

EDITORIAL

- 891 India's "Science for All" Academy
Raghunath Mashelkar
>> News section p. 904

NEWS OF THE WEEK

- 896 A roundup of the week's top stories

NEWS & ANALYSIS

- 899 WHO Group: H5N1 Papers Should Be Published In Full
>> See all H5N1 coverage online at http://scim.ag/_h5n1
- 900 Scientists Decry Cuts That Would Doom ExoMars Missions
- 901 Bigger Contribution to ITER Erodes Domestic Fusion Program
- 902 Advocates Win 'Exceptional' Boost for Alzheimer's Research
- 903 Kansas Veterinary Biosecurity Lab Trampled in Spending Plan

NEWS FOCUS

- 904 SCIENCE IN INDIA
India Rising
Ad Astra, With a 'Uniquely Indian Flavor'
Crowd-Sourcing Drug Discovery
Drawing a Bead on India's Enigmatic Monsoon
>> Science Podcast
- 907 India's Scholar-Prime Minister Aims for Inclusive Development
>> Editorial p. 891

LETTERS

- 915 Uniting Church and Science for Conservation
C. L. Cardelús et al.
Growing Need for Agriculture Experts
J. Volenec et al.
Demography's Role in Sustainable Development
W. Lutz et al.
- 918 CORRECTIONS AND CLARIFICATIONS
- 918 TECHNICAL COMMENT ABSTRACTS

BOOKS ET AL.

- 920 The Sounding of the Whale
D. G. Burnett, reviewed by G. Mitman
- 921 Charles R. Knight
R. Milner, reviewed by M. A. Parrish

POLICY FORUM

- 922 Preserving Montreal Protocol Climate Benefits by Limiting HFCs
G. J. M. Velders et al.

PERSPECTIVES

- 924 Some Like It Hot
F. A. Smith
>> Report p. 959
- 925 Frictional Dissipation—Blame It on the Rain
D. M. W. Frierson
>> Report p. 953
- 926 Cell Death by Glutamine Repeats?
C. D. Link and T. K. Saldi
>> Report p. 970
- 928 How a Neurotoxin Survives
M. Adler
>> Report p. 977
- 929 Solving Amorphous Structures—Two Pairs Beat One
J. M. Gibson
>> Report p. 950
- 930 Mendelian Puzzles
A. Chakravarti and A. Kapoor
>> Report p. 966

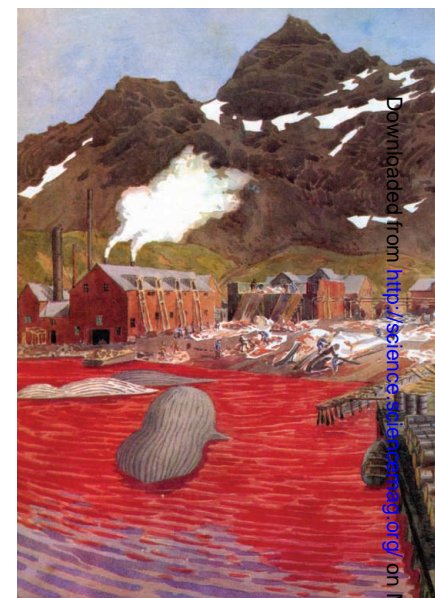
SCIENCE PRIZE ESSAY

- 932 A Season for Inquiry: Investigating Phenology in Local Campus Trees
T. Long and S. Wyse

CONTENTS continued >>



page 907



page 920

Downloaded from <http://science.sciencemag.org/> on May 24, 2019



COVER

An agricultural outreach educator visits a village in rural Andhra Pradesh, India. India aims to double the research and development share of its economy and engage a broader swathe of its 1.2 billion citizens in science and technology. See an interview with Prime Minister Manmohan Singh (page 907), an Editorial by Raghunath Mashelkar (page 891), and a special News package (beginning on page 904).

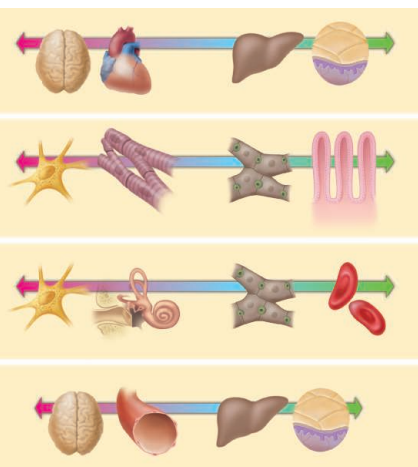
Photo: Pallava Bagla

DEPARTMENTS

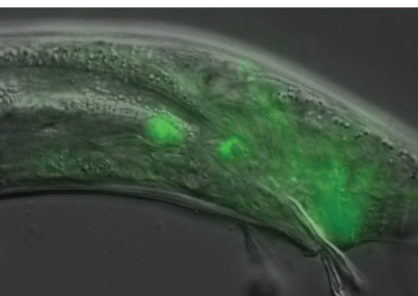
- 888 This Week in *Science*
892 Editors' Choice
894 *Science* Staff
935 AAAS News & Notes
997 New Products
998 *Science* Careers



page 932



page 936



pages 926 & 970

REVIEW

- 936 Disease Tolerance as a Defense Strategy
R. Medzhitov et al.

