

SPECIAL SECTION

Breakthrough of the Year

WINNER

1456 Making the cut

1457 People's choice

RUNNERS-UP

1458 A big year for small worlds

1459 Kennewick Man's kin

1459 Reproducibility in psychology

1460 *Homo naledi* comes out of the dark

1460 Deep mantle plumes rise to the test

1461 A vaccine against Ebola

1462 Yeast engineered to brew opioids

1462 Lymphatic vessels:
The brain's well-hidden secret

1463 Quantum weirdness confirmed

OTHER FEATURES

1461 Scorecard for 2015

1464 Areas to watch in 2016

1464 Breakdown of the year: Assault on the past

1465 Breakdown runners-up

ON THE COVER



Cheap, widely available, and easy to use, the genome editing system called CRISPR earned *Science*'s 2015 Breakthrough of the Year laurels for many great feats and some controversial ones—including the alteration of DNA in human embryos. See page 1456.

Illustration: Davide Bonazzi/@SalzmanArt

SEE ALSO

► EDITORIAL P. 1445 ► PODCAST ► VIDEO

1468 DISCLOSING BORON'S THINNEST SIDE

Borophene—stable, single-atom-thick layers of boron—displays remarkable properties *By H. Sachdev*

► REPORT P. 1513

1470 JOSEPHSON CONTACTS OF NEUTRAL STRONGLY INTERACTING FERMIONS

Contacts between superconductors are explored via their ultracold atomic gas analogs *By W. Belzig*

► REPORTS PP. 1498 & 1505

1471 A MORE SYSTEMATIC APPROACH TO BIOLOGICAL RISK

Management of emerging risks in life science and technology requires new leadership and a sober assessment of the legacy of Asilomar *By M. J. Palmer et al.*

1473 QUESTIONABLE POLICY FOR LARGE CARNIVORE HUNTING

U.S. wolf-hunting policies do not align with ecological theory or data

By S. Creel et al.

1476 SULFATE TO GO

A trisulfide intermediate is key to microbial sulfur reduction *By G. Fritz and P. M. H. Kroneck*

► REPORT P. 1541

1477 OPTING IN OR OUT OF THE NETWORK

Does learning commit neurons that are predisposed to recruitment to a memory network? *By K. C. Martin and E. M. Schuman*

1478 DESIGNER CELLS FINELY TUNED FOR THERAPY

Cells are engineered for on-demand control of psoriasis *By J. Di Domizio and M. Gilliet*

► SCIENCE TRANSLATIONAL MEDICINE RESEARCH ARTICLE BY L. SCHUKUR ET AL.

BOOKS ET AL.

1480 BRAIN STORMS

By J. Palfreman, reviewed by O. M. Smith

1481 THE HUNT FOR VULCAN

By T. Levenson, reviewed by M. Livio

1481 WONDER

Reviewed by O. M. Smith

NEWS

IN BRIEF

1446 News at a glance

IN DEPTH

1449 EARTH'S LAKES ARE WARMING FASTER THAN ITS AIR

First ever global survey reveals summer lake temperatures rising at an alarming rate *By E. Kintisch*

1450 CARBON TRACKERS COULD HELP BOLSTER CLIMATE VOWS

Projects lay groundwork for a global greenhouse monitoring system *By W. Cornwall*

1451 Inside the Paris climate deal

By W. Cornwall

1452 HUMAN IMPACTS ON ECOSYSTEMS BEGAN THOUSANDS OF YEARS AGO

Early humans broke up existing networks of plants and animals *By E. Pennisi*

1453 CAMEL VACCINE OFFERS HOPE TO STOP MERS

Vaccinated animals shed less virus, but is that good enough to prevent human outbreaks? *By K. Kupferschmidt*

► HAAGMANS ET AL. 10.1126/science.aad1283; SABIR ET AL. 10.1126/science.aac8608

1454 NSF LOOKS FOR NEW CONTRACTOR TO FINISH TROUBLED OBSERVATORY

Reboot sought for management of ecology network *By J. Mervis*

1455 TB CAMPAIGN STEPS UP

HIV-style activism marks effort to “end” TB by 2030 *By J. Cohen*

INSIGHTS

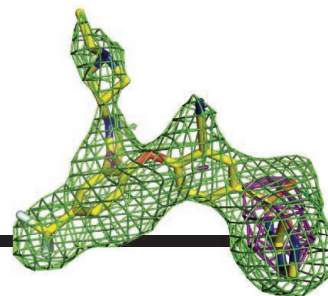
PERSPECTIVES

1466 ADRIFT IN AN OCEAN OF CHANGE

Rising temperatures and ocean acidification drive changes in phytoplankton communities *By M. Vogt*

► REPORTS PP. 1530 & 1533

CONTENTS



1491 & 1492

Specific targeting of a channel involved in pain perception

18 DECEMBER 2015 • VOLUME 350 • ISSUE 6267

LETTERS

1482 RETRACTION

By Y. H. Wang et al.

