

23 September 2011 | \$10

Science

 AAAS

EDITORIAL

- 1679 Rethinking Clinical Trials**
Andrew Grove

NEWS OF THE WEEK

- 1684** A roundup of the week's top stories

NEWS & ANALYSIS

- 1687** The Tevatron's Epitaph:
Solid Science, No Surprises
- 1688** Star Measurements Hint
at Many More Abodes for Life
- 1689** Aboriginal Genome Shows
Two-Wave Settlement of Asia
>>> *Science Express Report* by M. Rasmussen et al.
- 1691** Webb Telescope Pulled Back
From the Brink—For Now
- 1692** Tracing the Paths of the First Americans
- 1693** Banking Seeds for Future
Evolutionary Scientists

NEWS FOCUS

- 1694** XMRV & CHRONIC FATIGUE SYNDROME
False Positive
>>> *Science Express Partial Retraction* by
R. H. Silverman et al. and *Report* by
G. Simmons et al.; *Science Podcast*

LETTERS

- 1702** Breathing Life into Mortality
Data Collection
C. Rao
- Revolutionize Egypt's Science Culture
M. El-Sherbeini
- Decentralize Egypt's Higher Education
J. H. Toney and M. Abou-Sabe
- 1703** CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.

- 1704** *Field Notes on Science and Nature*
M. R. Canfield, Ed, reviewed by H. W. Greene
- 1705** *Reactions*
P. Atkins, reviewed by S. Tang and M. Poliakoff

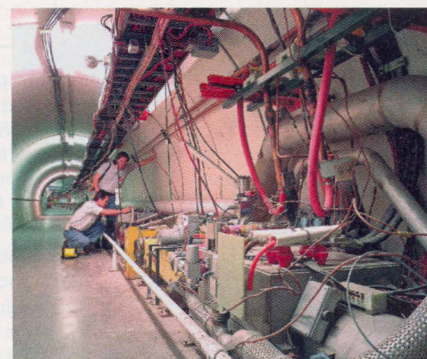
EDUCATION FORUM

- 1706** The Pseudoscience of Single-Sex
Schooling
D. F. Halpern et al.
>>> *Science Podcast*

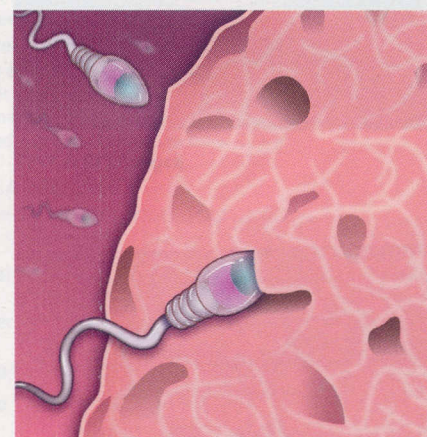
PERSPECTIVES

- 1708** The Sperm's Sweet Tooth
P. M. Wassarman
>>> *Report* p. 1761
- 1709** Biodiversity and Productivity
M. R. Willig
>>> *Report* p. 1750
- 1710** Coexisting with Cattle
J. T. du Toit
>>> *Report* p. 1753
- 1712** A Black Widow's Best Friend?
F. A. Rasio
>>> *Report* p. 1717
- 1713** Antibiotic Resistance, Not Shaken
or Stirred
R. L. Frisch and S. M. Rosenberg
>>> *Report* p. 1764
- 1714** Ironing Out Hydrogen Storage
S. Ott
>>> *Report* p. 1733
- 1715** Generating Helices in Nature
Y. Forterre and J. Dumais
>>> *Report* p. 1726

CONTENTS continued >>



page 1687



pages 1708 & 1761



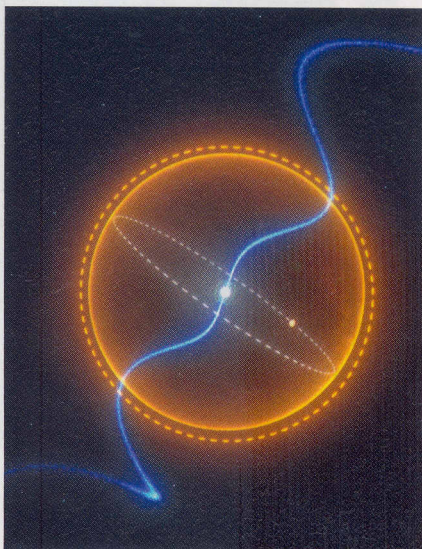
COVER

Tropical tree species in Soberania National Park, Panama. Differences in species composition across locations (β diversity) generally increase at low latitude and elevation, such that the β diversity of many clades peaks in lowland, tropical areas. Kraft *et al.* show that this trend is more likely driven by differences in the size of species pools than by differences in community assembly processes in temperate versus tropical systems. See page 1755.

