



**Editor-in-Chief** Jeremy Berg

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

**Deputy Editors** Lisa D. Chong, Andrew M. Sugden(UK), Valda J. Vinson, Jake S. Yeston

## Research and Insights

**DEPUTY EDITOR, EMERITUS** Barbara R. Jasny **SR. EDITORS** Gemma Alderton(UK), Caroline Ash(UK), Julia Fahrenkamp-Uppenbrink(UK), Pamela J. Hines, Stella M. Hurlley(UK), Paula A. Kiberstis, Marc S. Lavine(Canada), Steve Mao, Ian S. Osborne(UK), Beverly A. Purnell, L. Bryan Ray, H. Jesse Smith, Jelena Stajter, Peter Stern(UK), Phillip D. Szurromi, Sacha Vignieri, Brad Wible, Laura M. Zahn  
**ASSOCIATE EDITORS** Michael A. Funk, Brent Grocholski, Priscilla N. Kelly, Tage S. Rai, Seth Thomas Scanlon(UK), Keith T. Smith(UK)  
**ASSOCIATE BOOK REVIEW EDITOR** Valerie B. Thompson **LETTERS EDITOR** Jennifer Sills **LEAD CONTENT PRODUCTION EDITORS** Harry Jach, Lauren Kmec **CONTENT PRODUCTION EDITORS** Amelia Beyna, Jeffrey E. Cook, Amber Esplin, Chris Filiatreau, Cynthia Howe, Catherine Wolner  
**SR. EDITORIAL COORDINATORS** Carolyn Kyle, Beverly Shields **EDITORIAL COORDINATORS** Aneera Dobbins, Joi S. Granger, Jeffrey Healy, Lisa Johnson, Maryrose Madrid, Scott Miller, Jerry Richardson, Anita Wynn **PUBLICATIONS ASSISTANTS** Ope Martins, Nida Masiulis, Dona Mathieu, Hilary Stewart(UK), Alana Warnke, Alice Whaley(UK), Brian White **EXECUTIVE ASSISTANT** Jessica Slater **ADMINISTRATIVE SUPPORT** Janet Clements(UK), Ming Yang (UK)

## News

**NEWS MANAGING EDITOR** John Travis **INTERNATIONAL EDITOR** Martin Enserink **DEPUTY NEWS EDITORS** Elizabeth Culotta, David Grimm, Eric Hand, David Malakoff, Leslie Roberts **SR. CORRESPONDENTS** Daniel Cley(UK), Jeffrey Mervis, Elizabeth Pennisi **ASSOCIATE EDITORS** Jeffrey Brainard, Catherine Maticic **NEWS WRITERS** Adrian Cho, Jon Cohen, Jennifer Couzin-Frankel, Jocelyn Kaiser, Kelly Servick, Robert F. Service, Erik Stokstad(Cambridge, UK), Paul Voosen, Meredith Wadman **INTERNS** Roni Dengler, Katie Langin, Kelly Warren **CONTRIBUTING CORRESPONDENTS** John Bohannon, Warren Cornwall, Ann Gibbons, Mara Hvistendahl, Sam Kean, Eli Kintisch, Kai Kupferschmidt(Berlin), Andrew Lawler, Mitch Leslie, Eliot Marshall, Virginia Morell, Dennis Normile(Shanghai), Charles Pillier, Tania Rabesandratana(London), Emily Underwood, Gretchen Vogel(Berlin), Lizzie Wade(Mexico City) **CAREERS** Donisha Adams, Rachel Bernstein(Editor) **COPY EDITORS** Dorie Chevlen, Julia Cole (Senior Copy Editor), Cyra Master (Copy Chief) **ADMINISTRATIVE SUPPORT** Meagan Weiland

