

EDITORIAL

- 245 Earth System Research Priorities
Walter V. Reid et al.

NEWS OF THE WEEK

- 250 White House Taps Former Genome Chief Francis Collins as NIH Director
Questions About the Language of God
>> *Science Podcast*
- 251 Geophysicist McNutt Named to Lead U.S. Geological Survey
- 252 Sequencing Neandertal Mitochondrial Genomes by the Half-Dozen
>> *Report p. 318*
- 253 Lunar Survey Spacecraft Develops an Attitude Problem
- 253 From *Science's* Online Daily News Site
- 254 Roundup of Utah Collectors Stirs a Debate on Enforcement
- 255 From the *Science* Policy Blog

NEWS FOCUS

- 256 Insulin Resistance: Prosperity's Plague
- 261 Can Bolden Banish NASA Blues?
- 262 Shifting Orbits Gave Solar System a Big Shakeup, Model Suggests

LETTERS

- 265 Making the Most of Online Collaboration
J. Chakma and B. Pang
Cognitive Aging Data Will Take Time
K. B. Wray
Response
P. M. Greenfield
Open Access: Increased Citations Not Guaranteed
P. M. Davis
Open Access: The Self-Selection Effect
A. N. Burdett
Open Access: The Sooner the Better
M. Eisen and S. Salzberg

Response

J. A. Evans

- 267 TECHNICAL COMMENT ABSTRACTS
- 267 CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.

- 268 Ecological Developmental Biology
S. F. Gilbert and D. Epel, reviewed by D. W. Pfennig and C. Ledón-Rettig
- 269 The Age of Entanglement
L. Gilder, reviewed by J. P. Dowling

POLICY FORUM

- 270 Beneficial Biofuels—The Food, Energy, and Environment Trilemma
D. Tilman et al.

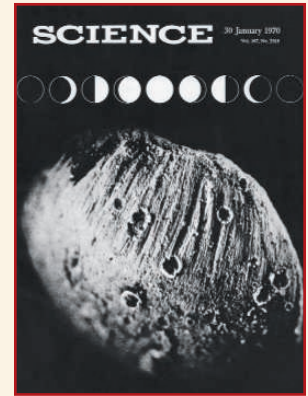
PERSPECTIVES

- 272 Neutralizing Toxic RNA
T. A. Cooper
>> *Report p. 336*
- 273 What Drives Climate Flip-Flops?
A. Timmermann and L. Menviel
>> *Report p. 310*
- 274 Does Viral Diversity Matter?
G. F. Medley and D. J. Nokes
>> *Research Article p. 290*
- 275 Is Quantum Theory Exact?
S. L. Adler and A. Bassi
- 277 Toward a Smarter Web
G. S. Hornby and T. Kurtoglu
- 278 Edge-State Physics Without Magnetic Fields
M. Büttiker
>> *Research Article p. 294*

REVIEWS

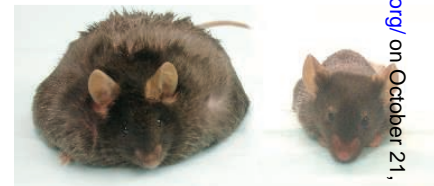
- 280 Dyslexia: A New Synergy Between Education and Cognitive Neuroscience
J. D. E. Gabrieli
- 284 Foundations for a New Science of Learning
A. N. Meltzoff et al.

CONTENTS continued >>

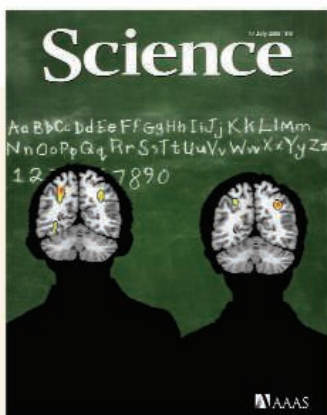


CELEBRATE THE 40TH ANNIVERSARY OF THE APOLLO 11 MOON LANDING

The scientific results of that mission and samples returned from the Moon, published in our 20 January 1970 issue, are now freely available with registration at www.sciencemag.org/apollo11.



page 256



COVER

Average patterns of brain recruitment, as measured by functional magnetic resonance imaging, in children with typical reading development (left) or dyslexia (right) as they sound out printed words. Left-hemisphere brain regions engaged by typical readers, the parietal cortex (upper left) and fusiform gyrus (lower left), are less engaged by dyslexic readers. See page 280.

