

EDITORIAL

- 1429 Science-Based Health Care
Chen Zhu

NEWS OF THE WEEK

- 1434 Budget Red Tape in Europe Brings New Delay to ITER
- 1435 Silicon Mystery Endures in Solved Anthrax Case
- 1437 Beyond *DSM*: Seeking a Brain-Based Classification of Mental Illness
- 1438 Budget Shortfall Could Derail Plans for Underground Lab
- 1438 MIT Engineering Dean Tapped to Head NSF
- 1439 Hardy Cotton-Munching Pests Are Latest Blow to GM Crops
- 1440 China Amasses War Chest to Confront Its Environmental Nightmares
Fresh Momentum for China's Science Juggernaut
- 1441 From *Science's* Online Daily News Site
- 1442 Polish Science Reforms Bring Fear and Hope
- 1443 Male Rivalry Extends to Sperm in Female Reproductive Tract
- 1443 From the *Science* Policy Blog

NEWS FOCUS

- 1444 The Nile Delta's Sinking Future
>> Science Podcast
- 1448 Lunar and Planetary Science Conference
Lucky Glimpses of a Weirdly Wetter Moon
Coaxing Out Another Taste of the Sun
Spirit Is Willing, Though Weak
Snapshots From the Meeting

LETTERS

- 1451 Unlocking the Door to Better Cybersecurity
A. K. Y. Wong
Response
W. A. Wulf and A. K. Jones

- Chilean Scientists Rally After Quake
G. Duménil
Salmon Swimming Against Multiple Threats
B. Wright
Planning for Biodiversity in Future Climates
L. P. Shoo
Response
O. Venter et al.
Is the Message from Athens Being Heard?
R. Merken et al.

1454 CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.

- 1455 The Fourth Paradigm
T. Hey, S. Tansley, K. Tolle, Eds.,
reviewed by J. P. Collins
- 1456 Delete
V. Mayer-Schönberger, reviewed by W. Dutton

POLICY FORUM

- 1457 China, India, and the Environment
K. S. Bawa et al.

PERSPECTIVES

- 1460 Setting the Trap for Reactive Resonances
S. C. Althorpe
>> Report p. 1501
- 1461 Phenology Under Global Warming
C. Körner and D. Basler
- 1462 Controlling Turbulence
B. J. McKeon
>> Report p. 1491
- 1463 AMPA Receptors—Another Twist?
M. Farrant and S. G. Cull-Candy
>> Report p. 1518
- 1466 Toward Organic All-Optical Switching
S. A. Haque and J. Nelson
>> Report p. 1485
- 1467 Fairness in Modern Society
K. Hoff
>> Research Article p. 1480
- 1468 Expanding the Repertoire of Shape Memory Alloys
J. Ma and I. Karaman
>> Report p. 1488

CONTENTS continued >>



page 1444



page 1461



COVER

Saturn and its rings as seen by the Cassini orbiter. Saturn's rings contain innumerable chunks of water ice polluted by material of varying color and composition. The massive B ring (bottom) and the tenuous C ring (closest to the planet) are dominated by unexplained structure. Saturn's yellowish appearance signifies a deep cloud layer beneath seasonal haze. See pages 1470 and 1476.

Image: NASA/JPL/CICLOPS

DEPARTMENTS

- 1425 This Week in *Science*
- 1430 Editors' Choice
- 1432 *Science* Staff
- 1433 Random Samples
- 1527 New Products
- 1528 *Science* Careers

REVIEWS

1470 An Evolving View of Saturn's Dynamic Rings

J. N. Cuzzi et al.

>> Review p. 1476

1476 Saturn: Atmosphere, Ionosphere, and Magnetosphere

T. I. Gombosi and A. P. Ingersoll

>> Review p. 1470

RESEARCH ARTICLE

1480 Markets, Religion, Community Size, and the Evolution of Fairness and Punishment

J. Henrich et al.

The origins of modern social norms and behaviors may be found in the evolution of institutions.

>> Perspective p. 1467

REPORTS

1485 Design of Polymethine Dyes with Large Third-Order Optical Nonlinearities and Loss Figures of Merit

J. M. Hales et al.

Nonlinear optical materials are designed and characterized for potential applications in all-optical switching.