**Executive Publisher** Rush D. Holt

**Publisher** Bill Moran **Chief Digital Media Officer** Josh Freeman

**DIRECTOR, BUSINESS STRATEGY AND PORTFOLIO MANAGEMENT** Sarah Whalen **DIRECTOR, PRODUCT AND CUSTOM PUBLISHING** Will Schweitzer **MANAGER, PRODUCT DEVELOPMENT** Hannah Heckner **BUSINESS SYSTEMS AND FINANCIAL ANALYSIS DIRECTOR** Randy Yi **DIRECTOR, BUSINESS OPERATIONS & ANALYST** Eric Knott **ASSOCIATE DIRECTOR, PRODUCT MANAGEMENT** Kris Bishop **ASSOCIATE DIRECTOR, INSTITUTIONAL LICENSING SALE** Geoffrey Worton **SENIOR SYSTEMS ANALYST** Nicole Mehmedovich **SENIOR BUSINESS ANALYST** Cory Lipman **MANAGER, BUSINESS OPERATIONS** Jessica Tierney **BUSINESS ANALYSTS** Meron Kebede, Sandy Kim, Jourdan Stewart **FINANCIAL ANALYST** Julian Iriarte **ADVERTISING SYSTEM ADMINISTRATOR** Tina Burks **SALES COORDINATOR** Shirley Young **DIRECTOR, COPYRIGHT, LICENSING, SPECIAL PROJECTS** Emilie David **DIGITAL PRODUCT ASSOCIATE** Michael Hardesty **RIGHTS AND PERMISSIONS ASSOCIATE** Elizabeth Sandler **RIGHTS, CONTRACTS, AND LICENSING ASSOCIATE** Lili Catlett **RIGHTS & PERMISSIONS ASSISTANT** Alexander Lee

**MARKETING MANAGER, PUBLISHING** Shawana Arnold **SENIOR ART ASSOCIATES** Paula Fry **ART ASSOCIATE** Kim Huynh

**DIRECTOR, INSTITUTIONAL LICENSING** Iqoo Edim **ASSOCIATE DIRECTOR, RESEARCH & DEVELOPMENT** Elisabeth Leonard **SENIOR INSTITUTIONAL LICENSING MANAGER** Ryan Rexroth **INSTITUTIONAL LICENSING MANAGERS** Marco Castellan, Chris Murawski **SENIOR OPERATIONS ANALYST** Lana Guz **MANAGER, AGENT RELATIONS & CUSTOMER SUCCESS** Judy Lillibridge

**WEB TECHNOLOGIES TECHNICAL DIRECTOR** David Levy **TECHNICAL MANAGER** Chris Coleman **PORTFOLIO MANAGER** Trista Smith **PROJECT MANAGER** Tara Kelly, Dean Robbins **DEVELOPERS** Elissa Heller, Ryan Jensen, Brandon Morrison

**DIGITAL MEDIA DIRECTOR OF ANALYTICS** Enrique Gonzales **SR. MULTIMEDIA PRODUCER** Sarah Crespi **MANAGING DIGITAL PRODUCER** Kara Estelle-Powers **PRODUCER** Lianna Birke **VIDEO PRODUCERS** Chris Burns, Nguyễn Khôi Nguyễn **DIGITAL SOCIAL MEDIA PRODUCER** Brice Russ

**DIGITAL/PRINT STRATEGY MANAGER** Jason Hillman **QUALITY TECHNICAL MANAGER** Marcus Spiegler **DIGITAL PRODUCTION MANAGER** Lisa Stanford **ASSISTANT MANAGER DIGITAL/PRINT** Rebecca Doshi **SENIOR CONTENT SPECIALISTS** Steve Forrester, Antoinette Hodal, Lori Murphy, Anthony Rosen **CONTENT SPECIALISTS** Jacob Hedrick, Kimberley Oster

**DESIGN DIRECTOR** Beth Rakouskas **DESIGN MANAGING EDITOR** Marcy Atarod **SENIOR DESIGNER** Chrystal Smith **DESIGNER** Christina Aycock **GRAPHICS MANAGING EDITOR** Alberto Cuadra **GRAPHICS EDITOR** Nirja Desai **SENIOR SCIENTIFIC ILLUSTRATORS** Valerie Altounian, Chris Bickel, Katharine Suttiff **SCIENTIFIC ILLUSTRATOR** Alice Kitterman **INTERACTIVE GRAPHICS EDITOR** Jia You **SENIOR GRAPHICS SPECIALISTS** Holly Bishop, Nathalie Cary **PHOTOGRAPHY MANAGING EDITOR** William Douthitt **PHOTO EDITOR** Emily Petersen **IMAGE RIGHTS AND FINANCIAL MANAGER** Jessica Adams

