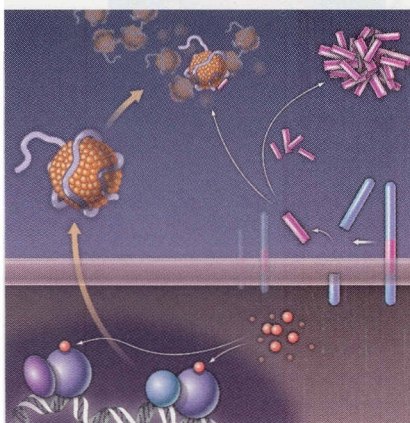


23 March 2012 | \$10

Science



page 1444



pages 1447 & 1503

EDITORIAL

- 1409 America's Community Colleges
Judy C. Miner
>> *Science Podcast*

NEWS OF THE WEEK

- 1422 A roundup of the week's top stories

NEWS & ANALYSIS

- 1425 Seeking Cures for North Korea's Environmental Ills
1426 A Vision of How Mouse Vision Can Reveal Consciousness' Secrets
1428 Gut Microbes Keep Rare Immune Cells in Line
>> *Science Express Report by T. Olszak et al.*
1429 Field Biologists Cry Foul Over Ban

NEWS FOCUS

- 1430 A Flapping of Wings
It's a Bird, It's a Plane, It's a ... Spy?
>> *Science Podcast*
1434 Materials Scientists Look to a Data-Intensive Future
1436 Learning How to NOT Make Your Own Earthquakes

LETTERS

- 1439 Finding a Good Research Question, in Theory
N. Bodemer and A. Ruggeri
Science in Nepal Needs Neighborly Aid
U. B. Shrestha
India Lacks Scientific Leadership
P. M. Bhargava
Response
C. N. R. Rao

- 1441 TECHNICAL COMMENT ABSTRACTS

BOOKS ET AL.

- 1443 American Genesis
J. P. Moran, reviewed by T. Burnett
1444 A History of the World in 100 Objects
N. MacGregor

EDUCATION FORUM

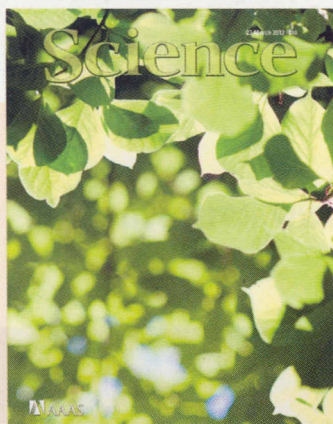
- 1445 Entrepreneurship Training for the Developing World
I. Z. Quadir
>> *Science Podcast*

PERSPECTIVES

- 1447 Old Drug, New Hope for Alzheimer's Disease
W. J. Strittmatter
>> *Report p. 1503*
1448 At the Bottom of the Oceanic Plate
H. Kawakatsu
>> *Report p. 1480*
1449 Keystones in a Tangled Bank
T. M. Lewinsohn and L. Cagnolo
>> *Reports pp. 1486 and 1489*
1451 How Plants See the Invisible
K. H. Gardner and F. Correa
>> *Report p. 1492*
1452 The Hunters Did It
M. McGlone
>> *Report p. 1483*
1454 Searching for a Better Thermal Battery
I. Gur et al.
1455 The Imaginary Mind of a Mouse
R. G. M. Morris and T. Takeuchi
>> *Report p. 1513*
1457 Retrospective: Oscar Miller (1925–2012)
S. McKnight et al.

REVIEW

- 1458 Photoacoustic Tomography: In Vivo Imaging from Organelles to Organs
L. V. Wang and S. Hu



COVER

Spring sun lights up signaling pathways. In plants, the UVR8 protein senses ultraviolet-B (UV-B) wavelengths in sunlight, triggering changes in growth and development, including the production of a protective chemical sunscreen. Pyramids of tryptophan rings intrinsic to UVR8 create a built-in light switch; no separate chromophore is required. Understanding how plant growth varies with changes in sunlight becomes more important as we adapt to climate change. See page 1492.

