



**Editor-in-Chief** Marcia McNutt

**Executive Editor** Monica M. Bradford **News Editor** Tim Appenzeller

**Managing Editor, Research Journals** Katrina L. Kelner

**Deputy Editors** Barbara R. Jasny, Andrew M. Sugden(UK), Valda J. Vinson, Jake S. Yeston

## Research and Insights

**SR. EDITORS** Caroline Ash(UK), Gilbert J. Chin, Lisa D. Chong, Julia Fahrenkamp-Uppenbrink(UK), Pamela J. Hines, Stella M. Hurlley(UK), Paula A. Kiberstis, Marc S. Lavine(Canada), Kristen L. Mueller, Ian S. Osborne(UK), Beverly A. Purnell, L. Bryan Ray, Guy Riddihough, H. Jesse Smith, Jelena Stajic, Peter Stern(UK), Phillip D. Szuromi, Brad Wible, Nicholas S. Wigginton, Laura M. Zahn **ASSOCIATE EDITORS** Brent Grocholski, Sacha Vignieri **ASSOCIATE BOOK REVIEW EDITOR** Valerie B. Thompson **ASSOCIATE LETTERS EDITOR** Jennifer Sills **CHIEF CONTENT PRODUCTION EDITOR** Cara Tate **SR. CONTENT PRODUCTION EDITORS** Harry Jach **CONTENT PRODUCTION EDITORS** Jeffrey E. Cook, Chris Filiatreau, Cynthia Howe, Lauren Krnec, Barbara P. Ordway **SR. EDITORIAL COORDINATORS** Carolyn Kyle, Beverly Shields **EDITORIAL COORDINATORS** Ramatoulaye Diop, Joi S. Granger, Lisa Johnson, Anita Wynn **PUBLICATIONS ASSISTANTS** Aneera Dobbins, Jeffrey Hearn, Dona Mathieu, Le-Toya Mayne Flood, Shannon McMahon, Scott Miller, Jerry Richardson, Rachel Roberts(UK), Alice Whaley(UK), Brian White **EXECUTIVE ASSISTANT** Anna Bashkirova **ADMINISTRATIVE SUPPORT** Janet Clements(UK), Monika Magon(UK, Intern), Lizanne Newton(UK), Maryrose Madrid, John Wood(UK)

## News

**NEWS MANAGING EDITOR** John Travis **INTERNATIONAL EDITOR** Richard Stone **DEPUTY NEWS EDITORS** Daniel Clery(UK), Robert Coontz, Elizabeth Culotta, David Grimm, David Malakoff, Leslie Roberts **CONTRIBUTING EDITORS** Martin Enserink(Europe), Mara Hvistendahl **SR. CORRESPONDENTS** Jeffrey Mervis, Elizabeth Pennisi **NEWS WRITERS** Adrian Cho, Jon Cohen, Jennifer Couzin-Frankel, Carolyn Gramling, Eric Hand, Jocelyn Kaiser, Kelly Servick, Robert F. Service, Erik Stokstad(Cambridge, UK), Emily Underwood **INTERNS** Emily Conover, David Shultz, Jia You **CONTRIBUTING CORRESPONDENTS** Pallava Bagla(South Asia), Michael Balter(Paris), John Bohannon, Ann Gibbons, Sam Kean, Richard A. Kerr, Eli Kintisch, Kai Kupferschmidt(Berlin), Andrew Lawler, Christina Larson(Beijing), Mitch Leslie, Charles C. Mann, Eliot Marshall, Virginia Morell, Dennis Normide(Tokyo), Heather Pringle, Tania Rabesandratana(Brussels), Gretchen Vogel(Berlin), Lizzie Wade(Mexico City) **CAREERS** Jim Austin(Editor), Donisha Adams, Rachel Bernstein **COPY EDITORS** Kara Estelle, Nora Kelly, Jennifer Levin **ADMINISTRATIVE SUPPORT** Scherraine Mack