Photo illustration: Yael Kats (brain scans, Susan Whitfield-Gabrieli and John Gabrieli; background, iStockphoto.com)

DEPARTMENTS

- 242 This Week in *Science*
- 246 Editors' Choice
- 248 *Science* Staff
- 249 Random Samples
- 344 New Products
- 345 *Science* Careers

BREVIA

289 Modern Riding Style Improves Horse Racing Times

T. Pfau et al.

Increased horse race speed over the past century can be attributed to the crouching posture and increased work done by jockeys.

RESEARCH ARTICLES

290 Demographic Variability, Vaccination, and the Spatiotemporal Dynamics of Rotavirus Epidemics

V. E. Pitzer et al.

Diarrhea-causing rotavirus epidemics can be predicted by shifts in birth rate rather than by seasonal variables.

>> *Perspective p. 274; Science Podcast*

294 Nonlocal Transport in the Quantum Spin Hall State

A. Roth et al.

A topological insulator exhibits current flow in edge states around the sample without the need for magnetic fields.

>> *Perspective p. 278*

REPORTS

297 Higher-Order Photon Bunching in a Semiconductor Microcavity

M. Abmann et al.

The tendency for photons to bunch gets stronger as their number increases.

300 Band Formation from Coupled Quantum Dots Formed by a Nanoporous Network on a Copper Surface

J. Lobo-Checa et al.

Trapped electronic states induced by a nanoporous overlayer create an artificial electronic band structure.

303 CH Stretching Excitation in the Early Barrier F + CHD₃ Reaction Inhibits CH Bond Cleavage

W. Zhang et al.

A molecular bond vibration unexpectedly inhibits, rather than promotes, cleavage of the carbon–hydrogen bond.

306 Deep-Sea Temperature and Ice Volume Changes Across the Pliocene-Pleistocene Climate Transitions

S. Sosdian and Y. Rosenthal

Increases in glacial ice volume and ice-sheet dynamics are implicated in two distinct climate cooling events.

310 Transient Simulation of Last Deglaciation with a New Mechanism for Bølling-Allerød Warming

Z. Liu et al.

A coupled atmosphere-ocean general circulation model simulates the warming of the last deglaciation.

>> *Perspective p. 273*

314 Undulatory Swimming in Sand: Subsurface Locomotion of the Sandfish Lizard

R. D. Maladen et al.

X-ray imaging reveals the undulatory motion of a sandfish lizard through a granular fluid.

318 Targeted Retrieval and Analysis of Five Neandertal mtDNA Genomes

A. W. Briggs et al.

Targeted sequencing improves Neandertal mitochondrial DNA retrieval and reveals low diversity among individuals.

>> *News story p. 252*321 The Human SepSecS-tRNA^{Sec} Complex Reveals the Mechanism of Selenocysteine Formation

S. Palioura et al.

A crystal structure shows how a pyroxydial phosphate enzyme catalyzes formation of selenocysteine from phosphoserine on transfer RNA.

325 Tiger Moth Jams Bat Sonar

A. J. Corcoran et al.

Bertholdia trigona thwarts the attacks of bats by generating bursts of ultrasound that interfere with the bats' sonar systems.

>> *Science Podcast*

328 Functional Amyloids as Natural Storage of Peptide Hormones in Pituitary Secretory Granules

S. K. Maji et al.

Peptide and protein hormones are stored in secretory granules in a nonpathological amyloid conformation.

332 RIP3, an Energy Metabolism Regulator That Switches TNF-Induced Cell Death from Apoptosis to Necrosis

D.-W. Zhang et al.

The protein kinase RIP3 mediates necrotic cell death, likely through regulation of metabolic enzymes.

336 Reversal of RNA Dominance by Displacement of Protein Sequestered on Triplet Repeat RNA

T. M. Wheeler et al.

An antisense oligonucleotide ameliorates the symptoms of myotonic dystrophy in transgenic mice.

>> *Perspective p. 272*

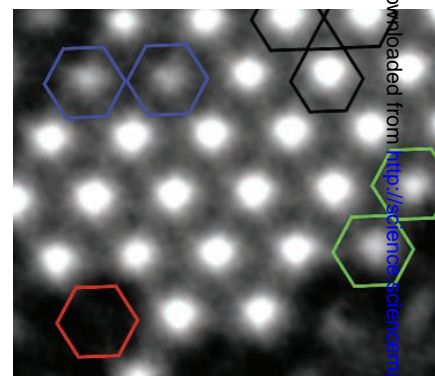
340 Genome-Wide RNAi Screen Identifies Genes Involved in Intestinal Pathogenic Bacterial Infection

S. J. F. Cronin et al.

In vivo RNA interference screen reveals regulators of innate immunity in *Drosophila*.