**SENIOR EDITOR, CUSTOM PUBLISHING** Sean Sanders: 202-326-6430 **ASSISTANT EDITOR, CUSTOM PUBLISHING** Jackie Oberst: 202-326-6463 **ASSOCIATE DIRECTOR, BUSINESS DEVELOPMENT** Justin Sawyers: 202-326-7061 **science\_advertising@aaas.org** **ADVERTISING PRODUCTION OPERATIONS MANAGER** Deborah Tompkins **SR. PRODUCTION SPECIALIST/GRAPHIC DESIGNER** Amy Hardcastle **SR. TRAFFIC ASSOCIATE** Christine Hall **DIRECTOR OF BUSINESS DEVELOPMENT AND ACADEMIC PUBLISHING RELATIONS, ASIA** Xiaoying Chu: +86-131 6136 3212, xchu@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 Dembksi: 847-498-4520 x3005, Steven Loerch: 847-498-4520 x3006 **UK EUROPE/ASIA** Roger Goncalves: TEL/FAX +41 43 243 1358 **JAPAN** Kaoru Sasaki (Tokyo): + 81 (3) 6459 4174 ksasaki@aaas.org

**GLOBAL SALES DIRECTOR ADVERTISING AND CUSTOM PUBLISHING** Tracy Holmes: +44 (0) 1223 326525 **CLASSIFIED** advertise@sciencecareers.org **SALES MANAGER, US, CANADA AND LATIN AMERICA** SCIENCE CAREERS Claudia Paulsen-Young: 202-326-6577 **EUROPE/ROW SALES** Sarah Lelarge **SALES ADMIN ASSISTANT** Kelly Grace +44 (0)1223 326528 **JAPAN** Miyuki Tani(Osaka): +81 (6) 6202 6272 mtani@aaas.org **CHINA/TAIWAN** Xiaoying Chu: +86-131 6136 3212, xchu@aaas.org **GLOBAL MARKETING MANAGER** Allison Pritchard **DIGITAL MARKETING ASSOCIATE** Aimee Aponte

**AAAS BOARD OF DIRECTORS, CHAIR** Susan Hockfield **PRESIDENT** Margaret A. Hamburg **PRESIDENT-ELECT** Steven Chu **TREASURER** Carolyn N. Ainslie **CHIEF EXECUTIVE OFFICER** Rush D. Holt **BOARD** Cynthia M. Beall, May R. Berenbaum, Rosina M. Bierbaum, Kaye Husbands Fealing, Stephen P.A. Fodor, S. James Gates, Jr., Michael S. Gazzaniga, Laura H. Greene, Robert B. Millard, Mercedes Pascual, William D. Provine

**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** 202-326-6730 **REPRINTS:** Author Inquiries 800-635-7181 **COMMERCIAL INQUIRIES** 803-359-4578 **PERMISSIONS** 202-326-6765, permissions@aaas.org **AAAS Member Central Support** 866-434-2227 www.aaas.org/membercentral

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 book 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 www.sciencemag.org/authors/science-information-authors