**Executive Publisher** Rush D. Holt

**Publisher** Kent R. Anderson **Chief Digital Media Officer** Rob Covey

**BUSINESS OPERATIONS AND ADMINISTRATION DIRECTOR** Deborah Rivera-Whinoloh **BUSINESS SYSTEMS AND FINANCIAL ANALYSIS DIRECTOR** Randy Yi **MANAGER OF FULFILLMENT SYSTEMS** Neal Hawkins **SYSTEMS ANALYST** Nicole Mehmedovich **ASSISTANT DIRECTOR, BUSINESS OPERATIONS** Eric Knott **MANAGER, BUSINESS OPERATIONS** Jessica Tierney **BUSINESS ANALYSTS** Cory Lipman, Cooper Tilton, Celeste Troxler **FINANCIAL ANALYST** Jeremy Clay **RIGHTS AND PERMISSIONS ASSISTANT DIRECTOR** Emilie David **PERMISSIONS ASSOCIATE** Elizabeth Sandler **RIGHTS, CONTRACTS, AND LICENSING ASSOCIATE** Lili Kiser

**MARKETING DIRECTOR** Ian King **MARKETING MANAGER** Julianne Wielga **MARKETING ASSOCIATE** Elizabeth Sattler **SR. MARKETING EXECUTIVE** Jennifer Reeves **SR. ART ASSOCIATE, PROJECT MANAGER** Tzeitel Sorrosa **ART ASSOCIATE** Seil Lee **ASSISTANT COMMERCIAL EDITOR** Selby Frame **MARKETING PROJECT MANAGER** Angelissa McArthur **SR. WRITER** Bill Zimmer **PROGRAM DIRECTOR, AAAS MEMBER CENTRAL** Peggy Mihelich **FULFILLMENT SYSTEMS AND OPERATIONS** membership@aaas.org **MANAGER, MEMBER SERVICES** Pat Butler **SPECIALISTS** LaToya Castejo, Javia Flemmings, Latasha Russell **MANAGER, DATA ENTRY** Mickie Napoleoni **DATA ENTRY SPECIALISTS** JJ Regan, Jaimee Wise, Fiona Giblin

**DIRECTOR, SITE LICENSING** Tom Ryan **DIRECTOR, CORPORATE RELATIONS** Eileen Bernadette Moran **SR. PUBLISHER RELATIONS SPECIALIST** Kiki Forsythe **PUBLISHER RELATIONS MANAGER** Catherine Holland **PUBLISHER RELATIONS, EASTERN REGION** Keith Layson **PUBLISHER RELATIONS, WESTERN REGION** Ryan Rexroth **MANAGER, SITE LICENSE OPERATIONS** Iqo Edim **FULFILLMENT ANALYST** Lana Guo **ASSOCIATE DIRECTOR, MARKETING** Christina Schlecht **MARKETING ASSOCIATES** Thomas Landreth, Minah Kim

**DIRECTOR OF WEB TECHNOLOGIES** Ahmed Khadr **SR. DEVELOPER** Chris Coleman **DEVELOPERS** Dan Berger, Jimmy Marks **SR. PROJECT MANAGER** Trista Smith **SYSTEMS ENGINEER** Luke Johnson **PRODUCT MANAGER** Walter Jones

**CREATIVE DIRECTOR, MULTIMEDIA** Martyn Green **DIRECTOR OF ANALYTICS** Enrique Gonzales **SR. WEB PRODUCER** Sarah Crespi **WEB PRODUCER** Alison Crawford **VIDEO PRODUCER** Nguyen Nguyen **SOCIAL MEDIA PRODUCER** Meghna Sachdev

**DIRECTOR OF OPERATIONS PRINT AND ONLINE** Elizabeth Harman **DIGITAL/PRINT STRATEGY MANAGER** Jason Hillman **QUALITY TECHNICAL MANAGER** Marcus Spiegel **DIGITAL PRODUCTION MANAGER** Lisa Stanford **ASSISTANT MANAGER DIGITAL/PRINT** Rebecca Doshi **DIGITAL MEDIA SPECIALIST** Tara Kelly **SENIOR CONTENT SPECIALISTS** Steve Forrester, Antoinette Hodal, Lori Murphy, Anthony Rosen **CONTENT SPECIALISTS** Jacob Hedrick, Kimberley Oster

