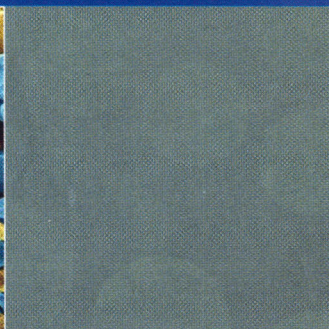
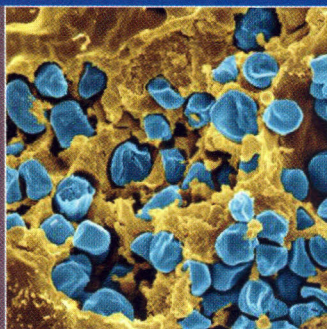


Science

2 November 2012 | \$10

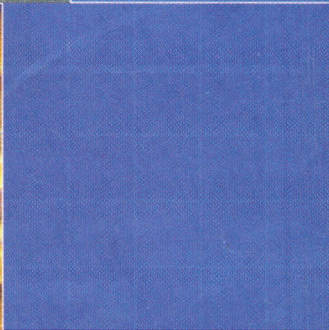
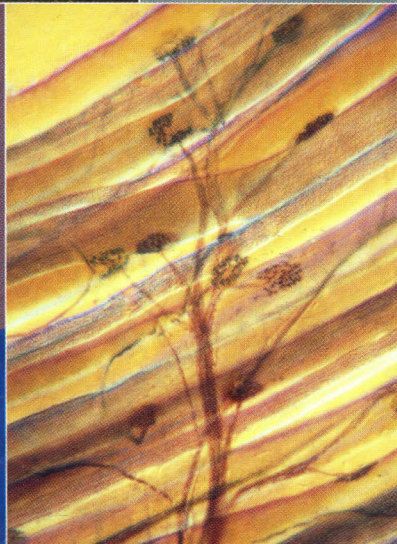
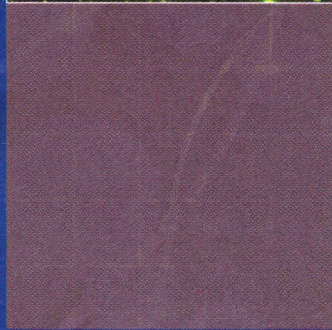
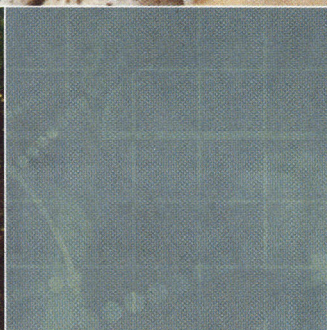
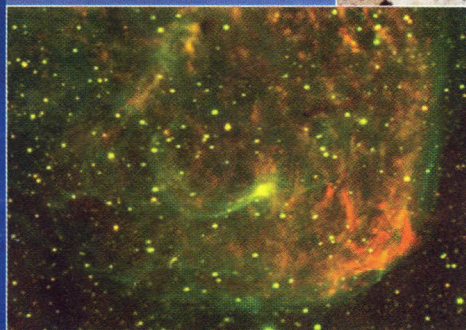


THE BEAUTY AND BENEFITS OF SCIENCE

AAAS ANNUAL MEETING

14-18 FEBRUARY 2013

HYNES CONVENTION CENTER
BOSTON



EDITORIAL

- 581 The Scientist as World Citizen
Mary-Claire King

NEWS OF THE WEEK

- 586 A roundup of the week's top stories

NEWS & ANALYSIS

- 589 Convictions Leave Italy's Civil Protection in Chaos
590 Immune Reactions Help Reprogram Cells
591 Flying Dinos and Baby Birds Offer New Clues About How Avians Took Wing
592 Indonesia to Drop Science for Youngest Students
593 Cancer Gene Data Casts Doubt on Popular Research Method
595 U.S. Agencies Feel the Pinch of Travel Cutbacks

NEWS FOCUS

- 596 GLOBAL RESEARCH UNIVERSITIES
Excellence, *Ja*, Elitism, *Non*
>> *Science Podcast*
600 Putting Rockfish Back Where They Belong

LETTERS

- 603 Antarctic Treaty System Ready for a Challenge
M. Haward et al.
China's Wastewater Treatment Goals
Z. Wang
Denuclearization's Indirect Consequences
S. D. Fam et al.
604 CORRECTIONS AND CLARIFICATIONS
604 TECHNICAL COMMENT ABSTRACTS

BOOKS ET AL.

