

EDITORIAL

- 369 Escalating Threat of Wheat Rust
Mogens Støvring Hovmøller et al.

NEWS OF THE WEEK

- 374 At Last, Vaginal Gel Scores Victory Against HIV
>> Science Express Research Article by Q. Abdoal Karim et al.
- 375 Planned Study of Avandia in Doubt After FDA Review
- 376 NSF Misfires on Plan to Revamp Minority Programs
- 377 Chinese Policies Could Pinch U.S. Efforts to Make Electric Vehicles
- 377 From the *Science* Policy Blog
- 378 Last Stand on the Yangtze
- 379 From *Science's* Online Daily News Site
- 380 Nobelist Paul Nurse to Pilot Royal Society, London Superlab

NEWS FOCUS

- 382 Dams for Patagonia
A Craving for Hydropower
>> Science Podcast
- 386 Can Dogs Behaving Badly Suggest a New Way to Treat OCD?

LETTERS

- 388 Bracing for Oil
R. N. Silverstein
- Evolution of Fairness: Cultural Variability
N. Baumard et al.
- Evolution of Fairness: Rereading the Data
A. W. Delton et al.
- Response
J. Henrich et al.

- 390 CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.

- 391 Hybrid
N. Kingsbury, reviewed by A. B. Bennett
- 392 Pandora's Seed
S. Wells, reviewed by S. H. Ali

POLICY FORUM

- 393 Prepublication Data Release, Latency, and Genome Commons
J. L. Contreras

PERSPECTIVES

- 395 Launched at 36,000g
J. L. van Leeuwen
>> Brevia p. 406
- 396 Pairs Rule Quantum Interference
J. D. Franson
>> Report p. 418
- 397 Wnt Fans the Flames in Obesity
D. Y. Oh and J. M. Olefsky
>> Report p. 454
- 399 Machine Science
J. Evans and A. Rzhetsky
- 400 Carbonates and Martian Climate
R. P. Harvey
>> Report p. 421
- 402 Filtering Wildlife
J. S. Brashares
- 403 Seeing the Light of Day
C. Cepko
>> Research Article p. 413

CONTENTS continued >>

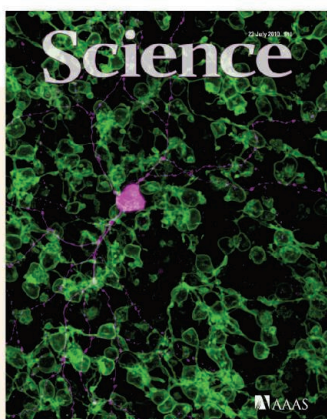


page 382



page 392

Downloaded from https://www.sciencemag.org/ on September 23, 2020



COVER

Retinal photoreceptors from a mouse model of retinitis pigmentosa, a degenerative disease that leads to blindness, following gene therapy. Expression of a microbial light-activated ion pump (green) in damaged cone cells restored light sensitivity to the diseased retinas. An activated ganglion cell, which relays visual information to the brain, is shown in magenta (diameter, ~12 μm). See page 413.

Image: Volker Busskamp and Botond Roska/Friedrich Miescher Institute for Biomedical Research, Basel, Switzerland

DEPARTMENTS

- 367 This Week in *Science*
- 370 Editors' Choice
- 372 *Science* Staff
- 373 Random Samples
- 466 New Products
- 467 *Science* Careers

BREVIA

- 406 **Sphagnum Moss Disperses Spores with Vortex Rings**
D. L. Whitaker and J. Edwards
Fluid dynamics similar to those known to drive smoke rings shoot moss spores far and wide.
>> *Perspective p. 395; Science Podcast*
- 407 **Reactivation of Hepatic EPO Synthesis in Mice After PHD Loss**
Y. A. Minamishima and W. G. Kaelin Jr.
Stimulating erythropoietin production in the mouse liver points to a treatment for anemia caused by chronic kidney disease.