**DESIGN DIRECTOR** Beth Rakouskas **DESIGN EDITOR** Marcy Atarod **SENIOR SCIENTIFIC ILLUSTRATORS** Chris Bickel, Katharine Sutliff **SCIENTIFIC ILLUSTRATOR** Valerie Altounian **SENIOR ART ASSOCIATES** Holly Bishop, Preston Huez **SENIOR DESIGNER** Garvin Grullón **DESIGNER** Chrystal Smith **SENIOR PHOTO EDITOR** William William Douthitt **PHOTO EDITOR** Leslie Liezard

**DIRECTOR, GLOBAL COLLABORATION, CUSTOM PUBLICATIONS, ADVERTISING** Bill Moran **EDITOR, CUSTOM PUBLISHING** Sean Sanders: 202-326-6430 **ASSISTANT EDITOR, CUSTOM PUBLISHING** Tianna Hicklin: 202-326-6463 **ADVERTISING MARKETING MANAGER** Justin Sawyers: 202-326-7061 **science\_advertising@aaas.org** **ADVERTISING MARKETING ASSOCIATE** Javia Flemmings **ADVERTISING SUPPORT MANAGER** Karen Foote: 202-326-6740 **ADVERTISING PRODUCTION OPERATIONS MANAGER** Deborah Tompkins **SR. PRODUCTION SPECIALIST/GRAPHIC DESIGNER** Amy Hardcastle **PRODUCTION SPECIALIST** Yuse Lajimimuhup **SR. TRAFFIC ASSOCIATE** Christine Hall **SALES COORDINATOR** Shirley Young **ASSOCIATE DIRECTOR, COLLABORATION, CUSTOM PUBLICATIONS/CHINA/TAIWAN/KOREA/SINGAPORE** Ruolei Wu: +86-186 0822 9345, rww@aaas.org **COLLABORATION/CUSTOM PUBLICATIONS/JAPAN** Adarsh Sandhu + 81532-81-5142 asandhu@aaas.org **EAST COAST/E. CANADA** Laurie Faraday: 508-747-9395, FAX 617-507-8189 **WEST COAST/W. CANADA** Lynne Stickrod: 415-931-9782, FAX 415-520-6940 **MIDWEST** Jeffrey Dembski: 847-498-4520 x3005, Steven Loerch: 847-498-4520 x3006 **UK EUROPE/ASIA** Roger Goncalves: TEL/FAX +41 43 243 1358 **JAPAN** Katsuyoshi Fukamizu(Tokyo): +81-3-3219-5777 fukamizu@aaas.org **CHINA/TAIWAN** Ruolei Wu: +86-0082-9345

**WORLDWIDE ASSOCIATE DIRECTOR OF SCIENCE CAREERS** Tracy Holmes: +44 (0) 1223 326525, FAX +44 (0) 1223 326532 tholmes@science-int.co.uk **CLASSIFIED** advertise@sciencerecruiters.org **US SALES** Tina Burks: 202-326-6577, Nancy Toerna: 202-326-6578 **SALES ADMINISTRATOR** Marci Gallun **EUROPE/ROW SALES** Axel Gesatzki, Sarah Lehar **SALES ASSISTANT** Kelly Grace **JAPAN** Hirokyuki Mashiki(Kyoto): +81-75-823-1109 hmashiki@aaas.org **CHINA/TAIWAN** Ruolei Wu: +86-186 0082 9345 **MARKETING MANAGER** Allison Pritchard **MARKETING ASSOCIATE** Aimee Aponte

**AAAS BOARD OF DIRECTORS** **RETIRING PRESIDENT, CHAIR** Phillip A. Sharp **PRESIDENT** Gerald R. Fink **PRESIDENT-ELECT** Geraldine (Gerri) Richmond **TREASURER** David Evans **SHAW CHIEF EXECUTIVE OFFICER** Alan I. Leshner **BOARD** Bonnie N. Bassler, May R. Berenbaum, Carlos J. Bustamante, Claire M. Fraser, Laura H. Greene, Elizabeth Loftus, Raymond Orbach, Inder M. Verma