Photo: iStockphoto.com

DEPARTMENTS

- 1405 This Week in *Science*
1410 Editors' Choice
1412 *Science* Staff
1517 New Products
1518 *Science* Careers

BREVIA

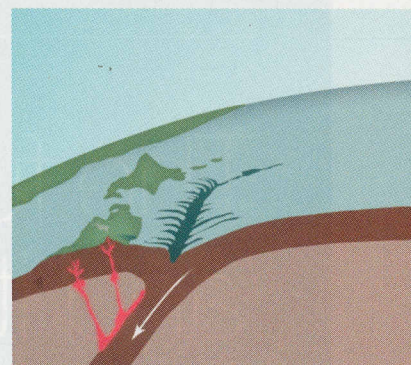
- 1463** Seroprevalence for H5N1 Influenza Infections in Humans: Meta-Analysis
T. T. Wang et al.
One to two percent of 14,000 people tested in 20 studies showed evidence of prior H5N1 infection.
>> See all H5N1 coverage online at http://scim.ag/_h5n1

REPORTS

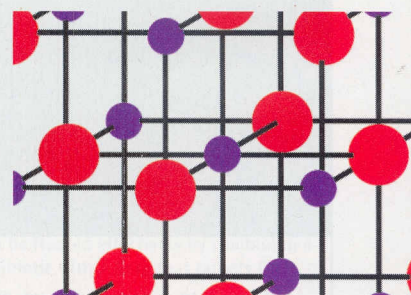
- 1464** Actinide Topological Insulator Materials with Strong Interaction
X. Zhang et al.
Density functional calculations predict that some binary actinide compounds support an exotic electron-correlated state.
- 1466** Experimental Realization of a Magnetic Cloak
F. Gömöry et al.
A ferromagnetic and superconductor composite structure can shield (cloak) a magnetic field without causing any distortion.
- 1468** Renewable Cathode Materials from Biopolymer/Conjugated Polymer Interpenetrating Networks
G. Milczarek and O. Inganäs
Lignin derivatives that can be sourced from paper-industry waste are examined as a battery cathode component.
- 1471** Iron-Catalyzed Cyclopropanation in 6 M KOH with in Situ Generation of Diazomethane
B. Morandi and E. M. Carreira
A robust catalyst circumvents the need to isolate a common reagent that is toxic and explosive.
- 1474** Energy Capture from Thermolytic Solutions in Microbial Reverse-Electrodialysis Cells
R. D. Cusick et al.
Thermally induced salt gradients could augment the electricity generated by microbial fuel cells from wastewater.
- 1477** Silicon Isotope Evidence Against an Enstatite Chondrite Earth
C. Fitoussi and B. Bourdon
Earth accreted from materials with a heterogeneous mix of chondritic meteorite compositions.
- 1480** The Gutenberg Discontinuity: Melt at the Lithosphere-Asthenosphere Boundary
N. Schmerr
Analysis of seismic waves suggests the presence of thin layers of melted rock below the Pacific Ocean lithosphere.
>> Perspective p. 1448
- 1483** The Aftermath of Megafaunal Extinction: Ecosystem Transformation in Pleistocene Australia
S. Rule et al.
The extinction of megafauna 40,000 years ago after the arrival of humans led to major changes in vegetation and fire regimes.
>> Perspective p. 1452