>> Perspective p. 1466

1488 Ferrous Polycrystalline Shape-Memory Alloy Showing Huge Superelasticity

Y. Tanaka et al.

A shape-memory alloy has been prepared with high mechanical energy absorption capability and reversible magnetization change.

>> Perspective p. 1468

1491 Eliminating Turbulence in Spatially Intermittent Flows

B. Hof et al.

Injection of jets of water is used to control the transition from laminar to turbulent flow in pipes.

>> Perspective p. 1462

1495 Microcavity Laser Oscillating in a Circuit-Based Resonator

C. Walther et al.

An ultrasmall laser is fabricated from conventional electronic components combined with an amplifying medium.

1497 The Climatic Signature of Incised River Meanders

C. P. Stark et al.

Typhoon frequency and bedrock strength influence river meandering in mountain environments.

1501 Transition-State Spectroscopy of Partial Wave Resonances in the F + HD Reaction

W. Dong et al.

Spectroscopy can distinguish the reaction paths in a collision between an atom and a diatomic system.

>> Perspective p. 1460

1502 Mechanosensitive Self-Replication Driven by Self-Organization

J. M. A. Carnall et al.

The type of mechanical agitation applied to a solution influences which of two molecular products dominate.

1506 Seminal Fluid Mediates Ejaculate Competition in Social Insects

S. P. A. den Boer et al.

Substances produced by rival male social insects destroy sperm, and females produce compounds to counteract sperm loss.

1509 Patterns of Diversity in Marine Phytoplankton

A. D. Barton et al.

Highest diversity occurs in physically dynamic mid-latitude zones, and lowest diversity and highest biomass occur toward the poles.

1512 Unicellular Cyanobacterial Distributions Broaden the Oceanic N₂ Fixation Domain

P. H. Moisaner et al.

Nitrogen fixation in the South Pacific Ocean is partitioned among several microbe species with distinct ecophysologies.

1515 A Critical Role for $\alpha 4\beta\delta$ GABA_A Receptors in Shaping Learning Deficits at Puberty in Mice

H. Shen et al.

Learning incapacity observed during puberty is related to receptor location in the hippocampus.

>> Science Podcast

1518 CKAMP44: A Brain-Specific Protein Attenuating Short-Term Synaptic Plasticity in the Dentate Gyrus

J. von Engelhardt et al.

A synaptic protein that regulates postsynaptic AMPA receptor responses has been cloned and functionally characterized.

>> Perspective p. 1463

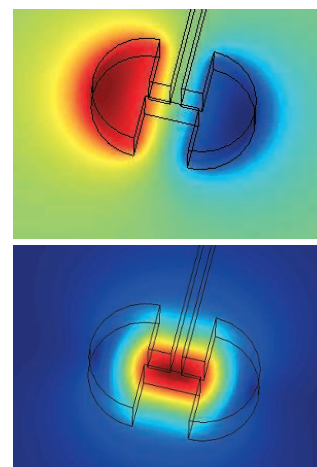
1522 Circadian Gating of the Cell Cycle Revealed in Single Cyanobacterial Cells

Q. Yang et al.

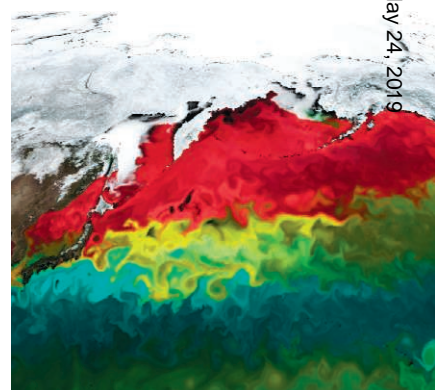
Modeling and observation of cyanobacteria show entrainment of the cell cycle by their biological clock.



pages 1462 & 1491



page 1495



page 1509

CONTENTS continued >>

SCIENCEONLINE

SCIENCEEXPRESS

www.sciencexpress.org

Functional Hierarchy and Reversibility Within the Murine Spermatogenic Stem Cell Compartment

T. Nakagawa et al.

Developmental flexibility within a stem cell system underpins the robust maintenance of spermatogenesis.
10.1126/science.1182868

Resolving Mechanisms of Competitive Fertilization Success in *Drosophila melanogaster*

M. K. Manier et al.

Fluorescently labeled sperm allow direct visualization of their activity within the female reproductive tract of flies.
10.1126/science.1187096