**SUBSCRIPTION SERVICES** For change of address, missing issues, new orders and renewals, and payment questions: 866-434-AAAS (2227) or 202-326-6417, FAX 202-842-1065. Mailing addresses: AAAS, P.O. Box 96178, Washington, DC 20090-6178 or AAAS Member Services, 1200 New York Avenue, NW, Washington, DC 20005

**INSTITUTIONAL SITE LICENSES** 202-326-6755 **REPRINTS:** Author Inquiries 800-635-7181 **COMMERCIAL INQUIRIES** 803-359-4578 **PERMISSIONS** 202-326-6765, permissions@aaas.org **AAAS Member Services** 202-326-6417 or http://membercentral.aaas.org/discourts

Science serves as a forum for discussion of important issues related to the advancement of science by publishing material on which a consensus has been reached as well as including the presentation of minority or conflicting points of view. Accordingly, all articles published in Science—including editorials, news and comment, and books reviews—are signed and reflect the individual views of the authors and not official points of view adopted by AAAS or the institutions with which the authors are affiliated.

**INFORMATION FOR AUTHORS** See pages 678 and 679 of the 6 February 2015 issue or access [www.sciencemag.org/about/authors](http://www.sciencemag.org/about/authors)

## SENIOR EDITORIAL BOARD

A. Paul Alivisatos, Lawrence Berkeley Nat'l. Laboratory, Ernst Fehr, U. of Zürich  
Susan M. Rosenberg, Baylor College of Medicine, Ali Shihatafi, Northwestern University  
Feinberg School of Medicine, Michael S. Turner, U. of Chicago