RESEARCH ARTICLES

- 408 **Switched Magnetospheric Regulation of Pulsar Spin-Down**
A. Lyne et al.
Irregularities in the pulsar rotation rates can be explained by quasi-periodic, abrupt changes in the pulsar magnetosphere.
- 413 **Genetic Reactivation of Cone Photoreceptors Restores Visual Responses in Retinitis Pigmentosa**
V. Busskamp et al.
A bacterial ion pump rescues visual function in damaged cone-photoreceptor cells in mouse models of retinitis pigmentosa.
>> *Perspective p. 403*

REPORTS

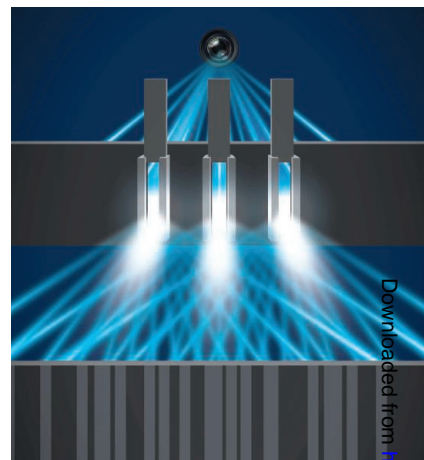
- 418 **Ruling Out Multi-Order Interference in Quantum Mechanics**
U. Sinha et al.
A multiple-slit diffraction experiment shows that interference arises from pairs of paths.
>> *Perspective p. 396*
- 421 **Identification of Carbonate-Rich Outcrops on Mars by the Spirit Rover**
R. V. Morris et al.
Substantial carbonate concentration in martian outcrops implies extensive aqueous activity in the past.
>> *Perspective p. 400*
- 424 **Ultrahigh Porosity in Metal-Organic Frameworks**
H. Furukawa et al.
The large surface areas of these materials would correspond to that of dispersed nanocubes just 3 to 6 nanometers wide.
- 428 **Calcareous Nannoplankton Response to Surface-Water Acidification Around Oceanic Anoxic Event 1a**
E. Erba et al.
Rather than going extinct, calcareous plankton adapted to ocean acidification ~120 million years ago.

- 432 **The Landscape of *C. elegans* 3'UTRs**
M. Mangone et al.
Genome-wide analysis of the nematode worm indicates a role for complex expression of 3' untranslated regions in development.
- 436 **A Septin Diffusion Barrier at the Base of the Primary Cilium Maintains Ciliary Membrane Protein Distribution**
Q. Hu et al.
Signaling proteins are retained in the cilium by a diffusion barrier created by a member of the septin family.
- 439 **Integrative Modeling Defines the Nova Splicing-Regulatory Network and Its Combinatorial Controls**
C. Zhang et al.
Network modeling reveals an RNA splicing network in the brain and uncovers complex mechanisms of regulation.
- 444 **Dnmt3a-Dependent Nonpromoter DNA Methylation Facilitates Transcription of Neurogenic Genes**
H. Wu et al.
DNA methylation is normally repressive but can activate genes when the methylated sites lie outside promoter regions.
- 448 **Functional Modules and Structural Basis of Conformational Coupling in Mitochondrial Complex I**
C. Hunte et al.
A long helix transduces conformational energy to the proton-pumping elements in complex I.
- 451 **An Electronic Bus Bar Lies in the Core of Cytochrome bc_1**
M. Świerczek et al.
Electrons move across the entire structure of a functional dimer of an enzyme central to cellular bioenergetics.
- 454 **Sfrp5 Is an Anti-Inflammatory Adipokine That Modulates Metabolic Dysfunction in Obesity**
N. Ouchi et al.
Fat cells secrete an anti-inflammatory factor that has beneficial effects on metabolic health.
>> *Perspective p. 397*
- 458 **Muscle Dysfunction Caused by a K_{ATP} Channel Mutation in Neonatal Diabetes Is Neuronal in Origin**
R. H. Clark et al.
Identification of the origin of muscle weakness that accompanies a form of neonatal diabetes may lead to safer therapies.

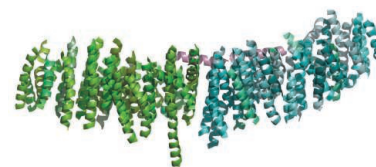
CONTENTS continued >>



page 399



pages 396 & 418



page 448

SCIENCEONLINE

SCIENCEEXPRESS

www.scienceexpress.org

Effectiveness and Safety of Tenofovir Gel, an Antiretroviral Microbicide, for the Prevention of HIV Infection in Women

Q. Abdoor Karim et al.

Tenofovir in a vaginal gel formulation shows significant protection against HIV infection in a randomized control trial.