- 1486** Specialization and Rarity Predict Nonrandom Loss of Interactions from Mutualist Networks
M. A. Aizen et al.
In the sierras of Argentina, specialized mutualistic plant-pollinator relationships increase vulnerability to habitat loss.
- 1489** Evolutionary Conservation of Species' Roles in Food Webs
D. B. Stouffer et al.
How species are embedded in food webs is an intrinsic species attribute and is conserved across diverse ecological communities.
>> Perspective p. 1449
- 1492** Plant UVR8 Photoreceptor Senses UV-B by Tryptophan-Mediated Disruption of Cross-Dimer Salt Bridges
J. M. Christie et al.
A tryptophan pyramid allows a dimeric protein to perceive ultraviolet light without an additional chromophore.
>> Perspective p. 1451
- 1496** MARF1 Regulates Essential Oogenic Processes in Mice
Y.-Q. Su et al.
A protein that is highly expressed in oocytes regulates meiosis, genomic integrity, and female fertility.
- 1499** Trim28 Is Required for Epigenetic Stability During Mouse Oocyte to Embryo Transition
D. M. Messerschmidt et al.
In early mouse embryos, the loss of a single maternal gene results in lethal phenotypic and epigenetic variability.
- 1503** ApoE-Directed Therapeutics Rapidly Clear β -Amyloid and Reverse Deficits in AD Mouse Models
P. E. Cramer et al.
Bexarotene counters the effects of neurodegenerative disease in mice.
>> Perspective p. 1447
- 1506** Long-Range-Projecting GABAergic Neurons Modulate Inhibition in Hippocampus and Entorhinal Cortex
S. Melzer et al.
Long-range inhibitory projections bidirectionally couple brain regions that play a role in spatial learning and memory.
- 1510** Glucocorticoids Can Induce PTSD-Like Memory Impairments in Mice
N. Kaouane et al.
The infusion of a stress hormone produces fear responses to cues that were not associated with the traumatic event itself.
- 1513** Generation of a Synthetic Memory Trace
A. R. Garner et al.
The brains of transgenic mice incorporate experimentally generated neural activity into a memory trace.
>> Perspective p. 1455

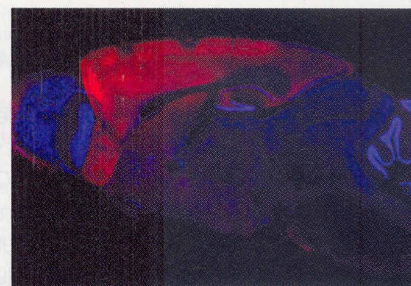
CONTENTS continued >>



pages 1448 & 1480



page 1464



pages 1455 & 1513

SCIENCEONLINE

SCIENCEEXPRESS

www.scienceexpress.org

Topography of the Northern Hemisphere of Mercury from MESSENGER Laser Altimetry

M. T. Zuber et al.

Mercury's topography indicates sustained geophysical activity for most of the planet's geological history.
10.1126/science.1218805

Gravity Field and Internal Structure of Mercury from MESSENGER

D. E. Smith et al.

Mercury's outer solid shell is denser than expected, suggesting a deep reservoir of high-density material, possibly iron-sulfur.
10.1126/science.1218809

A Lineage of Myeloid Cells Independent of Myb and Hematopoietic Stem Cells

C. Schulz et al.

In mice, a population of tissue-resident macrophages arises independently of bone marrow-derived stem cells.
10.1126/science.1219179

Microbial Exposure During Early Life Has Persistent Effects on Natural Killer T Cell Function

T. Olszak et al.

Early exposure of germ-free mice to microbes keeps later inflammation in check by modulating immune cells.
10.1126/science.1219328

>> [News story p. 1428](#); [Science Podcast](#)

Enantioselective C-H Croylation of Primary Alcohols via Hydrohydroxyalkylation of Butadiene

J. R. Zbieg et al.

A catalyst facilitates complex carbon-carbon bond formation using a bulk commodity feedstock compound.
10.1126/science.1219274

TECHNICALCOMMENTS

Comment on "Productivity Is a Poor Predictor of Plant Species Richness"

X. Pan et al.

Full text at www.sciencemag.org/cgi/content/full/335/6075/1441-a

Comment on "Productivity Is a Poor Predictor of Plant Species Richness"

J. D. Fridley et al.

Full text at www.sciencemag.org/cgi/content/full/335/6075/1441-b

Response to Comments on "Productivity Is a Poor Predictor of Plant Species Richness"

J. B. Grace et al.

Full text at www.sciencemag.org/cgi/content/full/335/6075/1441-c

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Were Some Neandertals Brown-Eyed Girls?

