



17 September 2010 | \$10

Science

EDITORIAL

- 1441** Young Leaders for Biology in India
Shubha Tole and Ronald D. Vale
>> *Policy Forum p. 1471*

NEWS OF THE WEEK

- 1450** With Stem Cells in Court, a History Primer
1453 China Clamps Down on Illegal Fossil Trading
1453 From the *Science* Policy Blog
1454 No Meeting of Minds on XMRV's Role in Chronic Fatigue, Cancer
1455 From *Science's* Online Daily News Site
1456 Genentech Scientist to Take the Helm at Rockefeller University
1457 Physicist Tapped to Turn Embattled Institute Into a Fully Fledged University

NEWS FOCUS

- 1458** Has China Outgrown the One-Child Policy? Of Population Projections and Projectiles
>> *Science Podcast*
1462 No Vaccines in the Time of Cholera
1464 11th International Conference of Archaeozoology
Score One for Hunting at Olduvai
Burying Man's Best Friend, With Honor
In a Cold Snap, Farmers Turned to Milk

LETTERS

- 1466** Battling the Paper Glut
D. Siegel and P. Baveye
India's Courteous Creativity
T. N. Narasimhan
Archaeology Augments Tibet's Genetic History
P. J. Brantingham et al.
Response
X. Yi et al.

- 1467** CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.

- 1469** Whistling Vivaldi
C. M. Steele, reviewed by W. von Hippel
1469 BROWNSINGS
1470 Nanotechnologies for Future Mobile Devices
T. Ryhänen et al., Eds.

POLICY FORUM

- 1471** Achieving Scientific Eminence Within Asia
A. S. Huang and C. Y. H. Tan
>> *Editorial p. 1441*

PERSPECTIVES

- 1473** New Roles for Codon Usage
I. Weygand-Durasevic and M. Ibba
>> *Report p. 1534*
1474 Aerosols in Clearer Focus
U. Baltensperger
>> *Research Article p. 1488; Report p. 1513*
1475 A Never-Ending Story
B.-M. Sjöberg
>> *Report p. 1526*
1477 Quantum Walks Through a Waveguide Maze
M. Hillery
>> *Report p. 1500*
1478 Should Confidence Be Trusted?
H. Lau and B. Maniscalco
>> *Report p. 1541*
1479 Seismic Images of the Biggest Crash on Earth
R. Kind and X. Yuan

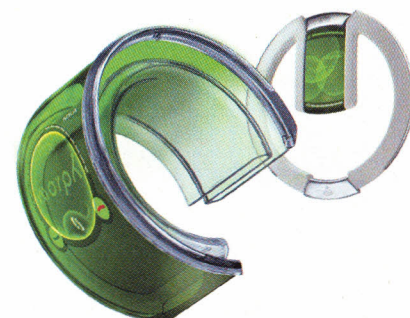
REVIEW

- 1481** Tyrannosaur Paleobiology: New Research on Ancient Exemplar Organisms
S. L. Brusatte et al.

CONTENTS continued >>



page 1458



page 1470



COVER

Topographic map of the Moon based on measurements from the Lunar Orbiter Laser Altimeter, showing the boundary between Oceanus Procellarum, a smooth, relatively young mare region on the western nearside (upper right), and the older, more heavily cratered highlands (center and lower left). Colors indicate increasing elevation from blue to red. The crescent-shaped Lorentz crater (center) is ~312 kilometers in diameter. See the Reports on pages 1504, 1507, and 1510.

Image: NASA/LRO/LOLA/GSFC/MIT/Brown

DEPARTMENTS

- 1437** This Week in *Science*
1442 Editors' Choice
1446 *Science* Staff
1449 Random Samples
1544 New Products
1545 *Science* Careers

BREVIA

- 1487** Island Biogeography Reveals the Deep History of SIV
M. Worobey et al.
 Separation of the island of Bioko from West Africa about 10,000 years ago dates the origins of simian immunodeficiency virus.

RESEARCH ARTICLES

- 1488** Hemispheric Aerosol Vertical Profiles: Anthropogenic Impacts on Optical Depth and Cloud Nuclei
A. Clarke and V. Kapustin
 Vertical profiles of atmospheric aerosols from throughout the Pacific region show the influence of anthropogenic combustion.
 >> *Perspective p. 1474; Report p. 1513*
- 1492** Evidence for an Alternative Glycolytic Pathway in Rapidly Proliferating Cells
M. G. Vander Heiden et al.
 Characterization of cancer cell metabolism provides evidence for a previously uncharacterized metabolic pathway.