10.1126/science.1193748

>> *News story p. 374; Science Podcast*

The *Legionella* Effector Protein DrrA AMPylates the Membrane Traffic Regulator Rab1b

M. P. Müller et al.

An intracellular bacterial pathogen interferes with host cell membrane trafficking.

10.1126/science.1192276

Detection of C₆₀ and C₇₀ in a Young Planetary Nebula

J. Cami et al.

Hydrogen-poor conditions allow fullerenes to form in space.

10.1126/science.1192035

Decrease in the CO₂ Uptake Capacity in an Ice-Free Arctic Ocean Basin

W.-J. Cai et al.

The current carbon dioxide levels in the Arctic Ocean basin will limit further uptake under ice-free conditions.

10.1126/science.1189338

The Kamil Crater in Egypt

L. Folco et al.

An unusually well-preserved 45-meter-diameter crater provides ground truth for small-scale meteorite impacts on Earth.

10.1126/science.1190990

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Will IVF Work for You?

New model attempts to calculate the odds of in vitro fertilization success.

The Persistence of Memory ... in Reprogrammed Cells

Researchers can turn an adult cell embryonic, but they cannot make it forget where it came from.

The Case of the Poisoned Fuel Cell

New catalysts could revive efforts to power fuel cells with gasoline and other liquid fuels.

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

RESEARCH ARTICLE: Increased Abundance of Opioid Receptor Heteromers After Chronic Morphine Administration

A. Gupta et al.

The μ - δ opioid heteromer may be a target for alleviation of chronic pain.

LETTERS: Comment and Response on "Increased MKK4 Abundance with Replicative Senescence Is Linked to the Joint Reduction of Multiple MicroRNAs"

U. Moens et al. and M. Gorospe et al.

Questions are raised about the antibody used to detect the phosphorylated form of the kinase PRAK.

PODCAST

M. Fainzilber and A. M. VanHook

Network redundancies lend robustness to the neuronal injury response.

GLOSSARY

Find out what FAST1, ARE, and ePR mean in the world of cell signaling.

SCIENCE CAREERS

www.sciencecareers.org/career_magazine

Free Career Resources for Scientists

Experimental Error

A. Ruben

Introducing the first humor column about science careers.

Re-Visioning a Career

R. Meja

David Price launched a career in computer science after losing his vision during graduate training in geology.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

PERSPECTIVE: Closing the Scientific Loop— Bridging Correlation and Causality in the Petaflop Age

G. An

High-performance computing, combined with an evolutionary paradigm for the interpretation of biomedical knowledge, can pinpoint disease causes.

PERSPECTIVE: Could Exercise Metabolomics Pave the Way for Gymnomimetics?

M. F. Burke et al.

An analysis of metabolites that change in concentration during exercise suggests possibilities for mimicking its beneficial effects.

RESEARCH ARTICLE: Comprehensive, Quantitative Mapping of T Cell Epitopes in Gluten in Celiac Disease

J. A. Tye-Din et al.

Three immunogenic peptides from gluten are mainly responsible for celiac disease, suggesting a way to replace the current burdensome therapy.



SCIENCE CAREERS

Don't try this at home.

RESEARCH ARTICLE: CD4⁺CD25⁺ Regulatory T Cell Depletion Improves the Graft-Versus-Tumor Effect of Donor Lymphocytes After Allogeneic Hematopoietic Stem Cell Transplantation

S. Maury et al.

Transplanted donor lymphocytes treat recurrent malignancy more effectively when they have been depleted of inhibitory T regulatory cells.

SCIENCE PODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show

Download the 23 July *Science* Podcast to hear about a microbicidal gel for preventing HIV infection, plans for hydropower dams in Patagonia, turbulent moss spore dispersal, and more.

SCIENCE INSIDER

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

Science

329 (5990)

Science **329** (5990), 367-466.

ARTICLE TOOLS

<http://science.sciencemag.org/content/329/5990>

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 © 2010 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.