## BOARD OF REVIEWING EDITORS (Statistics board members indicated with \$)

Adriano Aguzzi, U. Hospital Zürich  
Takuzo Aida, U. of Tokyo  
Leslie Aiello, Wenner-Gren Foundation  
Judith Allen, U. of Edinburgh  
Sonia Altizer, U. of Georgia  
Sebastian Amigorena, Institut Curie  
Kathryn Anderson, Memorial Sloan-Kettering Cancer Center  
Meinrat O. Andreae, Max-Planck Inst. Mainz  
Paola Arlotta, Harvard U.  
Johan Auwerx, EPFL  
David Awschalom, U. of Chicago  
Jordi Bascompte, Estación Biológica de Doñana CSIC  
Facundo Batista, London Research Inst.  
Ray H. Baughman, U. of Texas, Dallas  
David Baum, U. of Wisconsin  
Carlo Beenakker, Leiden U.  
Kamran Behnia, ESPCI-Paris Tech  
Yasmine Belkaid, NIAID, NIH  
Philip Benfey, Duke U.  
Stephen J. Benkovic, Penn State U.  
May Berenbaum, U. of Illinois  
Gabriele Bergers, U. of California, San Francisco  
Bradley Bernstein, Massachusetts General Hospital  
Peer Bork, EMBL  
Bernard Bourdon, Ecole Normale Supérieure de Lyon  
Chris Bowler, Ecole Normale Supérieure  
Ian Boyd, U. of St. Andrews  
Emily Brodsky, U. of California, Santa Cruz  
Ron Brookmeyer, U. of California Los Angeles (\$) **\$**  
Christian Büchel, U. Hamburg-Eppendorf  
Joseph A. Burns, Cornell U.  
György Buzsáki, New York U. School of Medicine  
Blanche Capel, Duke U.  
Mats Carlsson, U. of Oxford  
David Clapham, Children's Hospital Boston  
David Clary, U. of Oxford  
Joel Cohen, Rockefeller U., Columbia U.  
Jonathan D. Cohen, Princeton U.  
James Collins, Boston U.  
Robert Cook-Deegan, Duke U.  
Alan Cowman, Walter & Eliza Hall Inst.  
Robert H. Crabtree, Yale U.  
Roberta Croce, Vrije Universiteit  
Janet Currie, Princeton U.  
Jeff L. Dangl, U. of North Carolina  
Tom Daniel, U. of Washington  
Frans de Waal, Emory U.  
Stanislav Dehaene, Collège de France  
Robert Desimone, MIT  
Claude Desplais, New York U.  
Ap Dijksterhuis, Radboud U. of Nijmegen  
Dennis Discher, U. of Pennsylvania  
Gerald W. Dorn II, Washington U. School of Medicine  
Jennifer A. Doudna, U. of California, Berkeley  
Bruce Dunn, U. of California, Los Angeles  
Christopher Dye, WHO  
Todd Ehlers, U. of Tuebingen  
David Ehrhardt, Carnegie Inst. of Washington  
Tim Elston, U. of North Carolina at Chapel Hill  
Gerhard Ertl, Fritz-Haber-Institut, Berlin  
Barry Everitt, U. of Cambridge  
Ernst Fehr, U. of Zürich  
Anne C. Ferguson-Smith, U. of Cambridge  
Michael Feuer, The George Washington U.  
Kate Fitzgerald, U. of Massachusetts  
Peter Fratzl, Max-Planck Inst.  
Elaïne Fuchs, Rockefeller U.  
Daniel Geschwind, UCLA  
Andrew Gewirth, U. of Illinois  
Karl-Heinz Glassmeier, TU Braunschweig  
Ramon Gonzalez, Rice U.  
Julia R. Greer, Caltech  
Elizabeth Grove, U. of Chicago  
Nicolas Gruber, ETH Zürich  
Kip Guy, St. Jude's Children's Research Hospital  
Taekjip Ha, U. of Illinois at Urbana-Champaign  
Christian Haass, Ludwig Maximilians U.  
Steven Hahn, Fred Hutchinson Cancer Research Center  
Michael Hasselmo, Boston U.  
Martin Heimann, Max-Planck Inst. Jena  
Yka Helariutta, U. of Cambridge  
James A. Hendler, Rensselaer Polytechnic Inst.  
Janet G. Hering, Swiss Fed. Inst. of Aquatic Science & Technology  
Kai-Uwe Hinrichs, U. of Bremen  
Kei Hirose, Tokyo Inst. of Technology  
David Hodell, U. of Cambridge  
David Holden, Imperial College  
Lora Hooper, UT Southwestern Medical Ctr. at Dallas  
Raymond Huey, U. of Washington  
Steven Jacobsen, U. of California, Los Angeles  
Kai Johnson, EPFL Lausanne  
Peter Jonas, Inst. of Science & Technology (IST) Austria  
Matt Kaerberlein, U. of Washington  
William Kaelin Jr., Dana-Farber Cancer Inst.  
Daniel Kahne, Harvard U.  
Daniel Kammen, U. of California, Berkeley  
Masashi Kawasaki, U. of Tokyo  
Joel Kingsolver, U. of North Carolina at Chapel Hill  
Robert Kingston, Harvard Medical School  
Etienne Kochkin, Ecole Normale Supérieure  
Alexander Kolodkin, Johns Hopkins U.  