A study finds brown eyes and dusky skin in human relatives.
http://scim.ag/Neandertals_Eyes

Insight Into a Shocking Therapy for Depression
An imaging study reveals why jolting patients with electricity can lift mood.
http://scim.ag/Depression_Therapy

Enzyme 'Melts' Cancer Drug Barrier

Breaking down the tough matrix around pancreatic tumors makes chemotherapy work better in mice.
http://scim.ag/Drug_Barrier

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment
20 March issue: <http://scim.ag/ss032012>

RESEARCH ARTICLE: Cellular Inhibitors of Apoptosis Are Global Regulators of NF- κ B and MAPK Activation by Members of the TNF Family of Receptors

E. Varfolomeev et al.

Signaling downstream of tumor necrosis factor family receptors hinges on the presence or absence of c-IAP proteins.

RESEARCH ARTICLE: Cannabinoids Induce Pancreatic β -Cell Death by Directly Inhibiting Insulin Receptor Activation

W. Kim et al.

Activation of cannabinoid 1 receptors prevents insulin receptors from promoting β -cell survival in the pancreas.

PERSPECTIVE: The Structure of the TLR5-Flagellin Complex—A New Mode of Pathogen Detection, Conserved Receptor Dimerization for Signaling

J. Lu and P. D. Sun

TLR5 exhibits a distinct ligand-binding mechanism compared with those used by other TLRs.

EVENTS

Plan to attend a signaling-relevant meeting; six new meetings added since February.

GLOSSARY

Find out what p70S6K, Deptor, and PRAS40 mean in the world of cell signaling.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

Experimental Error: How to Write Like a Scientist
A. Ruben

Why do we require scientists to write badly?

http://scim.ag/EE_Writing

Enhance Your Career With Leadership Skills

S. A. Holgate

It's important to begin building leadership skills even before you take on a managerial role.

<http://scim.ag/EnhanceLeadership>

Career Q&A: Myron Cohen

B. Mole

The infectious disease expert and recipient of Science's 2011 Breakthrough of the Year award reflects on his career and keys to success.

http://scim.ag/QA_MyronCohen

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

21 March issue: <http://scim.ag/stm032112>

RESEARCH ARTICLE: Characterization of Circulating Endothelial Cells in Acute Myocardial Infarction

S. Damani et al.

Features of endothelial cells in blood samples may eventually permit prediction of atherosclerotic plaque rupture events.

RESEARCH ARTICLE: Prostaglandin D₂ Inhibits Hair Growth and Is Elevated in Bald Scalp of Men with Androgenetic Alopecia

L. A. Garza et al.

Prostaglandin D₂ inhibits hair growth through its receptor, GPR44, and this pathway could serve as a new target for developing treatments for male pattern baldness.

RESEARCH ARTICLE: Restoring Methicillin-Resistant *Staphylococcus aureus* Susceptibility to β -Lactam Antibiotics

C. M. Tan et al.

Methicillin-resistant *Staphylococcus aureus* (MRSA) infection can be treated effectively by combining a β -lactam antibiotic with a drug that targets FtsZ.

PERSPECTIVE: Merging Systems Biology with Pharmacodynamics

R. Iyengar et al.

Enhanced pharmacodynamic models combine favorable features of systems biology and traditional models and may form the basis of precision medicine.

SCIENCE PODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show

On the 23 March Science Podcast: entrepreneurship in the developing world, microbes and the immune response, flying robots, and more.

SCIENCE INSIDER

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 (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