>> **CONTENTS continued >>>**

page 270



page 300



page 321

SCIENCEONLINE

SCIENCEEXPRESS

www.sciencexpress.org

Lysine Acetylation Targets Protein Complexes and Co-Regulates Major Cellular Functions

C. Choudhary et al.

A proteomic-scale analysis of protein acetylation suggests that it is an important biological regulatory mechanism.

10.1126/science.1175371

Structure and Mechanism of a Na⁺-Independent Amino Acid Transporter

P. L. Shaffer et al.

The structure of the transporter ApcT reveals common architectural principles between proton- and sodium-coupled transporters.

10.1126/science.1176088

Mindblind Eyes: An Absence of Spontaneous Theory of Mind in Asperger Syndrome

A. Senju et al.

Asperger syndrome individuals do not pass a nonverbal false-belief test.

10.1126/science.1176170

An Expressed *Fgf4* Retrogene Is Associated with Breed-Defining Chondrodysplasia in Domestic Dogs

H. G. Parker et al.

The short legs that characterize certain dog breeds are associated with a gene that arose recently by RNA-based gene duplication.

10.1126/science.1173275

Exploring Dark Matter with Milky Way Substructure

M. Kuhlen et al.

Simulations reveal that dark matter in our galaxy could be detected by the Fermi space telescope.

10.1126/science.1174881

Bcl6 and Blimp-1 Are Reciprocal and Antagonistic Regulators of T Follicular Helper Cell Differentiation

R. J. Johnston et al.

The transcription factors that regulate follicular T helper cell differentiation are identified.

10.1126/science.1175870

TECHNICALCOMMENTS

Comment on "Neodymium-142 Evidence for Hadean Mafic Crust"

R. Andreasen and M. Sharma

full text at www.sciencemag.org/cgi/content/full/325/5938/267-a

Response to Comment on "Neodymium-142 Evidence for Hadean Mafic Crust"

J. O'Neil et al.

full text at www.sciencemag.org/cgi/content/full/325/5938/267-b

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Don't Blame Birds for 1918 Flu

A new paper disputes the idea that an avian strain caused the global disaster.

Futuristic Fibers Could Replace Camera Lenses

New technology could be woven into clothing and other materials.

Holy \$@%#! Swearing Eases the Pain

Researchers figure out why we curse when we get hurt.

SCIENCESIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

RESEARCH ARTICLE: Control of Neuronal Growth Cone Navigation by Asymmetric Inositol 1,4,5-Trisphosphate Signals

H. Akiyama et al.

Measurements of its spatial profile reveal the crucial role of asymmetric IP₃ signals in growth cone navigation.

PERSPECTIVE: Down-Regulating Destruction—Phosphorylation Regulates the E3 Ubiquitin Ligase Nedd4-2

P. M. Snyder

Phosphorylation of Nedd4-2 regulates epithelial Na⁺ transport.

GLOSSARY

Find out what ATM, GKAP, and MUP mean in the world of cell signaling.

SCIENCECAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

Tooling Up: The Biomanufacturing Career Track

D. Jensen

Biotech companies are hiring problem-solvers for their manufacturing facilities.

Business Sense: Starting an Academic Lab

S. Webb

Starting your new laboratory requires planning, negotiating, and wise spending decisions.

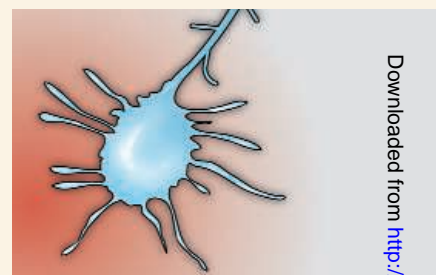
A Career Revisiting Classical Biological Problems

E. Pain

Nenad Ban earned recognition by cracking the crystal structures of complex macromolecules.



SCIENCENOW
Avian roots?



SCIENCESIGNALING
Growth cone navigation.

SCIENCEPODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show

Download the 17 July *Science* Podcast to hear about the dynamics of rotavirus epidemics, how tiger moths jam bat sonar, NIH's new director, and more.

ORIGINSBLOG

blogs.sciencemag.org/origins

A History of Beginnings

SCIENCEINSIDER

blogs.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 © 2009 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): \$835; 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

Science

325 (5938)

Science **325** (5938), 242-344.

ARTICLE TOOLS

<http://science.sciencemag.org/content/325/5938>

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. The title *Science* is a registered trademark of AAAS.

Copyright © 2009 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.