioids are released in reward-related brain areas after an alcoholic drink to a greater extent in heavy drinkers than in control subjects.

## SCIENCE CAREERS

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

Free Career Resources for Scientists

**Science in Northeastern Brazil**

*S. Gaidos*

Outside Brazil's major scientific hubs, progress requires a mix of patience and impatience.

[http://scim.ag/NE\\_Brazil](http://scim.ag/NE_Brazil)

**Shifting Sands in Northeastern Brazil**

*S. Gaidos*

Physician-scientist Selma Jeronimo is looking for ways to control the spread of leishmaniasis.

[http://scim.ag/Selma\\_Jeronimo](http://scim.ag/Selma_Jeronimo)

**Brazil's Science Culture Shock**

*S. Gaidos*

Physicist Mauro Copelli is working to foster a sustainable research culture in northeastern Brazil.

<http://scim.ag/MauroCopelli>

**Building Up Brazilian Brain Research**

*S. Gaidos*

Miguel Nicolelis is harnessing science as an agent of social change in northeastern Brazil.

<http://scim.ag/MiguelNicolelis>

## SCIENCEPODCAST

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

Free Weekly Show

On the 13 January *Science* Podcast: cost-effectively combating climate change, female leadership's effect on young girls, peopling the Aleutian Islands, and more.

## SCIENCEINSIDER

[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 © 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 (\$1 issues): \$149 (\$74 allocated to subscription). Domestic institutional subscription (\$1 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 (6065)**

*Science* **335** (6065), 144-239.

ARTICLE TOOLS

<http://science.sciencemag.org/content/335/6065>

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.