

Science

31 July 2009 | \$10

Programa de
Biotecnología
004

Restoration
Ecology

AAAS

INTI-Extensión y Desarrollo
División Biblioteca

1275

27 AGO 2009

SPECIAL SECTION

Restoration Ecology

INTRODUCTION

- 555 The Rise of Restoration Ecology

NEWS

- 556 Nursing China's Ailing Forests Back to Health
Restoring a 'Biological Desert' on Borneo
- 559 Bringing Coral Reefs Back From the Living Dead
- 562 Unleashing an Army to Repair Alien-Ravaged Ecosystems
- 564 Addicted to Rubber

PERSPECTIVES

- 567 Ecological Restoration in the Light of Ecological History
S. T. Jackson and R. J. Hobbs

- 569 Species Invasions and the Limits to Restoration: Learning from the New Zealand Experience
D. A. Norton

- 571 Pollination and Restoration
K. W. Dixon

- 573 Soil Microbial Communities and Restoration Ecology: Facilitators or Followers?
J. Harris

- 575 Restoration of Ecosystem Services for Environmental Markets
M. A. Palmer and S. Filoso

>> See also Editorial p. 517; News stories pp. 525 and 526; Research Article p. 578; Science Express Reports by J. M. Rey Benayas et al. and D. M. Schulte et al.; Science Express Perspective by M. W. Chase et al.

EDITORIAL

- 517 Gene Banks for a Warming Planet
M. S. Swaminathan
>> Restoration Ecology section p. 555

NEWS OF THE WEEK

- 522 More Bad Connections May Limit LHC Energy or Delay Restart
- 523 Fix Funding Agency's 'Original Sin,' ERC Review Panel Demands
- 524 From Science's Online Daily News Site
- 525 Oysters Booming on New Reefs, But Can They Survive Disease?
>> Science Express Report by D. M. Schulte et al.; Restoration Ecology section p. 555
- 526 Plant Bar Code Soon to Become Reality
>> Science Express Perspective by M. W. Chase et al.; Restoration Ecology section p. 555

- 527 Universities Begin to Rethink First-Year Biology Courses

- 527 From the Science Policy Blog

NEWS FOCUS

- 528 Reshuffling Graduate Training
>> Science Podcast
- 531 Saving a Venomous Ghost
- 532 A Quest for Cosmic Karma
- 534 Help Wanted: 2000 Leading Lights to Inject a Spirit of Innovation

LETTERS

- 536 Mayas Live On
J. M. Peña-Castro
Venezuelan Science: A Professor's Defense
J. Requena
Venezuelan Science: Government on Course
G. R. Barreto
Venezuelan Science: Making Great Strides
J. Chacón-Escamilla

- 538 CORRECTIONS AND CLARIFICATIONS

- 538 TECHNICAL COMMENT ABSTRACTS

BOOKS ET AL.

- 539 He Knew He Was Right/James Lovelock
J. Gribbin and M. Gribbin, reviewed by L. R. Kump
The Vanishing Face of Gaia
J. Lovelock, reviewed by L. R. Kump
- 540 Wiki Government
B. S. Noveck, reviewed by B. Shneiderman

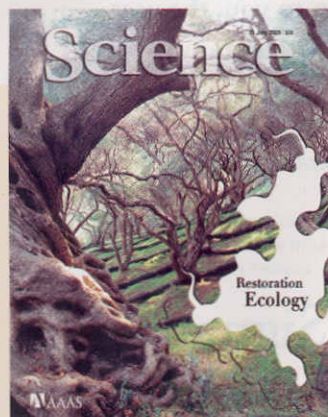
EDUCATION FORUM

- 541 Computing Has Changed Biology—Biology Education Must Catch Up
P. Pevzner and R. Shamir
- 542 Mathematical Biology Education: Beyond Calculus
R. Robeva and R. Laubenbacher

CONTENTS continued >>



page 528



COVER

Like solving a puzzle whose pieces themselves change shape, ecologists around the world are developing techniques to restore degraded and exploited ecosystems. See the special section beginning on page 555.

Photo illustration: Nayomi Kevitiyagala (image: Grand Tour/Corbis)

DEPARTMENTS

- 514 This Week in Science
518 Editors' Choice
520 Science Staff
521 Random Samples
552 AAAS News & Notes
629 New Products
630 Science Careers

PERSPECTIVES

544 Brain Wiring by Presorting Axons

K. Miyamichi and L. Luo

>> Research Article p. 585

545 Ironing Out the Oxidation of Earth's Mantle

M. M. Hirschmann

>> Report p. 605

546 Probing the Cold Universe

M. Rowan-Robinson

547 Nudging Through a Nucleosome

J. J. Otterstrom and A. M. van Oijen

>> Report p. 626

549 Dispensable But Not Irrelevant

T. Jia and E. G. Pamer

>> Report p. 612

550 Is Your Computer Secure?

F. R. Chang

BREVIA

577 The Map of Altinum, Ancestor of Venice

A. Ninfo et al.

Aerial mapping during an extreme drought has revealed the detailed plan of a major Roman city in the Venice lagoon.