## 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 Manchester*  
Sebastian Amigorena, *Institut Curie*  
Meinrat O. Andrae, *Max Planck Inst. Mainz*  
Paola Ariotta, *Harvard U.*  
Johan Auwerx, *EPFL*  
David Awschalom, *U. of Chicago*  
Clare Baker, *U. of Cambridge*  
Nenad Ban, *ETH Zürich*  
Franz Bauer, *Pontificia Universidad Católica de Chile*  
Ray H. Baughman, *U. of Texas at Dallas*  
Carlo Beenakker, *Leiden U.*  
Kamran Behnia, *ESPCI*  
Yasmine Belkaid, *NIAD, NIH*  
Philip Benfey, *Duke U.*  
Gabriele Bergers, *VI*  
Bradley Bernstein, *Massachusetts General Hospital*  
Peer Bork, *EMBL*  
Chris Bowler, *École Normale Supérieure*  
Ian Boyd, *U. of St. Andrews*  
Emily Brodsky, *U. of California, Santa Cruz*  
Ron Brookmeyer, *U. of California, Los Angeles (\$)*  
Christian Büchel, *UKE Hamburg*  
Dennis Burton, *The Scripps Res. Inst.*  
Carter Tribley Butts, *U. of California, Irvine*  
Gyorgy Buzsáki, *New York U. School of Medicine*  
Blanche Capel, *Duke U.*  
Mats Carlsson, *U. of Oslo*  
Ib Chorkendorff, *Denmark TU*  
James J. Collins, *MIT*  
Robert Cook-Deegan, *Arizona State U.*  
Lisa Coussens, *Oregon Health & Science U.*  
Alan Cowman, *Walter & Eliza Hall Inst.*  
Roberta Croce, *VU Amsterdam*  
Janet Currie, *Princeton U.*  
Jeff L. Dangl, *U. of North Carolina*  
Tom Daniel, *U. of Washington*  
Chiara Daraio, *Caltech*  
Nicolas Daughas, *U. of Chicago*  
Frans de Waal, *Emory U.*  
Stanislas Dehaene, *Collège de France*  
Robert Desimone, *MIT*  
Claude Desplan, *New York U.*  
Sandra Díaz, *Universidad Nacional de Córdoba*  
Dennis Discher, *U. of Penn.*  
Gerald W. Dorn II, *Washington U. in St. Louis*  
Jennifer A. Doudna, *U. of California, Berkeley*  
Bruce Dunn, *U. of California, Los Angeles*  
William Dunphy, *Caltech*  
Christopher Dye, *U. of Oxford*  
Todd Ehlers, *U. of Tübingen*  
Jennifer Elisseeff, *Johns Hopkins U.*  
Tim Elston, *U. of North Carolina at Chapel Hill*  
Barry Everitt, *U. of Cambridge*  
Vanessa Ezenwa, *U. of Georgia*  
Ernst Fehr, *U. of Zürich*  
Michael Feuer, *The George Washington U.*  
Toren Finkel, *NHLBI, NIH*  
Kate Fitzgerald, *U. of Massachusetts*  
Peter Fratzl, *Max Planck Inst. Potsdam*  
Eliane Fuchs, *Rockefeller U.*  
Eileen Furlong, *EMBL*  
Jay Gallagher, *U. of Wisconsin*  
Daniel Geschwind, *U. of California, Los Angeles*  
Karl-Heinz Glassmeier, *TU Braunschweig*  
Ramon Gonzalez, *Rice U.*  
Elizabeth Grove, *U. of Chicago*  
Nicolas Gruber, *ETH Zürich*  
Kip Guy, *U. of Kentucky College of Pharmacy*  
Taekjip Ha, *Johns Hopkins U.*  
Christian Haass, *Ludwig Maximilians U.*  
Sharon Hammes-Schiffer, *U. of Illinois at Urbana-Champaign*  
Wolf-Dietrich Hardt, *ETH Zürich*  
Michael Hasselmo, *Boston U.*  
Martin Heimann, *Max Planck Inst. Jena*  
Ykä Helariutta, *U. of Cambridge*  
Janet G. Hering, *Eawag*  
Kai-Uwe Hinrichs, *U. of Bremen*  
David Hodell, *U. of Cambridge*  
Lora Hooper, *UT Southwestern Medical Ctr. at Dallas*  
Fred Hughson, *Princeton U.*  
Randall Hulet, *Rice U.*  
Auke Ijspeert, *EPFL*  
Akiko Iwasaki, *Yale U.*  
Stephen Jackson, *USGS and U. of Arizona*  
Seema Jayachandran, *Northwestern U.*  
Kai Johnson, *EPFL*  
Peter Jonas, *Inst. of Science & Technology Austria*  
Matt Kaerberlein, *U. of Washington*  
William Kaelin Jr., *Dana-Farber Cancer Inst.*  
Daniel Kammen, *U. of California, Berkeley*  
Abby Kavner, *U. of California, Los Angeles*  
Masashi Kawasaki, *U. of Tokyo*  
V. Narry Kim, *Seoul Nat. U.*  
Robert Kingston, *Harvard Medical School*  
Etienne Koechlin, *École Normale Supérieure*  
Alexander Kolodkin, *Johns Hopkins U.*  
Thomas Langer, *U. of Cologne*  
Mitchell A. Lazar, *U. of Penn.*  
David Lazer, *Harvard U.*  
Stanley Lemon, *U. of North Carolina at Chapel Hill*

