

EDITORIAL

- 1241 Rekindling Japan's Spirit
Yoshiko Takahashi

NEWS OF THE WEEK

- 1246 A roundup of the week's top stories

NEWS & ANALYSIS

- 1249 Scientists Rush to Study Genome of Lethal *E. coli*
- 1250 Computer Scientist Goes on Offensive to Defend Climate Scientists
- 1252 Mice Prompt Look at Cholesterol's Role in Female Fertility
- 1253 Stigma of HIV Imperils Hard-Won Strides in Saving Lives
- 1255 Planetary Two-Step Reshaped Solar System, Saved Earth?

NEWS FOCUS

- 1256 A Bengali Recipe for Disaster
- 1259 Enceladus Now Looks Wet, So It May Be ALIVE!
- 1260 South African Cave Slowly Shares Secrets of Human Culture
>> *Science Podcast*

LETTERS

- 1262 Taking Experimental Philosophy to the People
D. Rolston
- Experimental Philosophy: Surveys Alone Won't Fly
D. Carmel
- Response
S. Nichols

Dealing with Data: Governments Records
H.-C. Kum et al.

Science Title Misstep
C. L. Bennett

Response
C. Norman

1263 CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.

- 1264 Natural Capital
P. Kareiva et al., Eds., reviewed by H. M. Leslie
- 1265 Inside Jokes
M. M. Hurley et al., reviewed by W. Sinnott-Armstrong

EDUCATION FORUM

- 1266 Preparing Future Math Teachers
W. H. Schmidt et al.

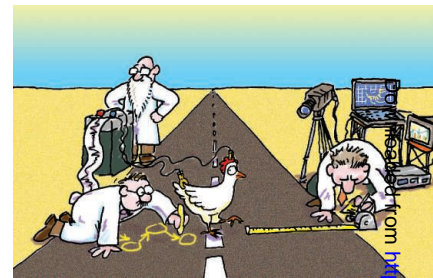
PERSPECTIVES

- 1268 No Need to Coax Monocytes
G. J. Randolph
>> *Research Article p. 1284*
- 1269 Taking the High Road and Getting There Before You
B. K. Carpenter
>> *Report p. 1300*
- 1270 New mTOR Targets Grb Attention
S. S. Yea and D. A. Fruman
>> *Reports pp. 1317 & 1322*
- 1271 Why Finance Matters
J. Morduch
>> *Research Article p. 1278*

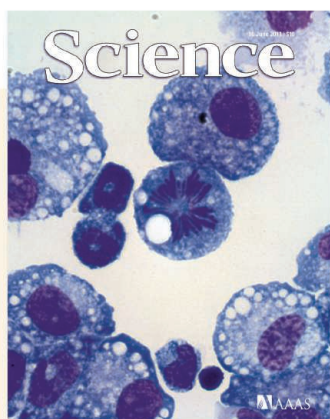
CONTENTS continued >>



page 1256



page 1265



COVER

Bright-field light microscopy image of peritoneal cells, including a macrophage undergoing cell division (center cell, ~20 micrometers across), taken from mice treated with the cytokine interleukin-4. On page 1284, Jenkins *et al.* describe a mechanism of inflammation in response to parasitic nematode infection whereby macrophages expand in number through cell division rather than by recruitment from the blood.

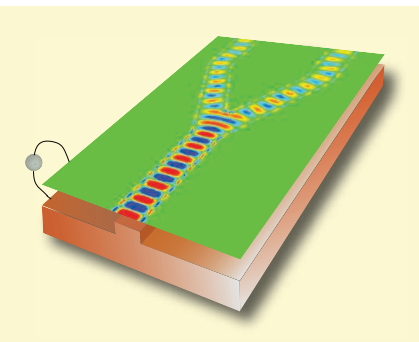
Photo: Stephen Jenkins, University of Edinburgh, UK

DEPARTMENTS

- 1237 This Week in *Science*
- 1242 Editors' Choice
- 1244 *Science* Staff
- 1333 New Products
- 1334 *Science* Careers



page 1273



page 1291

REVIEW

- 1273 **Terrestrial Ecosystem Responses to Species Gains and Losses**
D. A. Wardle et al.