RESEARCH ARTICLES

578 Rebuilding Global Fisheries

B. Worm et al.

Catch restrictions, gear modification, and closed areas are helping to rebuild overexploited marine ecosystems.

>> Restoration Ecology section p. 555

585 Pre-Target Axon Sorting Establishes the Neural Map Topography

T. Imai et al.

The mouse olfactory topographic neural map is self-organized by interactions between axons, not directed by the target.

>> Perspective p. 544

REPORTS

590 Grain Boundary Defect Elimination in a Zeolite Membrane by Rapid Thermal Processing

J. Choi et al.

A reduction in the formation of defects in silicalite-1 zeolite membranes improves their isomer separation capabilities.

594 Ultrasmooth Patterned Metals for Plasmonics and Metamaterials

P. Nagpal et al.

Films with enhanced surface-plasmon propagation may find use in sensing and communications devices.

597 Probing Spin-Charge Separation in a Tomonaga-Luttinger Liquid

Y. Jompol et al.

Electronic spin and charge respond differently during tunneling between low-dimensional electron systems.

601 The Formation of Population III Binaries from Cosmological Initial Conditions

M. J. Turk et al.

Simulations show that binary systems are likely to exist among the first generation of stars.

605 Water and the Oxidation State of Subduction Zone Magmas

K. A. Kelley and E. Cottrell

Oxidation of Earth's mantle at subduction zones is caused by fluids released from the melting of subducting plates.

>> Perspective p. 545

607 The cAMP Sensor Epac2 Is a Direct Target of Antidiabetic Sulfonylurea Drugs

C.-L. Zhang et al.

A drug used to enhance insulin secretion in diabetes has a previously unrecognized protein target.

611 Flexible Learning of Multiple Speech Structures in Bilingual Infants

Á. M. Kovács and J. Mehler

Exposure to two languages facilitates the development of a more flexible associative learning capacity.

612 Identification of Splenic Reservoir Monocytes and Their Deployment to Inflammatory Sites

F. K. Swirski et al.

A rapid deployment force of immune cells is identified in the spleen that is important for resolving inflammation.

>> Perspective p. 549

617 Innate and Adaptive Immunity Cooperate Flexibly to Maintain Host-Microbiota Mutualism

E. Slack et al.

Mouse immune systems interact to ensure tolerance to nonpathogenic bacteria in the gut.

621 Chronic Stress Causes Frontostriatal Reorganization and Affects Decision-Making

E. Dias-Ferreira et al.

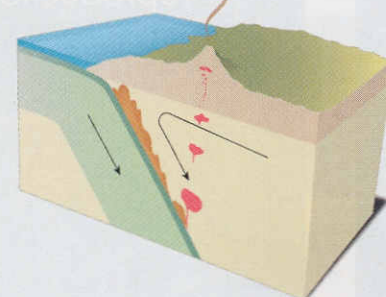
Chronic stress alters brain neural circuits and affects the ability of animals to perform actions based on their consequences.

626 Nucleosomal Fluctuations Govern the Transcription Dynamics of RNA Polymerase II

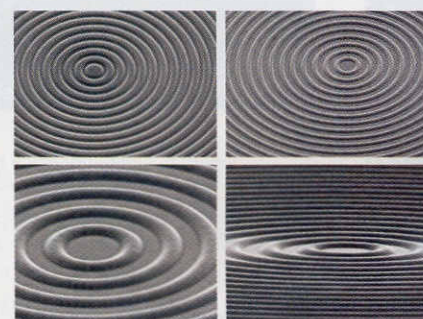
C. Hodges et al.

RNA polymerase acts as a molecular ratchet to force its way through nucleosome-infested DNA.

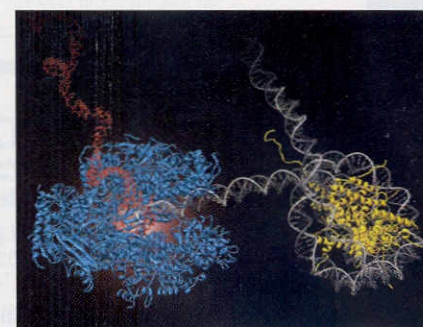
>> Perspective p. 547



pages 545 & 605



page 594



pages 547 & 626

CONTENTS continued >>

SCIENCEONLINE

SCIENCEEXPRESS

www.sciencexpress.org

Unprecedented Restoration of a Native Oyster Metapopulation

D. M. Schulte et al.

The height of oyster reefs above the river bed promotes their restoration in the Chesapeake Bay.
10.1126/science.1176516

