

Science

7 December 2012 | \$10



EDITORIAL

- 1263 Failure of Skin-Deep Learning
Bruce Alberts

NEWS OF THE WEEK

- 1268 A roundup of the week's top stories

NEWS & ANALYSIS

- 1270 Final Report on Stapel Also Blames Field As a Whole
- 1271 Proposed H5N1 Research Reviews Raise Concerns
- 1272 Peering Inside the Moon to Read Its Earliest History
>> *Science Express Reports* by M. T. Zuber et al., M. A. Wieczorek et al., and J. C. Andrews-Hanna et al.; *Science Podcast*
- 1273 River Basin Management Plan Secures Water for the Environment
- 1274 White House Panel Urges Agencies to Take More Risks
- 1275 India Barred Entry to U.S. Author of Seismic Review

NEWS FOCUS

- 1276 Growing Pains in the Desert
- 1282 All Eyes on RNA

LETTERS

- 1285 Voles, Vasopressin, and the Ethics of Framing
D. J. McKaughan and K. C. Elliott
- Disease Prevention: Data Integration
V. J. H. Powell and A. Acharya
- Risk Communication on Shaky Ground
M. Sirota and M. Juanchich
- 1287 CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.

- 1289 Some Suggestions from 2012—The SB&F Prizes Finalists
>> *Science Podcast*
- 1293 Finalists for the Royal Society's Young People's Book Prize

POLICY FORUM

- 1296 U.S. Regulation of Stem Cells as Medical Products
D. Sipp and L. Turner

PERSPECTIVES

- 1298 Putting a Greenhouse Gas to Work
G. Haufe
>> *Report p. 1324*
- 1299 Redder Than Red
T. P. Sakmar
>> *Report p. 1340*
- 1300 Atomic Layer Electrodeposition
J. A. Switzer
>> *Report p. 1327*
- 1301 The Utility of Mouse Models in Post-GWAS Research
A. Lewis and I. Tomlinson
>> *Report p. 1360*
- 1303 Inflammation to Rebuild a Brain
N. Stella
>> *Report p. 1353*
- 1304 Platelets Kill the Parasite Within
C. R. Engwerda and M. F. Good
>> *Report p. 1348*
- 1305 Global Decline in Large Old Trees
D. B. Lindenmayer et al.

CONTENTS continued >>



page 1276



page 1289



COVER

End-on view of the atomic model of the bacterial actinlike ParM protein double-helical filament, generated from an electron microscopic reconstruction. A bipolar spindle of antiparallel ParM filaments pushes plasmids to the cell poles, constituting the simplest known apparatus for the segregation of genetic information. The loops on the outside of the 8- to 9-nanometer-thick filaments are involved in spindle formation. See page 1334.

Image: Jan Löwe

DEPARTMENTS

- 1259 This Week in *Science*
- 1264 Editors' Choice
- 1266 *Science* Staff
- 1369 New Products
- 1370 *Science* Careers

BREVIA

- 1307 Drought in Africa Caused Delayed Arrival of European Songbirds**
A. P. Tøttrup et al.
A severe drought in the Horn of Africa delayed the spring arrival in Europe of two migratory species.

RESEARCH ARTICLE

- 1308 Crystal Structure of the Calcium Release-Activated Calcium Channel Orai**
X. Hou et al.
The unusual architecture of this ion-channel pore regulates the flow of calcium into cells.

REPORTS

- 1314 Binary Millisecond Pulsar Discovery via Gamma-Ray Pulsations**
H. J. Pletsch et al.
A computer-intensive search revealed gamma-ray pulsations from an exotic binary star system in data from the Fermi Telescope.
- 1317 Mapping Local Charge Recombination Heterogeneity by Multidimensional Nanospectroscopic Imaging**
W. Bao et al.
A near-field optical probe designed to maximize its own signal enhancement can be used to image nonmetallic samples.
- 1321 Robust Photogeneration of H₂ in Water Using Semiconductor Nanocrystals and a Nickel Catalyst**
Z. Han et al.
A photoreduction system combining nanoparticulate light absorbers with a soluble molecular catalyst proves stable for weeks.
- 1324 Taming of Fluoroform: Direct Nucleophilic Trifluoromethylation of Si, B, S, and C Centers**
G. K. S. Prakash et al.
Proper choice of base and solvent renders fluoroform a useful reagent to introduce trifluoromethyl groups into a range of compounds.
>> *Perspective p. 1298*
- 1327 Self-Terminating Growth of Platinum Films by Electrochemical Deposition**
Y. Liu et al.
Control over the presence of adsorbed hydrogen enables rapid sequential deposition of metal monolayers from aqueous solution.
>> *Perspective p. 1300*
- 1330 Phase Transformations and Metallization of Magnesium Oxide at High Pressure and Temperature**
R. S. McWilliams et al.
Mantle minerals conductive at the high pressures and temperatures of planetary interiors could induce a magnetic field.