- 607 The Science of Human Perfection
N. Comfort, reviewed by A. N. H. Creager
608 Cells to Civilizations
E. Coen, reviewed by M. D. Laubichler

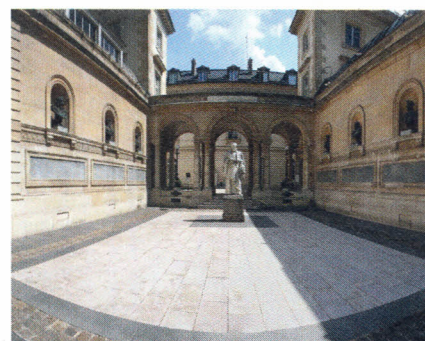
POLICY FORUM

- 610 Obama and the Promotion of International Science
T. J. Bollyky and P. L. Bollyky
612 Optimizing Investments in Malaria Treatment and Diagnosis
J. M. Cohen et al.
615 From Financing to Fevers: Lessons of an Antimalarial Subsidy Program
R. Laxminarayan et al.
>> *Science Podcast*

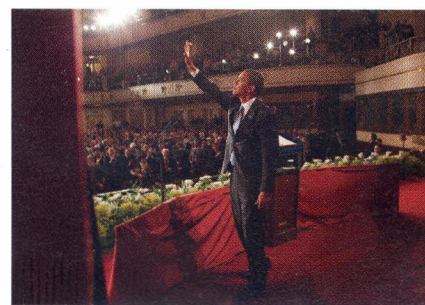
PERSPECTIVES

- 617 Implications of Scarcity
A. P. Zwane
>> *Report p. 682*
618 Getting to the Root of Aging
A. Baudisch and J. W. Vaupel
619 How Cichlids Diversify
M. E. Santos and W. Salzburger
621 Quantum Procrastination
S. Lloyd
>> *Reports pp. 634 and 637*
622 Chloroplast Delivery by UPS
F. Kessler
>> *Report p. 655*
624 A New Direction for Gene Loops
M. Hampsey
>> *Report p. 671*
625 Getting Moore from Solar Cells
D. J. Norris and E. S. Aydil
>> *Report p. 643*
626 Tempting a Molecular Tug-of-War
M. R. Diehl
>> *Report p. 662*

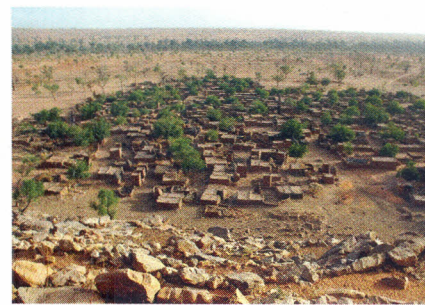
CONTENTS continued >>



page 596



page 610



pages 617 & 682



COVER

The theme of the 2013 AAAS Annual Meeting, 14 to 18 February in Boston, Massachusetts, is *The Beauty and Benefits of Science*. This theme highlights the "unreasonable effectiveness" of the scientific enterprise in creating economic growth, solving societal problems, and satisfying the essential human drive to understand the world in which we live. The preliminary program begins on page 688.

Images (clockwise from top-left): wekwek/iStockphoto; Science Source; Biophoto Associates/Science Source; Eric Grave/Science Source; NASA; Ted Kinsman/Science Source

DEPARTMENTS

- 578 This Week in *Science*
582 Editors' Choice
584 Science Staff
687 New Products
688 AAAS Meeting Program
698 Science Careers