1482 EDITORIAL EXPRESSION OF CONCERN

By M. McNutt

1482 PREVENTING TROPICAL MINING DISASTERS

By D. P. Edwards and W. F. Laurance

1482 THE GLOBAL WARMING HIATUS'S IRRELEVANCE

By M. F. Wehner and D. R. Easterling

1483 TECHNICAL COMMENT ABSTRACTS

RESEARCH

IN BRIEF

1487 From *Science* and other journals

REVIEW

1490 ELECTRON MICROSCOPY

Opportunities and challenges in liquid cell electron microscopy *F. M. Ross*

REVIEW SUMMARY; FOR FULL TEXT:

dx.doi.org/10.1126/science.aaa9886

RESEARCH ARTICLES

STRUCTURAL BIOLOGY

1491 Structural basis of Nav1.7 inhibition by an isoform-selective small-molecule antagonist *S. Ahuja* et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: dx.doi.org/10.1126/science.aac5464

1492 Structure of the voltage-gated calcium channel $Ca_v1.1$ complex *J. Wu* et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: dx.doi.org/10.1126/science.aad2395

1493 GENOMIC EVOLUTION

Genomic islands of speciation separate cichlid ecomorphs in an East African crater lake *M. Malinsky* et al.

REPORTS

1498 QUANTUM SIMULATION

Connecting strongly correlated superfluids by a quantum point contact *D. Husmann* et al.

► PERSPECTIVE P. 1470; REPORT P. 1505

1501 ULTRAFAST DYNAMICS

Direct observation of collective modes coupled to molecular orbital-driven charge transfer *T. Ishikawa* et al.

1505 QUANTUM SIMULATION

Josephson effect in fermionic superfluids across the BEC-BCS crossover *G. Valtolina* et al.

► PERSPECTIVE P. 1470; REPORT P. 1498

1508 ENERGY STORAGE

Nitrogen-doped mesoporous carbon of extraordinary capacitance for electrochemical energy storage *T. Lin* et al.

1513 NANOMATERIALS

Synthesis of borophenes: Anisotropic, two-dimensional boron polymorphs *A. J. Mannix* et al.

► PERSPECTIVE P. 1468

1516 BATTERIES

Visualization of O-O peroxo-like dimers in high-capacity layered oxides for Li-ion batteries *E. McCalla* et al.

1521 PLANT SYMBIOSES

Rice perception of symbiotic arbuscular mycorrhizal fungi requires the karrikin receptor complex *C. Gutjahr* et al.

1525 NEURODEVELOPMENT

Loss of motoneuron-specific microRNA-218 causes systemic neuromuscular failure *N. D. Amin* et al.

1530 PHYTOPLANKTON

Millennial-scale plankton regime shifts in the subtropical North Pacific Ocean *K. W. McMahon* et al.

► PERSPECTIVE P. 1466; REPORT P. 1533

1533 MARINE CALCIFERS

Multidecadal increase in North Atlantic coccolithophores and the potential role of rising CO_2 *S. Rivero-Calle* et al.

► PERSPECTIVE P. 1466; REPORT P. 1530

1537 PALEOCEANOGRAPHY

Dynamical excitation of the tropical Pacific Ocean and ENSO variability by Little Ice Age cooling *G. T. Rustic* et al.

1541 MICROBIAL METABOLISM

A protein trisulfide couples dissimilatory sulfate reduction to energy conservation *A. A. Santos* et al.

► PERSPECTIVE P. 1476

1545 ECOTOXICOLOGY

Algal toxin impairs sea lion memory and hippocampal connectivity, with implications for strandings *P. F. Cook* et al.

1548 MEMBRANE REMODELING

Structure and membrane remodeling activity of ESCRT-III helical polymers *J. McCullough* et al.

1552 EVOLUTIONARY GENETICS

An essential cell cycle regulation gene causes hybrid inviability in *Drosophila* *N. Phadnis* et al.

DEPARTMENTS

1445 EDITORIAL

Breakthrough to genome editing

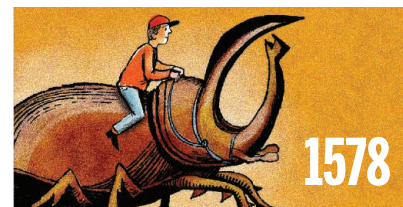
By *Marcia McNutt*

► BREAKTHROUGH OF THE YEAR SECTION P. 1456

1578 WORKING LIFE

Beetle horns and book writing

By *Elizabeth Pennisi*



Science Staff	1444
AAAS News & Notes	1485
New Products	1557
Science Careers	1558

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 © 2015 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): \$153 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$1282. 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 #R1254 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

350 (6267)

Science **350** (6267), 1445-1578.

ARTICLE TOOLS

<http://science.sciencemag.org/content/350/6267>

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 © 2015 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.