RESEARCH ARTICLES

- 1278 **Microcredit in Theory and Practice: Using Randomized Credit Scoring for Impact Evaluation**
D. Karlan and J. Zinman
A randomized controlled trial reveals both expected and surprising effects of microcredit.
>> *Perspective p. 1271; Science Podcast*
- 1284 **Local Macrophage Proliferation, Rather than Recruitment from the Blood, Is a Signature of T_H2 Inflammation**
S. J. Jenkins et al.
Proliferation in situ, rather than immune cell recruitment, drives macrophage expansion in response to parasitic infection.
>> *Perspective p. 1268*

REPORTS

- 1288 **Real-Time Dynamics of Quantized Vortices in a Unitary Fermi Superfluid**
A. Bulgac et al.
A generalized theoretical approach is developed to describe the dynamics and phase transitions of Fermi superfluids.
- 1291 **Transformation Optics Using Graphene**
A. Vakil and N. Engheta
Simulations show that control of the conductivity of a region within a graphene sheet could guide optical waves.
- 1294 **Wafer-Scale Graphene Integrated Circuit**
Y.-M. Lin et al.
Components such as inductors were fabricated alongside graphene transistors to create integrated radio-frequency mixers.
- 1297 **Endotoxin-Induced Structural Transformations in Liquid Crystalline Droplets**
I.-H. Lin et al.
Bacterial lipid A was detected by its interactions with defects in droplet-confined liquid crystals.

- 1300 **Methylhydroxycarbene: Tunneling Control of a Chemical Reaction**
P. R. Schreiner et al.
Quantum tunneling induces the opposite outcome expected from traditional kinetic factors in a chemical rearrangement.
>> *Perspective p. 1269*
- 1304 **Origin and Evolution of Prebiotic Organic Matter As Inferred from the Tagish Lake Meteorite**
C. D. K. Herd et al.
The study of organic matter in a well-preserved meteorite provides insight into processes that affected its parent asteroids.
- 1307 **Activation of Visual Pigments by Light and Heat**
D.-G. Luo et al.
Thermal activation of visual pigments involves the same chromophore-isomerization reaction as does light activation.
- 1313 **A DNA Damage Response Screen Identifies RHINO, a 9-1-1 and TopBP1 Interacting Protein Required for ATR Signaling**
C. Cotta-Ramusino et al.
A screen identifies proteins not previously known to function in protecting cells from DNA damage.
- 1317 **The mTOR-Regulated Phosphoproteome Reveals a Mechanism of mTORC1-Mediated Inhibition of Growth Factor Signaling**
P. P. Hsu et al.
- 1322 **Phosphoproteomic Analysis Identifies Grb10 as an mTORC1 Substrate That Negatively Regulates Insulin Signaling**
Y. Yu et al.
A search for substrates of a growth-promoting kinase revealed a regulatory feedback loop involved in tumor suppression.
>> *Perspective p. 1270*
- 1327 **Adaptation and Evolutionary Rescue in Metapopulations Experiencing Environmental Deterioration**
G. Bell and A. Gonzalez
Dispersal and previous exposure to stress help yeast adapt to highly stressful environments.
- 1330 **Nicotine Decreases Food Intake Through Activation of POMC Neurons**
Y. S. Mineur et al.
Nicotine decreases weight gain by targeting a brain pathway involved in the regulation of energy balance and food intake.

SCIENCEONLINE

SCIENCEEXPRESS

www.sciencexpress.org

The Unusual Nature of Recent Snowpack Declines in the North American Cordillera
G. T. Pederson et al.

The snowpack covering the mountains of western North America has decreased dramatically during the past 50 years.
10.1126/science.1201570

School-Based Early Childhood Education and Age-28 Well-Being: Effects by Timing, Dosage, and Subgroups

A. J. Reynolds et al.
A little bit of preschool goes a long way.
10.1126/science.1203618

>> [Science Podcast](#)

Long Unfolded Linkers Facilitate Membrane Protein Import Through the Nuclear Pore Complex

A. C. Meinema et al.
Natively unfolded linkers facilitate nuclear membrane protein import.
10.1126/science.1205741

Climate-Forced Variability of Ocean Hypoxia
C. Deutsch et al.

