

SPECIAL SECTION

## Cancer Genomics

### INTRODUCTION

1539 A Medical Renaissance?

### NEWS

1540 Steering Cancer Genomics Into the Fast Lane

1543 The Downside of Diversity

### REVIEWS

1546 Cancer Genome Landscapes  
*B. Vogelstein et al.*

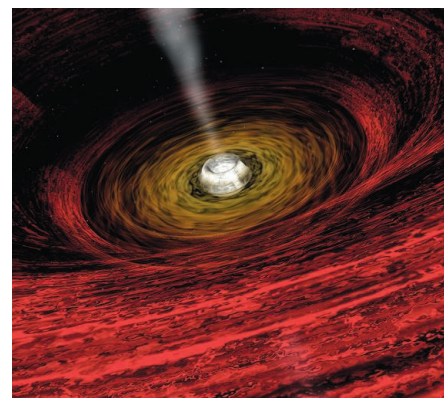
1559 Diagnostic Cancer Genome Sequencing and the Contribution of Germline Variants  
*O. Kilpivaara and L. A. Aaltonen*

1563 Cancer Pharmacogenomics: Early Promise, But Concerted Effort Needed  
*H. L. McLeod*

1567 Epigenetic Reprogramming in Cancer  
*M. L. Suvà et al.*

>> *Science Podcast*

>> *Editorial p. 1493; Science Signaling; and Science Careers at [www.sciencemag.org/special/cancergenomics](http://www.sciencemag.org/special/cancergenomics)*



page 1514

### EDITORIAL

1493 Grappling with Cancer

*Edison T. Liu*

>> *Cancer Genomics section p. 1539*

### NEWS OF THE WEEK

1504 A roundup of the week's top stories

### NEWS & ANALYSIS

1507 Return of Unexpected DNA Results Urged

1508 A Midcourse Correction for U.S. Missile Defense System

1510 Congress Limits NSF Funding for Political Science

1511 U.S. Science Agencies Finally Have (Reduced) Budgets for This Year

1513 Universe's High-Def Baby Picture Confirms Standard Theory

### NEWS FOCUS

1514 Decade of the Monster

>> *Science Podcast*

1517 As Threats to Corals Grow, Hints of Resilience Emerge

### LETTERS

1521 Misuse of Scientific Data in Wolf Policy  
*G. Chapron et al.*

Biodiversity Depends on Logging Recovery Time

*F. Michalski and C. A. Peres*

1522 TECHNICAL COMMENT ABSTRACTS

1522 CORRECTIONS AND CLARIFICATIONS

1523 The BUZZ: Genetically Modified Organism Policy

### BOOKS ET AL.

1524 Shaky Foundations

*M. Solovey, reviewed by A. J. Wolfe*

1525 Tibet Wild

*G. B. Schaller, reviewed by H. W. Greene*

### POLICY FORUM

1526 Measuring China's Circular Economy

*Y. Geng et al.*

### PERSPECTIVES

1528 Fungal Carbon Sequestration

*K. K. Treseder and S. R. Holden*

>> *Report p. 1615*

1529 A Protease for the Ages

*S. Michaelis and C. A. Hrycyna*

>> *Reports pp. 1600 and 1604*

1530 FRETting over the Spectroscopic Ruler

*J. R. Winkler*

>> *Report p. 1586*

**CONTENTS** continued >>

Explore our rich online offerings, including multimedia, news, *Science Careers*, and our two research journals—*Science Signaling* and *Science Translational Medicine*—at [www.sciencemag.org](http://www.sciencemag.org)



### COVER

Human colon cancer (at lower center) identified by a colored barium x-ray shown overlaid with a representation of a genetic sequence. Genome sequence analysis of human tumors has uncovered an array of genetic alterations that help drive tumor growth—information that may lead to more effective cancer therapies. See the special section beginning on page 1539.

*Image: Mehau Kulyk/Science Source*

### DEPARTMENTS

1487 This Week in *Science*

1497 Editors' Choice

1502 *Science* Staff

1538 AAAS News & Notes

1630 New Products

1631 *Science Careers*

## 1532 The Global Plight of Pollinators

J. M. Tylianakis

&gt;&gt; Reports pp. 1608 and 1611

## 1533 Toward a Green Internet

D. Reforgiato Recupero

## 1534 Neural Stem Cells, Excited

J. Hsieh and J. W. Schneider

## SCIENCE PRIZE ESSAY

## 1536 Integrating Inquiry-Based Teaching with Faculty Research

T. Fukami

## RESEARCH ARTICLES

## 1572 Dust and Biological Aerosols from the Sahara and Asia Influence Precipitation in the Western U.S.

J. M. Creamean et al.

Dust and biological aerosols from the Sahara and Asia can act as ice nuclei for precipitation in California's Sierra Nevada.