>> News story p. 525; Restoration Ecology section p. 555

Enhancement of Biodiversity and Ecosystem Services by Ecological Restoration: a Meta-Analysis

J. M. Rey Benayas et al.

Restoration, biodiversity, and ecosystem services are positively linked in a wide range of ecosystem types across the globe.
10.1126/science.1172460

>> Restoration Ecology section p. 555; Science Podcast

Common Regulatory Variation Impacts Gene Expression in a Cell Type-Dependent Manner

A. S. Dimas et al.

Genetic variation in regulatory elements among humans affects gene expression in a tissue specific manner.
10.1126/science.1174148

Reassessing the Source of Long-Period Comets

N. A. Kaib and T. Quinn

Numerical simulations show that the inner Oort Cloud is a major source of long-period comets that cross Earth's orbit.
10.1126/science.1172676

Barcoding of Plants and Fungi

M. W. Chase and M. F. Fay

10.1126/science.1176906

>> News story p. 526; Restoration Ecology section p. 555

TECHNICALCOMMENTS

Comment on "Remeasuring the Double Helix"

N. B. Becker and R. Everaers

full text at www.sciencemag.org/cgi/content/full/325/5940/538-b

Response to Comment on "Remeasuring the Double Helix"

R. S. Mathew-Fenn et al.

full text at www.sciencemag.org/cgi/content/full/325/5940/538-c

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

A 'Cloaking Device' for Earthquakes

Plastic rings could make buildings invisible to quake waves.

New Zealand Tree Stuck in a Time Warp

Plant still harbors adaptations that protected it from a long-dead foe.

Catching a Giant Wave

New insights into tsunami behavior may help researchers better track them with radar.

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

EDITORIAL GUIDE: Unraveling Signaling Complexity

N. R. Gough and J. F. Foley

Dynamics adds to the complexity of signaling networks.

RESEARCH ARTICLE: Cell Type-Specific Importance of Ras-c-Raf Complex Association Rate Constants for MAPK Signaling

C. Kiel and L. Serrano

Ras-c-Raf association rates affect downstream signaling in the absence of negative feedback but not in its presence.

RESEARCH ARTICLE: Comparative Analysis Reveals Conserved Protein Phosphorylation Networks Implicated in Multiple Diseases

C. S. H. Tan et al.

Comparing the human phosphoproteome to that of flies, worms, and yeast reveals insights into evolution and disease.

RESEARCH ARTICLE: Integrating Proteomic, Transcriptional, and Interactome Data Reveals Hidden Components of Signaling and Regulatory Networks

S.-S. C. Huang and E. Fraenkel

Analysis of multiple "omic" data sets with a prize-collecting Steiner tree algorithm reveals components of signaling networks that are not obvious by analyzing the data individually.

PERSPECTIVE: Understanding Modularity in Molecular Networks Requires Dynamics

R. P. Alexander et al.

Relating structure and dynamics of molecular networks remains very challenging.

PERSPECTIVE: Proteomic Revelation—SUMO Changes Partners When the Heat Is On

K. Flick and P. Kaiser

A system-level view of SUMOylation dynamics shows the importance of SUMOylation to the heat shock response.

PERSPECTIVE: The Complexity of Cell Signaling and the Need for a New Mechanics

W. S. Hlavacek and J. R. Faeder

Studies that make sense of protein networks provide approaches to cope with complex signaling pathways.

PERSPECTIVE: Dynamic Advances in NF- κ B Signaling Analysis

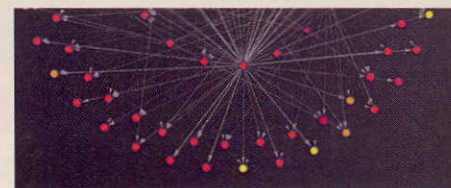
T. Kobayashi and R. Kageyama

Cytokine stimulation of cells at different time intervals produces distinct patterns of NF- κ B-dependent gene transcription.

PODCAST

M. B. Yaffe and A. M. VanHook

Science Signaling's Chief Scientific Editor discusses complexity in signaling networks.



SCIENCE SIGNALING

Kinase-substrate network.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

Perspective: How to Succeed in Big Science and Still Get Tenure

V. McGovern

You need to show that you are a serious scientist, separate from your work group.

Independent Postdocs: Early Autonomy

E. Pain

Demonstrate your independence by negotiating with advisers, seeking individual fellowships, or obtaining a junior-PI position.

Independent Postdocs: Resources

E. Pain

Here is a list of grants, fellowships, and junior-leader positions for postdocs in Europe and the United States.

SCIENCEPODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show

Download the 31 July Science Podcast to hear about assessing ecological restoration, rethinking graduate student funding, science in Venezuela, and more.

ORIGINSBLOG

blogs.sciencemag.org/origins

A History of Beginnings

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 © 2009 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): \$835; 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