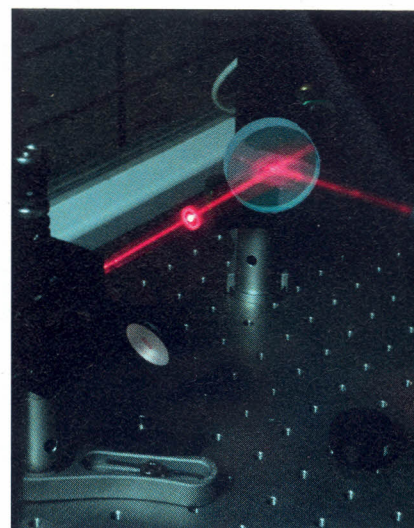
REVIEW

- 628 **Marine Microbes See a Sea of Gradients**
R. Stocker
>> Report p. 675

REPORTS

- 634 **A Quantum Delayed-Choice Experiment**
A. Peruzzo et al.
>> Science Podcast
- 637 **Entanglement-Enabled Delayed-Choice Experiment**
F. Kaiser et al.
Quantum entanglement is used to probe the nature of the photon.
>> Perspective p. 621
- 640 **Quantum Entanglement of High Angular Momenta**
R. Fickler et al.
A method to entangle photons with very-high-orbital angular momentum quantum numbers advances quantum information science.
- 643 **Efficient Hybrid Solar Cells Based on Meso-Superstructured Organometal Halide Perovskites**
M. M. Lee et al.
Mesostructured alumina acts as an insulating scaffold for the assembly of very thin films of n- and p-type semiconductors.
>> Perspective p. 625
- 647 **Photoinduced Ullmann C–N Coupling: Demonstrating the Viability of a Radical Pathway**
S. E. Creutz et al.
A century-old carbon–nitrogen coupling method can be accelerated by light.
- 651 **The Absolute Chronology and Thermal Processing of Solids in the Solar Protoplanetary Disk**
J. N. Connelly et al.
Isotopic dating implies that, contrary to previous results, two types of primitive solar system solids formed coevally.
- 655 **Chloroplast Biogenesis Is Regulated by Direct Action of the Ubiquitin-Proteasome System**
Q. Ling et al.
Protein degradation helps to coordinate the growth of chloroplasts with that of the whole plant.
>> Perspective p. 622
- 659 **Tricking the Guard: Exploiting Plant Defense for Disease Susceptibility**
J. Lorang et al.
Cochliobolus victoriae, a necrotrophic fungal pathogen with devastating effects on oat crops reveals its strategies.
- 662 **Tug-of-War in Motor Protein Ensembles Revealed with a Programmable DNA Origami Scaffold**
N. D. Derr et al.
Two microtubule motors attached to the same cargo cooperate or compete, depending on relative directionality.
>> Perspective p. 626
- 666 **Synchronizing Nuclear Import of Ribosomal Proteins with Ribosome Assembly**
D. Kressler et al.
The transport adaptor symportin mediates stoichiometric import of a pair of ribosomal proteins.
- 671 **Gene Loops Enhance Transcriptional Directionality**
S. M. Tan-Wong et al.
A protein constrains double-helical DNA physically, thereby pointing RNA polymerases in the right direction.
>> Perspective p. 624
- 675 **Trade-Offs of Chemotactic Foraging in Turbulent Water**
J. R. Taylor and R. Stocker
In their quest for dissolved organic matter, marine bacteria overcome the effects of turbulence by swimming efficiently.
>> Review p. 628
- 679 **Asymmetric Division of *Drosophila* Male Germline Stem Cell Shows Asymmetric Histone Distribution**
V. Tran et al.
The allocation of newly made histones to the daughter cell may explain how stem cells retain their epigenetic footprint.
- 682 **Some Consequences of Having Too Little**
A. K. Shah et al.
Being poor means that resources such as time and money are scarce, and this changes how people who are poor behave.
>> Perspective p. 617; Science Podcast

CONTENTS continued >>



page 640



pages 622 & 655

ONLINE HIGHLIGHTS

SCIENCEEXPRESS

www.sciencexpress.org

Publication Ahead of Print

The Imprint of the Extragalactic Background Light in the Gamma-Ray Spectra of Blazars

M. Ackermann et al.

10.1126/science.1227160

Para-Aminosalicylic Acid Acts as an Alternative Substrate of Folate Metabolism in *Mycobacterium tuberculosis*

S. Chakraborty et al.

10.1126/science.1228980

Mice Lacking a *Myc* Enhancer That Includes Human SNP rs6983267 Are Resistant to Intestinal Tumors

I. K. Sur et al.

10.1126/science.1228606

Content-Specific Fronto-Parietal Synchronization During Visual Working Memory

R. F. Salazar et al.

10.1126/science.1224000

Influence of Threonine Metabolism on S-Adenosylmethionine and Histone Methylation

N. Shyh-Chang et al.

10.1126/science.1226603

TECHNICAL COMMENTS

Comment and Response on "Multiyear Prediction of Monthly Mean Atlantic Meridional Overturning Circulation at 26.5°N"

Comment: G. A. Vecchi et al.