Variation in Transcription Factor Binding Among Humans

M. Kasowski et al.

Transcription factor binding sites vary among individuals and are correlated with differences in expression.
10.1126/science.1183621

Heritable Individual-Specific and Allele-Specific Chromatin Signatures in Humans

R. McDaniel et al.

An appreciable amount of variation in chromatin status and transcription factor binding has a genetic basis.
10.1126/science.1184655

Three-Dimensional Invisibility Cloak at Optical Wavelengths

T. Ergin et al.

A structured photonic crystal can be used to cloak an object at optical wavelengths and over a wide viewing angle.
10.1126/science.1186351
>> [Science Podcast](#)

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Carbon-Capture Method Could Poison Oceans

Fertilizing algae with iron boosts levels of harmful neurotoxin.

CSI's Latest Clue—Bacteria

Unique skin microbes might allow identification of criminals.

Psychopaths Keep Their Eyes on the Prize

The brain's overreaction to rewards may lead to impulsive, antisocial behavior.

SCIENCESIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

RESEARCH ARTICLE: Cholinergic Augmentation of Insulin Release Requires Ankyrin-B

J. A. Healy et al.

PODCAST

V. Bennett and A. M. VanHook

Reduction of ankyrin-B activity impairs maximal insulin release and is a risk factor for diabetes.

RESEARCH ARTICLE: Inferring Signaling Pathway Topologies from Multiple Perturbation Measurements of Specific Biochemical Species

T.-R. Xu et al.

Bayesian inference-based modeling identifies the most likely paths through a signaling network.

RESEARCH ARTICLE: A Loss-of-Function Screen Reveals Ras- and Raf-Independent MEK-ERK Signaling During *Chlamydia trachomatis* Infection

R. K. Gurumurthy et al.

A siRNA-based screen of host factors that influence infection by *Chlamydia* reveals the decoupling of the canonical Ras-ERK signaling pathway.

SCIENCECAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

Mind Matters: Back to Work After a Baby

I. S. Levine

Dropping off an infant and returning to work is stressful for new mothers.

Tooling Up: I'm Special, Aren't You?

D. Jensen

Your parents may say you're special, but the job market requires some humility.

Going Home to a Changing Poland

E. Pain

Reforms in Poland give molecular biologist Agnieszka Chacinska hopes for the future.
>> [News story p. 1442](#)

SCIENCE TRANSLATIONAL MEDICINE

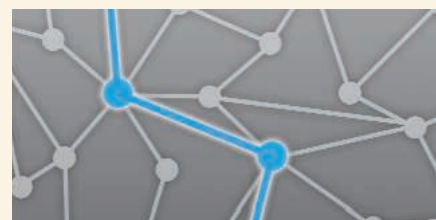
www.sciencetranslationalmedicine.org

Integrating Medicine and Science

PERSPECTIVE: Finding New Cures for Neurological Disorders—A Possible Fringe Benefit of Biodefense Research?

D. A. Jett

Drugs developed to treat exposure to toxic chemicals might help cure conditions such as stroke, epilepsy, and neurodegenerative diseases.



SCIENCESIGNALING

Picking the right path.

RESEARCH ARTICLE: Mutations in Fibrillin-1 Cause Congenital Scleroderma—Stiff Skin Syndrome

B. L. Loeys et al.

PERSPECTIVE: Stiff and Tight Skin—A Rear Window into Fibrosis Without Inflammation

E. V. Avvedimento and A. Gabrielli

Mutations in the fibrillin-1 gene that cause a rare congenital form of scleroderma shed light on a common fibrotic condition.

RESEARCH ARTICLE: Targeting Robo4-Dependent Slit Signaling to Survive the Cytokine Storm in Sepsis and Influenza

N. R. London et al.

Blunting the increased vascular permeability caused by immune responses to Slit ligand increases survival in models of sepsis and viral infection.

SCIENCEPODCAST

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

Download the 19 March *Science* Podcast to hear about the biology behind learning deficits at puberty, a three-dimensional invisibility cloak, and the Nile delta's sinking future.

SCIENCEINSIDER

blogs.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

327 (5972)

Science **327** (5972), 1425-1527.

ARTICLE TOOLS

<http://science.sciencemag.org/content/327/5972>

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.