The spatial extent of ocean hypoxic zones, which are uninhabitable by many marine organisms, is very sensitive to dioxygen content.
10.1126/science.1202422

Palladium-Catalyzed Aerobic Dehydrogenation of Substituted Cyclohexanones to Phenols
Y. Izawa et al.

Phenol derivatives are prepared from nonaromatic ring compounds that can bear a wide variety of substituents.
10.1126/science.1204183

SCIENCE NOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Bat Hibernation Keeps Rabies Going
A mathematical model helps researchers understand how the virus spreads.
<http://scim.ag/bat-hibernation>

Antiatoms, All Out of Energy and Ready for Work

Reaching the least-energetic state is a milestone in efforts to compare antimatter and matter.
<http://scim.ag/antiatoms>

Melanoma Drug Combo Shows Promise in Early Trial

A widely hailed new drug for melanoma, which was tested in combination with another drug to boost its tumor-fighting power, has done well in a key safety trial.
<http://scim.ag/melanoma-drug>

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment
7 June issue: <http://scim.ag/ss060711>

RESEARCH ARTICLE: TWIK-1 Two-Pore Domain Potassium Channels Change Ion Selectivity and Conduct Inward Leak Sodium Currents in Hypokalemia

L. Ma et al.
Very low extracellular K⁺ concentrations, which can trigger cardiac arrhythmias, cause TWIK-1 potassium channels to become permeable to Na⁺.

RESEARCH ARTICLE: The cis-Regulatory Logic of Hedgehog Gradient Responses—Key Roles for Gli Binding Affinity, Competition, and Cooperativity

D. S. Parker et al.

PERSPECTIVE: Beyond the Balance of Activator and Repressor

T. Whittington et al.
Transcription factor binding site affinity has a counterintuitive effect on the regulation of gene expression in response to Hedgehog.

RESEARCH ARTICLE: Antigen Potency and Maximal Efficacy Reveal a Mechanism of Efficient T Cell Activation

O. Dushek et al.
Efficient T cell activation depends on the rate with which T cell receptors and antigens bind and unbind, rather than simply their equilibrium affinity.

GLOSSARY

Find out what BL, DUB, and FX mean in the world of cell signaling.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science
8 June issue: <http://scim.ag/stm060811>

PERSPECTIVE: Broken Barriers—A New Take on Sepsis Pathogenesis

N. M. Goldenberg et al.

Loss of the endothelial barrier and subsequent leakiness in the microvasculature might be key determinants of the pathogenesis of sepsis.

RESEARCH ARTICLE: Protein Interactome Reveals Converging Molecular Pathways Among Autism Disorders

Y. Sakai et al.
An autism protein interaction network provides a framework for studying autism pathogenesis.

RESEARCH ARTICLE: Off-Target Lapatinib Activity Sensitizes Colon Cancer Cells Through TRAIL Death Receptor Up-Regulation

N. G. Dolloff et al.
The breast cancer drug lapatinib increases the sensitivity of colon cancer cells to apoptosis through a HER2- and EGFR-independent mechanism.

RESEARCH ARTICLE: Host Alloreactive Memory T Cells Influence Tolerance to Kidney Allografts in Nonhuman Primates

O. Nadadzin et al.

PERSPECTIVE: Transplantation Tolerance—Memories That Haunt Us

M. L. Ford and C. P. Larsen
Screening for preformed donor-reactive memory T cells may advance the goal of organ transplant acceptance without immunosuppression.

SCIENCE CAREERS

www.sciencereers.org/career_magazine
Free Career Resources for Scientists

Mind Matters: Resilience

I. S. Levine

A growing body of research and experience suggests that individuals possessing personal resilience are more likely to overcome career roadblocks.
http://scim.ag/mm_resilience

Presenting Science for the Anxiety Averse

S. A. Holgate

Presenting your work effectively is an important part of a scientific career, but dealing with the anxiety it provokes is rarely taught.
http://scim.ag/presentation_anxiety

SCIENCE PODCAST

www.sciencemag.org/multimedia/podcast
Free Weekly Show

On the 10 June *Science* Podcast: assessing microcredit programs, preschool's lasting impacts, the archaeology of human cognition, 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 © 2011 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 \$25.00 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

332 (6035)

Science **332** (6035), 1237-1333.

ARTICLE TOOLS

<http://science.sciencemag.org/content/332/6035>

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 © 2011 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.