Photo: Christian Ziegler, Smithsonian Tropical Research Institute

DEPARTMENTS

- 1676** This Week in *Science*
- 1680** Editors' Choice
- 1682** *Science* Staff
- 1770** New Products
- 1771** *Science* Careers



pages 1712 & 1717



pages 1710 & 1753

REPORTS

- 1717 Transformation of a Star into a Planet in a Millisecond Pulsar Binary**
M. Bailes et al.
Timing observations of a millisecond pulsar reveal a planet that is far denser than any known planet.
>> Perspective p. 1712
- 1720 Electrically Controlled Nonlinear Generation of Light with Plasmonics**
W. Cai et al.
A plasmonic structure is used to electrically produce frequency-doubled light.
- 1723 Coherent Two-Dimensional Nanoscopy**
M. Aeschlimann et al.
Coherent electronic states excited by ultrafast laser pulses were imaged at subwavelength resolution with photoelectrons.
- 1726 Geometry and Mechanics in the Opening of Chiral Seed Pods**
S. Armon et al.
Two joined latex strips show complex twisting behavior similar to that of seed pods.
>> Perspective p. 1715
- 1730 The Role of a Bilayer Interfacial Phase on Liquid Metal Embrittlement**
J. Luo et al.
The formation of single-layer complexes between different metals is a cause of liquid metal embrittlement.
- 1733 Efficient Dehydrogenation of Formic Acid Using an Iron Catalyst**
A. Boddien et al.
Iron-catalyzed hydrogen generation raises prospects for a cheap hydrogen storage medium.
>> Perspective p. 1714
- 1737 Megacity Emissions and Lifetimes of Nitrogen Oxides Probed from Space**
S. Beirle et al.
Analysis of downwind plume evolution using satellite observations can be used for air pollution estimates.
- 1739 Inbreeding Promotes Female Promiscuity**
Ł. Michalczyk et al.
After a population bottleneck, polyandry allows females to select sperm with the best prospects for fitness.
- 1742 Asynchronous Diversification in a Specialized Plant-Pollinator Mutualism**
S. R. Ramírez et al.
Insect sensory biases played a major role in driving reproductive adaptations in flowering plants.

- 1746 Single-Base Pair Unwinding and Asynchronous RNA Release by the Hepatitis C Virus NS3 Helicase**
W. Cheng et al.
During RNA unwinding, nucleotides are transiently sequestered, and their release is decoupled from base pair opening.
- 1750 Productivity Is a Poor Predictor of Plant Species Richness**
P. B. Adler et al.
Standardized sampling from many sites worldwide was used to address an important ecological problem.
>> Perspective p. 1709
- 1753 African Wild Ungulates Compete with or Facilitate Cattle Depending on Season**
W. O. Odadi et al.
Native wildlife enhance cattle performance during the wet season in a savanna landscape.
>> Perspective p. 1710
- 1755 Disentangling the Drivers of β Diversity Along Latitudinal and Elevational Gradients**
N. J. B. Kraft et al.
Increases in species turnover of woody plants at low latitudes and elevations are explained by the size of species pools alone.
- 1758 A Role for Snf2-Related Nucleosome-Spacing Enzymes in Genome-Wide Nucleosome Organization**
T. Gkikopoulos et al.
Three chromatin remodeling enzymes in yeast drive higher-order chromatin compaction.
- 1761 Human Sperm Binding Is Mediated by the Sialyl-Lewis^x Oligosaccharide on the Zona Pellucida**
P.-C. Pang et al.
Fertilization in humans is initiated by binding of spermatozoa to a selectin ligand on the egg's extracellular matrix.
>> Perspective p. 1708
- 1764 Acceleration of Emergence of Bacterial Antibiotic Resistance in Connected Microenvironments**
Q. Zhang et al.
Gradients of antibiotics generated in a microfluidic device provoke selection of ciprofloxacin resistance in *Escherichia coli*.
>> Perspective p. 1713
- 1767 Promoting the Middle East Peace Process by Changing Beliefs About Group Malleability**
E. Halperin et al.
A belief that the beliefs of other groups are changeable rather than fixed is conducive to negotiation.

SCIENCEONLINE

SCIENCEEXPRESS

www.sciencexpress.org

An Aboriginal Australian Genome Reveals Separate Human Dispersals into Asia

M. Rasmussen et al.

Whole-genome data indicates that early modern humans expanded into Australia 62,000 to 75,000 years ago.

10.1126/science.1211177

>> *News story p. 1689; Science Podcast*

Impacts of the Cretaceous Terrestrial Revolution and KPg Extinction on Mammal Diversification

R. W. Meredith et al.

Molecular phylogenetic analysis, calibrated with fossils, resolves the time frame of the mammalian radiation.

10.1126/science.1211028

N-Terminal Acetylation Acts as an Avidity Enhancer Within an Interconnected Multiprotein Complex

D. C. Scott et al.

Acetylation of an N-terminal methionine is important for mediating specific protein-protein interactions.