<http://dx.doi.org/10.1126/science.1222566>

Response: D. Matei et al.

<http://dx.doi.org/10.1126/science.1223200>

SCIENCE NOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Using Gut Bacteria to Fight Diarrhea

Mice show a treatment for chronic infection.

http://bit.ly/Gut_Bacteria

Dinosaurs Sprouted Wings Earlier Than Previously Thought

However, these wings were probably used for courtship or brooding rather than flight.

http://bit.ly/Dino_wings

Oceans Getting Too Hot to Handle?

Tropical marine organisms are shifting northward as temperatures rise.

http://bit.ly/Shifting_Plankton

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

30 October issue: <http://scim.ag/ss103012>

RESEARCH ARTICLE: Mice Lacking the ITIM-Containing Receptor G6b-B Exhibit Macrothrombocytopenia and Aberrant Platelet Function

A. Mazharian et al.

PODCAST

Y. A. Senis and A. M. VanHook

An inhibitory receptor ensures that megakaryocytes produce proper numbers of functional platelets.

MEETING REPORT: Stress Response and Child Health

E. Charmandari et al.

Endocrine and inflammatory responses to stress affect many aspects of development, physiology, and cognition.

PRESENTATION: Prenatal Stress, Telomere Biology, and Fetal Programming of Health and Disease Risk

S. Entringer et al.

Telomere biology may link intrauterine stress to newborn, child, and adult health and disease risk.

PRESENTATION: Protein Complexes and Target Genes Identification by in Vivo Biotinylation—The STAT5 Paradigm

E. Katsantoni

A transcription factor's interacting partners and target genes can reveal context-specific signaling and transcriptional outputs.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

31 October issue: <http://scim.ag/stm103112>

RESEARCH ARTICLE: Food-Grade Bacteria Expressing Elafin Protect Against Inflammation and Restore Colon Homeostasis

J. P. Motta et al.

Gut bacteria engineered to make a protease inhibitor inhibit inflammation and heal colitis in mice.

RESEARCH ARTICLE: Immune Parameters Correlate with Protection Against Ebola Virus Infection in Rodents and Nonhuman Primates

G. Wong et al.

Antibody induction may serve as a surrogate for survival in protecting against Ebola infection.

RESEARCH ARTICLE: Window Reveals a Pre-Micrometastasis Stage During Liver Metastasis

L. Ritsma et al.

FOCUS: A Window into Metastasis

D. Brucker et al.

An abdominal window allows imaging of cancer metastasis in real time.

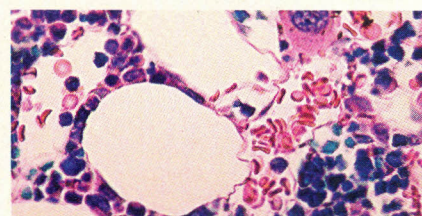
EDITORIAL: Emerging Economies, Enduring Partnerships

B. Onaral

PODCAST

B. Onaral and K. LaMarco

Mutually beneficial innovation alliances are built on belief in a joint mission and a shared vision.



SCIENCE SIGNALING

Platelet-producing megakaryocytes.

REVIEW: Computational Medicine—Translating Models to Clinical Care

R. L. Winslow et al.

Modeling molecular networks, physiology, and anatomy could improve personalized medicine.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

<http://scim.ag/SciCareers2November2012>

A Modest Workforce Proposal

M. Price

An NAS report forgoes skills-gap rhetoric and focuses on DOD's needs.

Taken for Granted: Ethics Across Borders

B. L. Benderly

Different approaches to responsible research conduct challenge scientists working internationally.

myIDP: Interests

B. Lindstaedt et al.

It sounds obvious, but when choosing a career path, you need to think hard about what you like to do.

SCIENCE PODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show for 2 November 2012

Listen to stories on delaying quantum decisions, perpetuating poverty, growing global universities, 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