Ottoline Leyser, *U. of Cambridge*  
Wendell Lim, *U. of California, San Francisco*  
Marcia C. Linn, *U. of California, Berkeley*  
Jianguo Liu, *Michigan State U.*  
Luis Liz-Marzán, *CIC bioMaGUNE*  
Jonathan Losos, *Harvard U.*  
Ke Lu, *Chinese Acad. of Sciences*  
Christian Lüscher, *U. of Geneva*  
Laura Machesky, *Cancer Research UK Beatson Inst.*  
Fabienne Mackay, *U. of Melbourne*  
Anne Magurran, *U. of St. Andrews*  
Oscar Marin, *King's College London*  
Charles Marshall, *U. of California, Berkeley*  
Christopher Marx, *U. of Idaho*  
C. Robertson McClung, *Dartmouth College*  
Rodrigo Medellín, *U. of Mexico*  
Graham Medley, *London School of Hygiene & Tropical Med.*  
Jane Memmott, *U. of Bristol*  
Tom Misteli, *NCI, NIH*  
Yasuhiko Miyashita, *U. of Tokyo*  
Richard Morris, *U. of Edinburgh*  
Christian Büchel, *U. of Edinburgh*  
Alison Motsinger-Reif, *NC State U. (\$)*  
Daniel Neumark, *U. of California, Berkeley*  
Kitty Nijmeijer, *TU Eindhoven*  
Helga Nowotny, *Austrian Council*  
Rachel O'Reilly, *U. of Warwick*  
Harry Orr, *U. of Minnesota*  
Pilar Ossorio, *U. of Wisconsin*  
Andrew Oswald, *U. of Warwick*  
Isabella Pagano, *Istituto Nazionale di Astrofisica*  
Margaret Palmer, *U. of Maryland*  
Steve Palumbi, *Stanford U.*  
Jane Parker, *Max Planck Inst. Cologne*  
Giovanni Parmigiani, *Dana-Farber Cancer Inst. (\$)*  
John H. J. Petrini, *Memorial Sloan Kettering*  
Samuel Pfaff, *Salk Inst. for Biological Studies*  
Kathrin Plath, *U. of California, Los Angeles*  
Martin Plenio, *Ulm U.*  
Albert Polman, *FOM Institute for AMOLF*  
Elvira Poloczanska, *Alfred-Wegener-Inst.*  
Philippe Poulin, *CNRS*  
Jonathan Pritchard, *Stanford U.*  
David Randall, *Colorado State U.*  
Sarah Reisman, *Caltech*  
Félix A. Rey, *Institut Pasteur*  
Trevor Robbins, *U. of Cambridge*  
Amy Rosenzweig, *Northwestern U.*  
Mike Ryan, *U. of Texas at Austin*  
Mitinori Saitou, *Kyoto U.*  
Shimon Sakaguchi, *Osaka U.*  
Miquel Salmeron, *Lawrence Berkeley Nat. Lab*  
Nitin Samarth, *Penn. State U.*  
Jürgen Sandkühler, *Medical U. of Vienna*  
Alexander Schier, *Harvard U.*  
Wolfram Schlenker, *Columbia U.*  
Susannah Scott, *U. of California, Santa Barbara*  
Vladimir Shalaev, *Purdue U.*  
Beth Shapiro, *U. of California, Santa Cruz*  
Jay Shendure, *U. of Washington*  
Brian Shiochet, *U. of California, San Francisco*  
Robert Siliciano, *Johns Hopkins U. School of Medicine*  
Uli Simonsohn, *U. of Penn.*  
Lucia Sivilotti, *U. College London*  
Alison Smith, *John Innes Centre*  
Richard Smith, *U. of North Carolina at Chapel Hill (\$)*  
Mark Smyth, *QIMR Berghofer*  
Pam Soltis, *U. of Florida*  
John Speakman, *U. of Aberdeen*  
Tara Spres-Jones, *U. of Edinburgh*  
Allan C. Spradling, *Carnegie Institution for Science*  
Eric Steig, *U. of Washington*  
Paula Stephan, *Georgia State U.*  
V. S. Subrahmanian, *U. of Maryland*  
Ira Tabas, *Columbia U.*  
Sarah Teichmann, *U. of Cambridge*  
Shubha Tole, *Tata Inst. of Fundamental Research*  
Wim van der Putten, *Netherlands Inst. of Ecology*  
Bert Vogelstein, *Johns Hopkins U.*  
David Wallach, *Weizmann Inst. of Science*  
Jane-Ling Wang, *U. of California, Davis (\$)*  
David Waxman, *Fudan U.*  
Jonathan Weissman, *U. of California, San Francisco*  
Chris Wikle, *U. of Missouri (\$)*  
Terrie Williams, *U. of California, Santa Cruz*  
Ian A. Wilson, *The Scripps Res. Inst. (\$)*  
Timothy D. Wilson, *U. of Virginia*  
Yu Ye, *Princeton U.*  
Jan Xian, *Leiden U.*  
Kenneth Zaret, *U. of Penn. School of Medicine*  
Jonathan Zehr, *U. of California, Santa Cruz*  
Maria Zuber, *MIT*