REPORTS

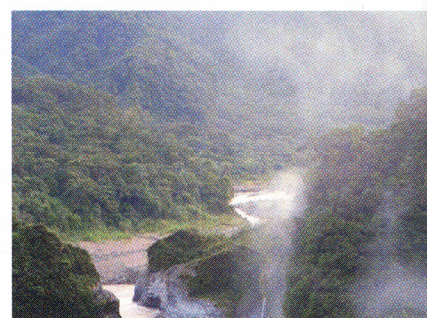
- 1500** Quantum Walks of Correlated Photons
A. Peruzzo et al.
 Pairs of correlated photons retain their quantum-mechanical correlations as they propagate through a waveguide maze.
 >> *Perspective p. 1477*
- 1504** Global Distribution of Large Lunar Craters: Implications for Resurfacing and Impactor Populations
J. W. Head III et al.
 An analysis of high-resolution global topography data advances our understanding of the impact history of the Moon.
- 1507** Global Silicate Mineralogy of the Moon from the Diviner Lunar Radiometer
B. T. Greenhagen et al.
- 1510** Highly Silicic Compositions on the Moon
T. D. Glotch et al.
 Remote thermal emission spectroscopy reveals the existence of complex igneous processes on the Moon.
- 1513** Rainforest Aerosols as Biogenic Nuclei of Clouds and Precipitation in the Amazon
U. Pöschl et al.
 The majority of cloud condensation nuclei in the Amazon during the wet season are derived from biogenic precursors.
 >> *Perspective p. 1474; Research Article p. 1488*
- 1516** Melting of Peridotite to 140 Gigapascals
G. Fiquet et al.
 High-temperature and high-pressure experiments reveal details about how and where the mantle melts.

- 1518** A Test of the Snowball Theory for the Rate of Evolution of Hybrid Incompatibilities
D. R. Matute et al.
- 1521** Hybrid Incompatibility "Snowballs" Between *Solanum* Species
L. C. Moyle and T. Nakazato
 Two studies support the theory that the number of genes involved in hybrid incompatibility increases faster than linearly.
- 1523** The Ecological Significance of Tool Use in New Caledonian Crows
C. Rutz et al.
 Stable isotope analysis reveals the nutritional benefits of tool use in wild New Caledonian crows.
 >> *Science Podcast*
- 1526** Structural Basis for Activation of Class Ib Ribonucleotide Reductase
A. K. Boal et al.
 A single protein activates two different metallofactors by distinct chemistries.
 >> *Perspective p. 1475*
- 1530** Bifurcation of Toll-Like Receptor 9 Signaling by Adaptor Protein 3
M. Sasai et al.
 Compartmentalization of signaling components allows induction of distinct pathways downstream of a pathogen receptor.
- 1534** Differential Arginylation of Actin Isoforms Is Regulated by Coding Sequence-Dependent Degradation
F. Zhang et al.
 The translational speed of proteins influences whether they are cotranslationally degraded after arginylation.
 >> *Perspective p. 1473*
- 1537** MiR-16 Targets the Serotonin Transporter: A New Facet for Adaptive Responses to Antidepressants
A. Baudry et al.
 The uptake transporter for a key neurotransmitter is regulated by a microRNA, yielding new insight into how Prozac functions.
- 1541** Relating Introspective Accuracy to Individual Differences in Brain Structure
S. M. Fleming et al.
 Individual differences in the capacity for introspection are reflected in structural variation in the frontal lobe.
 >> *Perspective p. 1478*

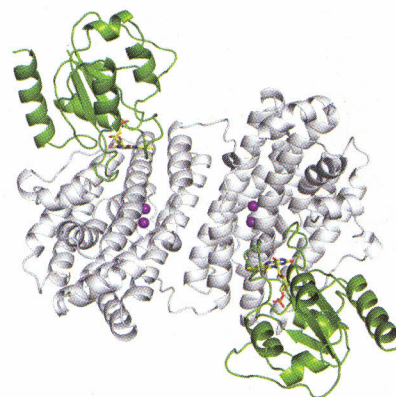
CONTENTS continued >>



page 1487



pages 1474, 1488, & 1513



pages 1475 & 1526

SCIENCEONLINE

SCIENCEEXPRESS

www.scienceexpress.org

Family Planning and the Millennium Development Goals

W. Cates Jr. et al.

To alleviate global poverty, investments and partnerships in family planning are needed.