- 1334 A Bipolar Spindle of Antiparallel ParM Filaments Drives Bacterial Plasmid Segregation**
P. Gayathri et al.
A bipolar spindle, formed by antiparallel actinlike filaments, pushes sister plasmids apart.

- 1337 Kinetic Responses of β -Catenin Specify the Sites of Wnt Control**
A. R. Hernández et al.
Reducing the rate of phosphorylation of β -catenin leads to an increase in the steady-state level of the unmodified form.

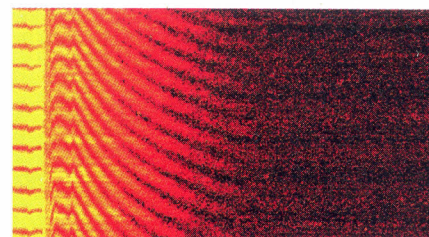
- 1340 Tuning the Electronic Absorption of Protein-Embedded All-*trans*-Retinal**
W. Wang et al.
Opsin-based light absorption was tuned over a 200-nanometer range by rationally engineering retinol-binding protein.
>> *Perspective p. 1299*

- 1344 Identity and Function of a Large Gene Network Underlying Mutagenic Repair of DNA Breaks**
A. A. M. Al Mamun et al.
The complete set of proteins required for a mutagenic DNA-repair pathway is defined in *Escherichia coli*.

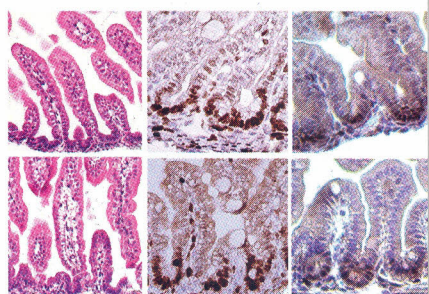
- 1348 Platelet Factor 4 and Duffy Antigen Required for Platelet Killing of *Plasmodium falciparum***
B. J. McMorran et al.
Interaction of a platelet protein and a red cell protein enables platelets to attack malarial parasites inside red cells.
>> *Perspective p. 1304*

- 1352 Developmental Progression to Infectivity in *Trypanosoma brucei* Triggered by an RNA-Binding Protein**
N. G. Kolev et al.
The developmental stages of the sleeping sickness parasite can now be observed without the tsetse fly.
>> *Science Podcast*

- 1353 Acute Inflammation Initiates the Regenerative Response in the Adult Zebrafish Brain**
N. Kyritsis et al.
An inflammatory response to traumatic injury promotes neurogenesis and repair in the zebrafish brain.
>> *Perspective p. 1303*



page 1330



pages 1301 & 1360

- 1357 Sexually Dimorphic BDNF Signaling Directs Sensory Innervation of the Mammary Gland**
Y. Liu et al.
Androgen-driven changes in receptor expression disrupt a neuronal signaling pathway and de-innervation.
- 1360 Mice Lacking a *Myc* Enhancer That Includes Human SNP rs6983267 Are Resistant to Intestinal Tumors**
I. K. Sur et al.
A human genetic variant, identified in genome-wide association studies as increasing cancer risk, alters tumorigenesis in mice.
>> *Perspective p. 1301*
- 1363 Evolution of an MCM Complex in Flies That Promotes Meiotic Crossovers by Blocking BLM Helicase**
K. P. Kohl et al.
Minichromosome maintenance proteins have been co-opted to make meiotic recombination safe in flies.

CONTENTS continued >>

ONLINE HIGHLIGHTS

SCIENCEEXPRESS

www.sciencexpres.org

Publication Ahead of Print

Gravity Field of the Moon from the Gravity Recovery and Interior Laboratory (GRAIL) Mission
M. T. Zuber et al.