BREVIA

- 942 Extremely Long-Lived Nuclear Pore Proteins in the Rat Brain
J. N. Savas et al.
Individual components of rat brain nuclear pores can be almost as old as the animal itself.

RESEARCH ARTICLE

- 943 Evolution of Shape by Multiple Regulatory Changes to a Growth Gene
D. W. Loehlin and J. H. Werren
The comparison of two closely related parasitoid wasps reveals the genetic bases for differences in size and shape of the *Nasonia* wings.

REPORTS

- 947 Field-Effect Tunneling Transistor Based on Vertical Graphene Heterostructures
L. Britnell et al.
Boron nitride or molybdenum disulfide layers sandwiched between graphene sheets act as tunneling barriers to minimize device leakage currents.
- 950 The Local Structure of Amorphous Silicon
M. M. J. Treacy and K. B. Borisenko
Amorphous silicon is more accurately described by a paracrystalline model, not the idealized continuous random network.
>> *Perspective p. 929*
- 953 Satellite Estimates of Precipitation-Induced Dissipation in the Atmosphere
O. Pauluis and J. Dias
Falling precipitation rivals turbulence in dissipating atmospheric energy.
>> *Perspective p. 925*
- 956 Collapse of Classic Maya Civilization Related to Modest Reduction in Precipitation
M. Medina-Elizalde and E. J. Rohling
The fall of Maya civilization occurred over two centuries when droughts reduced precipitation by up to 40 percent annually.
- 959 Evolution of the Earliest Horses Driven by Climate Change in the Paleocene-Eocene Thermal Maximum
R. Secord et al.
Oxygen isotope measurements of fossil teeth show that the body size of the horse *Sifrhippus* decreased as temperature increased.
>> *Perspective p. 924; Science Podcast*

- 962 One-Time Transfers of Cash or Capital Have Long-Lasting Effects on Microenterprises in Sri Lanka
S. de Mel et al.
Small businesses run by the urban poor enjoy greater profits and longevity 5 years after receiving a helping hand.
- 966 Evolutionarily Assembled cis-Regulatory Module at a Human Ciliopathy Locus
J. H. Lee et al.
Mutation in either of a pair of neighboring, coordinately expressed genes causes indistinguishable human disease.
>> *Perspective p. 930*
- 970 Control of Nonapoptotic Developmental Cell Death in *Caenorhabditis elegans* by a Polyglutamine-Repeat Protein
E. S. Blum et al.
A nematode protein containing runs of the amino acid glutamine, like some linked to neurodegeneration, causes cell death.
>> *Perspective p. 926*
- 973 The Robustness and Restoration of a Network of Ecological Networks
M. J. O. Pocock et al.
Analysis of seven interconnected networks on a farm reveals that they vary in their fragility, but that they do not covary.
>> *Science Podcast*
- 977 Botulinum Neurotoxin Is Shielded by NTNHA in an Interlocked Complex
S. Gu et al.
Structural and biochemical studies show how a bacterial toxin protects itself against digestion in the gut.
>> *Perspective p. 928*
- 981 Single-Molecule Fluorescence Experiments Determine Protein Folding Transition Path Times
H. S. Chung et al.
Quickly and slowly folding proteins take the same time to cross the barrier from the unfolded to the folded state.
- 984 The Alarmin Interleukin-33 Drives Protective Antiviral CD8⁺ T Cell Responses
W. V. Bonilla et al.
A danger signal released from dying cells is required for antiviral immunity in mice.
- 989 The Cellular Basis of GABA_B-Mediated Interhemispheric Inhibition
L. M. Palmer et al.
Coordinating the right and left sides of the brain is mediated by the inhibition of activation in neuronal dendrites.

SCIENCEONLINE

SCIENCEEXPRESS

www.sciencexpress.org

Seroevidence for H5N1 Influenza Infections in Humans: Meta-Analysis

T. T. Wang et al.

One to two percent of 14,000 people tested in 20 studies showed evidence of prior H5N1 infection. 10.1126/science.1218888

>> See all H5N1 coverage online at http://scim.ag/_h5n1

Glucocorticoids Can Induce PTSD-Like Memory Impairments in Mice

N. Kaouane et al.

The infusion of a stress hormone produces fear responses to cues that were not associated with the traumatic event itself. 10.1126/science.1207615

A Bruce Effect in Wild Geladas

E. K. Roberts et al.

Long-term field studies show that female monkeys improve their fitness by terminating their pregnancies when a new male becomes dominant. 10.1126/science.1213600