10.1126/science.1197080

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.

10.1126/science.1193134

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.

10.1126/science.1194174

IDH2 Mutations in Patients with D-2-Hydroxyglutaric Aciduria

M. Kranendijk et al.

A mutation that changes the specificity of an enzyme in human cancer is also found in an inherited metabolic disorder.

10.1126/science.1192632

Propane Respiration Jump-Starts Microbial Response to a Deep Oil Spill

D. L. Valentine et al.

Hydrocarbon gases were the first compounds that bacteria degraded in deep underwater petroleum plumes.

10.1126/science.1196830

>> Science Podcast

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

How to Train Your Robot (to Lie)

Researchers create fibbing machines in the lab.

Fast-Growing Boys Have More Sex as Men

Research supports the idea that early infant experiences shape adult attributes.

Physicists Fashion the Ultimate Peashooter Out of Laser Light

A "light pipe" delivers tiny objects across the room with hair's breadth accuracy.

SCENCESIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

EVOLUTION OF SIGNALING SYSTEMS

EDITORIAL GUIDE: Focus Issue—

Evolution III—Domains for Change

N. R. Gough

Domains provide evolution with tools for the creation of new functions.

RESEARCH ARTICLE: Characterization of the Extrinsic Apoptotic Pathway in the Basal Chordate Amphioxus

S. Yuan et al.

Death domain-dependent signaling in the basal chordate amphioxus suggests that extrinsic apoptotic signaling is not restricted to vertebrates.

PERSPECTIVE: Domain Recombination—A Workhorse for Evolutionary Innovation

G. Apic and R. B. Russell

Firm evidence for domain shuffling as a means of evolving new functions may lead us to the creation of combinations of practical benefit.

PERSPECTIVE: Signals—Tinkering with Domains

E. Bornberg-Bauer

Binding domains in signaling proteins can tolerate sequence variation but still bind ligands and be structurally stable.

REVIEW: ABL Tyrosine Kinases—Evolution of Function, Regulation, and Specificity

J. Colicelli

Insight into the regulation of ABL-family tyrosine kinases could facilitate development of therapies for malignancies driven by ABL fusion proteins.

SCIENCECAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

Tooling Up: A Job-Search Plan

for the Person Without One (Part 2)

D. Jensen

The key to a successful job hunt is to precisely target particular jobs.

Expanding the Genetic Code

E. Pain

Trained as a chemist, Jason Chin is rewriting central dogmas of biology by coaxing cells to make proteins containing novel amino acids.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

PERSPECTIVE: GIP—No Longer the Neglected Incretin Twin?

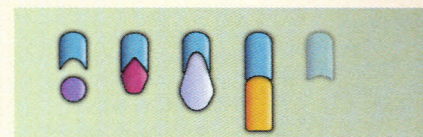
R. N. Kulkarni

The incretin hormone gastric inhibitory polypeptide may be a promising therapeutic target for type 2 diabetes.

COMMENTARY: A Multi-Level Systems Perspective for the Science of Team Science

K. Börner et al.

Understanding how teams function is vital, because they are increasingly dominating the production of high-impact science.



SCIENCESIGNALING

Evolving domains.

RESEARCH ARTICLE: Personalized Epigenomic Signatures That Are Stable Over Time and Covary with Body Mass Index

A. P. Feinberg et al.

Epigenetic signatures akin to genetic fingerprints may correlate with a common genetic trait.

RESEARCH ARTICLE: Disruption at the *PTCHD1* Locus on Xp22.11 in Autism Spectrum Disorder and Intellectual Disability

A. Noor et al.

Mutations of the X-linked gene *PTCHD1* are associated with autism spectrum disorders and intellectual disability.

SCIENCEPODCAST

www.sciencemag.org/multimedia/podcast
Free Weekly Show

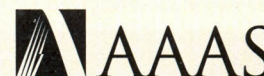
Download the 17 September Science Podcast to hear about 30 years of China's one-child policy, hydrocarbon-degrading bacteria in the Gulf of Mexico, tool-making crows, and more.

SCIENCEINSIDER

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