10.1126/science.1209307

Replication-Dependent Loss of 5-Hydroxymethylcytosine in Mouse Preimplantation Embryos

A. Inoue and Y. Zhang

The oxidation product of methylated cytosine is passively lost from DNA in the zygote as cell division progresses.

10.1126/science.1212483

Increasing N Abundance in the Northwestern Pacific Ocean Due to Atmospheric Nitrogen Deposition

T.-W. Kim et al.

Nitrogen deposition from the atmosphere has altered the nitrate:phosphorus ratio in the marginal seas of the northwestern Pacific Ocean.

10.1126/science.1206583

Partial Retraction of "Detection of an Infectious Retrovirus, XMRV, in Blood Cells of Patients with Chronic Fatigue Syndrome"

R. H. Silverman et al.

10.1126/science.1212182

Failure to Confirm XMRV/MLVs in the Blood of Patients with Chronic Fatigue Syndrome: A Multi-Laboratory Study

G. Simmons et al.

The assays used to detect XMRV in patients with chronic fatigue syndrome are unreliable.

10.1126/science.1213841

>> *News story p. 1694*

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Gene Therapy May Thwart HIV

A promising but preliminary clinical trial could bring the field closer to a potential cure.

<http://scim.ag/HIVgene>

Return of a Killer Volcano

Air pollution from extended Icelandic eruption could kill thousands in Europe.

<http://scim.ag/killer-volcano>

Earth's Ultimate Destruction—And Possible Reincarnation

Astronomers ponder the fate of our world.

<http://scim.ag/earth-fate>

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment
20 September issue: <http://scim.ag/ss092011>

RESEARCH ARTICLE: A Synthetic Biology Approach Reveals a CXCR4-G₁₃-Rho Signaling Axis Driving Transendothelial Migration of Metastatic Breast Cancer Cells

H. Yagi et al.

PODCAST

J. S. Gutkind and A. M. VanHook

Interfering with a specific G protein-coupled receptor pathway may block metastasis of some forms of breast cancer.

RESEARCH ARTICLE: *Shigella flexneri* Infection Generates the Lipid PISP to Alter Endocytosis and Prevent Termination of EGFR Signaling

D. Ramel et al.

Shigella keeps infected cells alive by preventing the lysosomal trafficking and degradation of an activated growth factor receptor.

RESEARCH RESOURCE: Phosphoproteomic Analysis of *Salmonella*-Infected Cells Identifies Key Kinase Regulators and SopB-Dependent Host Phosphorylation Events

L. D. Rogers et al.

The foodborne pathogen *Salmonella* triggers distinct phosphorylation events in host cells to promote infection.

TEACHING RESOURCE: An Introduction to Dynamical Systems

E. A. Sobie

TEACHING RESOURCE: An Introduction to MATLAB

E. A. Sobie

TEACHING RESOURCE: Obtaining and Estimating Kinetic Parameters from the Literature

S. R. Neves

Lecture notes and problem sets provide materials for teaching systems biology.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org
Integrating Medicine and Science

21 September issue: <http://scim.ag/stm092111>

COMMENTARY: Academic Medical Centers—Ripe for Rapid-Learning Personalized Health Care

G. S. Ginsburg et al.

Academic medical centers must play a central role in unleashing the potential of personalized health care.

COMMENTARY: Integrating Cancer Control into Global Health

H. Varmus and E. L. Trimble

The newly formed Center for Global Health at the National Cancer Institute seeks to control cancer in the world's poorest countries.

RESEARCH ARTICLE: Repeated Vulvovaginal Fungal Infections Cause Persistent Pain in a Mouse Model of Vulvodynia

M. A. Farmer et al.

The development of an animal model of vulvodynia indicates that recurrent candidiasis is a potential cause of the disorder.

RESEARCH ARTICLE: A Plasmablast Biomarker for Nonresponse to Antibody Therapy to CD20 in Rheumatoid Arthritis

K. Owczarczyk et al.

Plasmablast biomarkers predict whether rheumatoid arthritis patients will respond to therapeutic antibodies to CD20.

RESEARCH ARTICLE: Teriparatide as a Chondroregenerative Therapy for Injury-Induced Osteoarthritis

E. R. Sampson et al.

Teriparatide is chondroprotective and chondroregenerative in a mouse model of injury-induced osteoarthritis of the knee.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

Experimental Error: Nobel Gas

A. Ruben

It's time to reclaim the Nobel Prize for the common scientist.

http://scim.ag/EE_NobelGas

A Tale of Two Volunteers

E. Pain

Two scientists tell how time spent volunteering in developing countries impacted their lives and careers.

<http://scim.ag/2Volunteers>

How Many Astronauts Do We Need?

M. Price

A newly shuttle-less NASA is trying to figure out how many astronauts to recruit.

http://scim.ag/Astro_Recruitment

SCIENCEPODCAST

www.sciencemag.org/multimedia/podcast

On the 23 September *Science* Podcast: an Aboriginal Australian genome, assessing single-sex education, the latest on XMRV and chronic fatigue, 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 © 2011 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 \$25.00 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