Coherent Sensing of a Mechanical Resonator with a Single-Spin Qubit

S. Kolkowitz et al.

The spin of a nitrogen vacancy defect in diamond is used to sense the motion of a magnetized microresonator. 10.1126/science.1216821

The Role of Driving Energy and Delocalized States for Charge Separation in Organic Semiconductors

A. A. Bakulin et al.

Bound excited charge carriers achieve long-range separation by promotion to delocalized band states. 10.1126/science.1217745

TECHNICALCOMMENTS

Comment on "Lévy Walks Evolve Through Interaction Between Movement and Environmental Complexity"

V. A. A. Jansen et al.

Full text at www.sciencemag.org/cgi/content/full/335/6071/918-c

Response to Comment on "Lévy Walks Evolve Through Interaction Between Movement and Environmental Complexity"

M. de Jager et al.

Full text at www.sciencemag.org/cgi/content/full/335/6071/918-d

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

A Practical Blueprint for a Low-Carbon Electric World?

'Transformative' technologies may wean the world from fossil fuel-based electricity.

http://scim.ag/Electric_World

Nuclear Reactors Not Needed to Make the Most Common Medical Isotope

A new technique uses a medical cyclotron to produce radioisotopes.

http://scim.ag/Medical_Isotope

Global Fisheries Deals: What's the Catch?

Some fishing agreements are not what they seem.

http://scim.ag/Global_Fisheries

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

21 February issue: <http://scim.ag/ss022112>

RESEARCH ARTICLE: RGS Proteins Maintain Robustness of GPCR-GIRK Coupling by Selective Stimulation of the G Protein Subunit G α_o

H. Chuang and A. Y. Chuang

Opposing actions of RGS proteins both stimulate and inhibit G proteins to modulate the amplitude and kinetics of the downstream response.

RESEARCH ARTICLE: Inhibition of Autophagy Ameliorates Acute Lung Injury Caused by Avian Influenza A H5N1 Infection

Y. Sun et al.

Blocking autophagy reduces the extent of lung damage and decreases mortality in mice infected with the H5N1 strain of avian influenza.

PERSPECTIVE: Semaphorin Signaling Meets Rap

J. L. Bos and W.-J. Pannkoek

Semaphorin binding stimulates the ability of plexin receptors to inhibit the GTPase Rap1, thereby enabling neurite retraction.

PRESENTATION: TGF- β Signaling in Endothelial-to-Mesenchymal Transition—The Role of Shear Stress and Primary Cilia

P. ten Dijke et al.

The loss of primary cilia is a prerequisite for flow-induced endothelial-to-mesenchymal transition in heart development.

GLOSSARY

Find out what 4E-BP, DEAD, and eIF4E mean in the world of cell signaling.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

22 February issue: <http://scim.ag/stm022212>

RESEARCH ARTICLE: First-in-Human Testing of a Wirelessly Controlled Drug Delivery Microchip

R. Farra et al.

A wireless microchip-based device implanted in humans delivers a drug for treating osteoporosis.

EDITORIAL: Reengineering Device Translation Timelines

J. Watson

Innovative engineering will shorten the translational timeline from concept to clinical application for medical devices.

RESEARCH ARTICLE: MicroRNA-21 Blocks Abdominal Aortic Aneurysm Development and Nicotine-Augmented Expansion

L. Maegdefessel et al.

miR-21 modulates abdominal aortic aneurysm development by regulating cell proliferation and apoptosis.

RESEARCH ARTICLE: Breast Cancer-Associated *Abraxas* Mutation Disrupts Nuclear Localization and DNA Damage Response Functions

S. Solyom et al.

A germline mutation in the *Abraxas* gene impairs the BRCA1 DNA damage response in familial breast cancer.

COMMENTARY: Recalibrating Intellectual Property Rights to Enhance Translational Research Collaborations

T. Bubela et al.

New collaborative models of therapeutic research and development require active governance of intellectual property rights to enable sharing.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

Experimental Error: I've Got Your Impact Factor Right Here

A. Ruben

The *Journal of Negative Results* is only the beginning.

http://scim.ag/EE_NewJournals

Stepping Out of Big Pharma's Shadow

M. Price

As big-pharma jobs disappear, pharma scientists are landing at start-ups, launching their own, or joining academia.

<http://scim.ag/SteppingOutBigPharma>

Q&A: Outsourcing Himself

E. Pain

Chemist Andrew McElroy got the idea for his company the day he was told he would likely lose his job at Pfizer.

<http://scim.ag/OutsourcingHimself>

SCIENCEPODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show

On the 24 February *Science* Podcast: restoring ecological "networks of networks," climate change and early horse evolution, the state of science in India, 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 #R1254 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

Science

335 (6071)

Science **335** (6071), 888-997.

ARTICLE TOOLS

<http://science.sciencemag.org/content/335/6071>

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. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.