10.1126/science.1231507

The Crust of the Moon as Seen by GRAIL

M. A. Wieczorek et al.

10.1126/science.1231530

Ancient Igneous Intrusions and Early Expansion of the Moon Revealed by GRAIL Gravity Gradiometry

J. C. Andrews-Hanna et al.

10.1126/science.1231753

>> News story p. 1272

Neural Basis of a Pollinator's Buffet: Olfactory Specialization and Learning in *Manduca sexta*

J. A. Riffell et al.

10.1126/science.1225483

Suppression of Oxidative Stress by β -Hydroxybutyrate, an Endogenous Histone Deacetylase Inhibitor

T. Shimazu et al.

10.1126/science.1227166

JNK Expression by Macrophages Promotes Obesity-Induced Insulin Resistance and Inflammation

M. S. Han et al.

10.1126/science.1227568

Germline DNA Demethylation Dynamics and Imprint Erasure Through 5-Hydroxymethylcytosine

J. A. Hackett et al.

10.1126/science.1229277

SCIENCE NOW

www.sciencenow.org

Highlights From Our Daily News Coverage

The First Signs of Ancient Life on Mars?

The Curiosity rover has detected organic matter, but it may never have been alive.

<http://scim.ag/Life-Mars>

Why Old People Get Scammed

The anterior insula may make us less suspicious as we age.

http://scim.ag/Brain_Region

Read My Hips

Intense emotions are easier to read in the body than in the face.

http://scim.ag/Intense_Emotions

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

4 December issue: <http://scim.ag/ss120412>

RESEARCH ARTICLE: RNF4-Dependent Hybrid SUMO-Ubiquitin Chains Are Signals for RAP80 and Thereby Mediate the Recruitment of BRCA1 to Sites of DNA Damage

C. M. Guzzo et al.

DNA repair proteins find sites of damage marked by hybrid SUMO-ubiquitin chains.

RESEARCH ARTICLE: G Protein-Coupled Receptor-Mediated Activation of p110 β by G β Is Required for Cellular Transformation and Invasiveness

H. A. Dbouk et al.

Loss of the phosphatase PTPN22 enhances the functions of both effector and regulatory T cells.

PERSPECTIVE: Cdc42 Oscillations in Yeasts

F. O. Bendezu and S. G. Martin

Oscillations in the localization of active Cdc42 govern polarized cell growth in yeasts.

PRESENTATION: SCF-Mediated Degradation of p100 (NF- κ B2): Mechanisms and Relevance in Multiple Myeloma

L. Busino et al.

Degradation of an inhibitor of noncanonical NF- κ B signaling promotes cell survival.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

5 December issue: <http://scim.ag/stm120512>

FOCUS: The Goldilocks Effect

M. Boothby and C. L. Williams

RESEARCH ARTICLE: Overexpression of Methyl-CpG Binding Protein 2 Impairs T_H1 Responses

T. Yang et al.

MECP2 gene duplication causes immune dysregulation by suppressing IFN- γ production from T helper cells.

FOCUS: Creating a Space for Innovative Device Development

M. McMurtry-Heath and M. A. Hamburg

The FDA announces a nonprofit partnership to advance regulatory science for medical technology development.

RESEARCH ARTICLE: α -Synuclein-Induced Down-Regulation of Nurr1 Disrupts GDNF Signaling in Nigral Dopamine Neurons

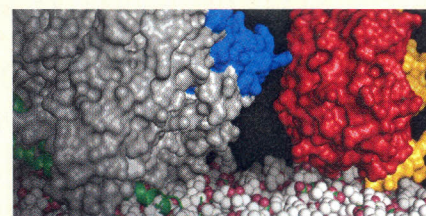
M. Decressac et al.

Nurr1 mediates protection of dopamine neurons by GDNF in response to α -synuclein-mediated toxicity.

RESEARCH ARTICLE: Decreased Tonic Inhibition in Cerebellar Granule Cells Causes Motor Dysfunction in a Mouse Model of Angelman Syndrome

K. Egawa et al.

Ube3a deficiency causes decreased cerebellar tonic inhibition by preventing degradation of GAT1 in Angelman syndrome.



SCIENCE SIGNALING

Targeting the interaction site.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

4 December issue: <http://scim.ag/SciCareers7December2012>

Getting Back Your Mojo

M. Price

Psychologists share tips for figuring out what is sapping your enthusiasm—and how to get it back.

Taken for Granted: How Not to Attract Minorities to STEM

B. L. Benderly

Research shows that large admissions preferences stymie studies in science and technical subjects.

myIDP: What Do You Care About?

B. Lindstaedt et al.

Analyzing and prioritizing your deeply held values are crucial steps in choosing a scientific career.

SCIENCE PODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show for 7 December 2012

Listen to stories on sleeping sickness, prize-winning children's books, the GRAIL project, 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 © 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