## 1578 Multiple Instances of Ancient Balancing Selection Shared Between Humans and Chimpanzees

E. M. Leffler et al.

Genome-wide shared genetic polymorphisms between humans and chimps mostly affect host-pathogen interactions.

## REPORTS

## 1582 Topology-Driven Magnetic Quantum Phase Transition in Topological Insulators

J. Zhang et al.

Simultaneous topological and magnetic quantum phase transitions are observed in thin films of  $\text{Bi}_2(\text{Se}_x\text{Te}_{1-x})_3$  doped with chromium.

## 1586 Ultrafast Tryptophan-to-Heme Electron Transfer in Myoglobins Revealed by UV 2D Spectroscopy

C. Consani et al.

Relaxation in a photoexcited protein by electron transfer may limit the generality of a common energy transfer-based probe.

&gt;&gt; Perspective p. 1530

## 1590 Tuning Selectivity in Propylene Epoxidation by Plasmon Mediated Photo-Switching of Cu Oxidation State

A. Marimuthu et al.

In situ visible light irradiation reverses the oxidative degradation of a copper catalyst, thereby enhancing its viability.

1593 Photoredox Activation for the Direct  $\beta$ -Arylation of Ketones and Aldehydes

M. T. Pirnot et al.

Two catalysts working in tandem form carbon-carbon bonds at a conventionally unreactive site.

## 1597 Direct Observations of the Evolution of Polar Cap Ionization Patches

Q.-H. Zhang et al.

Observations of ionospheric perturbations after a solar burst hit Earth show how a patch of ionization formed and evolved.

## 1600 Structure of the Integral Membrane Protein CAAX Protease Ste24p

E. E. Pryor Jr. et al.

## 1604 The Structural Basis of ZMPSTE24-Dependent Laminopathies

A. Quigley et al.

Structures of two transmembrane zinc proteases reveal a barrel of seven helices surrounding a large cavity.

&gt;&gt; Perspective p. 1529

## 1608 Wild Pollinators Enhance Fruit Set of Crops Regardless of Honey Bee Abundance

L. A. Garibaldi et al.

Flower visits by wild insects enhanced fruit production in crops worldwide, well beyond the effect of bees.

## 1611 Plant-Pollinator Interactions over 120 Years: Loss of Species, Co-Occurrence, and Function

L. A. Burkle et al.

Long-term data in a North American landscape document the loss of species interactions in plant-pollinator networks.

&gt;&gt; Perspective p. 1532

## 1615 Roots and Associated Fungi Drive Long-Term Carbon Sequestration in Boreal Forest

K. E. Clemmensen et al.

Reservoirs of carbon in boreal forest soils are revisited in an island chronosequence, using modeling and molecular approaches.

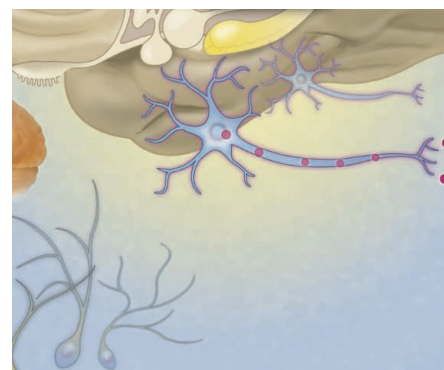
&gt;&gt; Perspective p. 1528

## 1618 The Biological Underpinnings of Namib Desert Fairy Circles

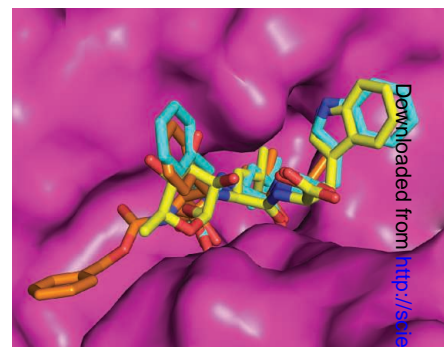
N. Juergens

Termites alter local soil conditions to facilitate the growth of grasses, generating patterns in the desert.

&gt;&gt; Science Podcast



page 1534



pages 1529, 1600, &amp; 1604

## 1621 (R)-2-Hydroxyglutarate Is Sufficient to Promote Leukemogenesis and Its Effects Are Reversible

J.-A. Losman et al.

A metabolite specific to certain cancers, and of therapeutic interest, exists in two forms, only one of which is oncogenic.

## 1625 ESCRT-III Assembly and Cytokinetic Abcission Are Induced by Tension Release in the Intercellular Bridge

J. Lafaurie-Janvore et al.

When a daughter cell lets go, the mother cell cuts it loose.

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 © 2013 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 \$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.

# Science

**339 (6127)**

*Science* **339** (6127), 1487-1630.

**ARTICLE TOOLS**

<http://science.sciencemag.org/content/339/6127>

**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.