Alberto R. Kornblitt, U. of Buenos Aires  
Leonid Kruglyak, UCLA  
Thomas Langer, U. of Cologne  
Mitchell A. Lazar, U. of Pennsylvania  
David Lazer, Harvard U.  
Thomas Lecuit, IBM  
Virginia Lee, U. of Pennsylvania  
Stanley Lemon, U. of North Carolina at Chapel Hill  
Ottoline Leyser, Cambridge U.  
Marcia C. Linn, U. of California, Berkeley  
Jianguo Liu, Michigan State U.  
Luis Liz-Marzan, CIC bioGUNE  
Jonathan Losos, Harvard U.  
Ke Lu, Chinese Acad. of Sciences  
Christian Lüscher, U. of Geneva  
Laura Machesky, CRUK Beatson Inst. for Cancer Research  
Aime Magurran, U. of St. Andrews  
Oscar Marin, CSIC & U. Miguel Hernández  
Charles Marshall, U. of California, Berkeley  
C. Robertson McClung, Dartmouth College  
Graham Medley, U. of Warwick  
Yasushi Miyashita, U. of Tokyo  
Mary Ann Moran, U. of Edinburgh  
Richard Morris, U. of Edinburgh  
Alison Møntsgaard-Reif, NC State U. (\$) **\$**  
Sean Munro, MRC Lab. of Molecular Biology  
Thomas Murray, The Hastings Center  
James Nelson, Stanford U. School of Med.  
Daniel Neumar, U. of California, Berkeley  
Timothy W. Nilsen, Case Western Reserve U.  
Pär Nordlund, Karolinska Inst.  
Heiga Novotny, European Research Advisory Board  
Ben Oken, MIT  
Jose Orenstein, U. of California Berkeley & Lawrence Berkeley National Lab  
Harry Orr, U. of Minnesota  
Andrew Oswald, U. of Warwick  
Steve Palumbi, Stanford U.  
Jane Parker, Max-Planck Inst. of Plant Breeding Research  
Giovanni Parmigiani, Dana-Farber Cancer Inst. (\$) **\$**  
Donald R. Paul, U. of Texas, Austin  
John H. J. Petrini, Memorial Sloan-Kettering Cancer Center  
Joshua Plotkin, U. of Pennsylvania  
Alfred Polman, FOM Institute AMOLF  
Philippe Poulin, CNRS  
Jonathan Pritchard, Stanford U.  
David Randall, Colorado State U.  
Colin Renfrew, U. of Cambridge  
Felix Rey, Institut Pasteur  
Trevor Robbins, U. of Cambridge  
Jim Roberts, Fred Hutchinson Cancer Research Ctr.  
Barbara A. Romanowicz, U. of California, Berkeley  
Jens Rostrup-Nielsen, Haldor Topsøe  
Mike Ryan, U. of Texas, Austin  
Mitsunori Saitou, Kyoto U.  
Shimon Sakaguchi, Kyoto U.  
Miquel Salmeron, Lawrence Berkeley National Lab  
Jürgen Sandkühler, Medical U. of Vienna  
Alexander Schier, Harvard U.  
Randy Seeley, U. of Cincinnati  
Vladimir Shalaev, Purdue U.  
Robert Siliciano, Johns Hopkins School of Medicine  
Joseph Silk, Institut d'Astrophysique de Paris  
Dennis Simon, Arizona State U.  
Alison Smith, John Innes Centre  
Richard Smith, U. of North Carolina (\$) **\$**  
John Speakman, U. of Aberdeen  
Allan C. Spradling, Carnegie Institution of Washington  
Jonathan Sprent, Garvan Inst. of Medical Research  
Eric Steig, U. of Washington  
Paula Stephan, Georgia State U. and National Bureau of Economic Research  
Molly Stevens, Imperial College London  
V. S. Subrahmanian, U. of Maryland  
Ira Tabas, Columbia U.  
Sarah Teichmann, Cambridge U.  
John Thomas, North Carolina State U.  
Shubha Tole, Tata Institute of Fundamental Research  
Christopher Tyler-Smith, The Wellcome Trust Sanger Institute  
Herbert Virgin, Washington U.  
Bert Vogelstein, Johns Hopkins U.  
Cynthia Volkert, U. of Göttingen  
Douglas Wallace, Dalhousie U.  
David Wallace, Weizmann Inst. of Science  
Ian Walsmsley, U. of Oxford  
David A. Warde, Swedish U. of Agric. Sciences  
David Waxman, Fudan U.  
Jonathan Weissman, U. of California, San Francisco  
Chris Wikle, U. of Missouri (\$) **\$**  
Ian A. Wilson, The Scripps Res. Inst. (\$) **\$**  
Timothy D. Wilson, U. of Virginia  
Rosemary Wye, Johns Hopkins U.  
Jan Zaenen, Leiden U.  
Kenneth Zarek, U. of Pennsylvania School of Medicine  
Jonathan Zehr, U. of California, Santa Cruz  
Len Zon, Children's Hospital Boston  
Maria Zuber, MIT

## BOOK REVIEW BOARD

David Bloom, Harvard U. Samuel Bowring, MIT, Angela Creager, Princeton U., Richard Swedner, U. of Chicago, Ed Wasserman, DuPont