

Editor-in-Chief Holden Thorp, hthorp@aaas.org

Executive Editor Monica M. Bradford

Editors, Research Valda Vinson, Jake S. Yeston Editor, Insights Lisa D. Chong

DEPUTY EDITORS Julia Fahrenkamp-Uppenbrink (UK), Stella M. Hurlley (UK), Phillip D. Szuroimi, Sacha Vignieri **SR. EDITORIAL FELLOW** Andrew M. Sugden (UK) **SR. EDITORS** Gemma Alderton (UK), Caroline Ash (UK), Brent Grocholski, Pamela J. Hines, Paula A. Kiberstis, Marc S. Lavine (Canada), Steve Mao, Ian S. Osborne (UK), Beverly A. Purnell, L. Bryan Ray, H. Jesse Smith, Keith T. Smith (UK), Jelena Stajic, Peter Stern (UK), Valerie B. Thompson, Brad Wible, Laura M. Zahn **ASSOCIATE EDITORS** Michael A. Funk, Priscilla N. Kelly, Tage S. Rai, Seth Thomas Scanlon (UK), Yury V. Suleymanov **LETTERS EDITOR** Jennifer Sills **LEAD CONTENT PRODUCTION EDITORS** Harry Jach, Lauren Kmec **CONTENT PRODUCTION EDITORS** Amelia Beyna, Jeffrey E. Cook, Chris Filiatreau, Julia Katris, Nida Masiulis, Suzanne M. White **SR. EDITORIAL COORDINATORS** Carolyn Kyle, Beverly Shields **EDITORIAL COORDINATORS** Aneera Dobbins, Joi S. Granger, Jeffrey Hearn, Lisa Johnson, Maryrose Madrid, Ope Martins, Shannon McMahon, Jerry Richardson, Hilary Stewart (UK), Alana Warnke, Alice Whaley (UK), Anita Wynn **PUBLICATIONS ASSISTANTS** Jeremy Dow, Alexander Kief, Ronmel Navas, Brian White **EXECUTIVE ASSISTANT** Jessica Slater **ASI DIRECTOR, OPERATIONS** Janet Clements (UK) **ASI SR. OFFICE ADMINISTRATOR** Jessica Waldoock (UK)

News Editor Tim Appenzeller

NEWS MANAGING EDITOR John Travis **INTERNATIONAL EDITOR** Martin Enserink **DEPUTY NEWS EDITORS** Elizabeth Culotta, Lila Guterman, David Grimm, Eric Hand (Europe), David Malakoff **SR. CORRESPONDENTS** Daniel Clery (UK), Jon Cohen, Jeffrey Mervis, Elizabeth Pennisi **ASSOCIATE EDITORS** Jeffrey Brainard, Catherine Maticic **NEWS REPORTERS** Adrian Cho, Jennifer Couzin-Frankel, Jocelyn Kaiser, Kelly Servick, Robert F. Service, Erik Stokstad, Paul Voosen, Meredith Wadman **INTERNS** Eva Frederick, Rodrigo Perez Ortega **CONTRIBUTING CORRESPONDENTS** Warren Cornwall, Ann Gibbons, Mara Hvistendahl, Sam Kean, Eli Kintisch, Kai Kupferschmidt (Berlin), Andrew Lawler, Mitch Leslie, Eliot Marshall, Virginia Morell, Dennis Normile (Shanghai), Elisabeth Pain (Careers), Charles Piller, Michael Price, Tania Rabesandratana (Barcelona), Emily Underwood, Gretchen Vogel (Berlin), Lizzie Wade (Mexico City) **CAREERS** Donisha Adams, Rachel Bernstein (Editor), Katie Langin (Acting Editor) **COPY EDITORS** Julia Cole (Senior Copy Editor), Cyra Master (Copy Chief) **ADMINISTRATIVE SUPPORT** Meagan Welland

Creative Director Beth Rakouskas

DESIGN MANAGING EDITOR Marcy Atarod **GRAPHICS MANAGING EDITOR** Alberto Cuadra **PHOTOGRAPHY MANAGING EDITOR** William Douthitt **WEB CONTENT STRATEGY MANAGER** Kara Estelle-Powers **SENIOR DESIGNER** Chrystal Smith **DESIGNER** Christina Aycock **GRAPHICS EDITOR** Nirja Desai **INTERACTIVE GRAPHICS EDITOR** Xing Liu **SENIOR SCIENTIFIC ILLUSTRATORS** Valerie Altounian, Chris Bickel **SCIENTIFIC ILLUSTRATOR** Alice Kitterman **SENIOR GRAPHICS SPECIALISTS** Holly Bishop, Nathalie Cary **SENIOR PHOTO EDITOR** Emily Petersen **PHOTO EDITOR** Kaitlyn Dolan

Chief Executive Officer and Executive Publisher Sudip Parikh

Publisher, Science Family of Journals Bill Moran

DIRECTOR, BUSINESS SYSTEMS AND FINANCIAL ANALYSIS Randy Yi **DIRECTOR, BUSINESS OPERATIONS & ANALYTICS** Eric Knott **DIRECTOR OF ANALYTICS** Enrique Gonzales **MANAGER, BUSINESS OPERATIONS** Jessica Tierney **SENIOR BUSINESS ANALYST** Cory Lipman, Meron Kebede **FINANCIAL ANALYST** Alexander Lee **ADVERTISING SYSTEM ADMINISTRATOR** Tina Burks **SENIOR SALES COORDINATOR** Shirley Young **DIGITAL/PRINT STRATEGY MANAGER** Jason Hillman **QUALITY TECHNICAL MANAGER** Marcus Spiegler **ASSISTANT MANAGER DIGITAL/PRINT** Rebecca Doshi **SENIOR CONTENT SPECIALISTS** Steve Forrester, Jacob Hedrick, Antoinette Hodal, Lori Murphy **DIGITAL PRODUCTION MANAGER** Lisa Stanford **CONTENT SPECIALIST** Kimberley Oster **ADVERTISING PRODUCTION OPERATIONS MANAGER** Deborah Tompkins **DESIGNER, CUSTOM PUBLISHING** Jeremy Huntsinger **SR. TRAFFIC ASSOCIATE** Christine Hall **SPECIAL PROJECTS ASSOCIATE** Sarah Dhre

ASSOCIATE DIRECTOR, BUSINESS DEVELOPMENT Justin Sawyers **GLOBAL MARKETING MANAGER** Allison Pritchard **DIGITAL MARKETING MANAGER** Aimee Aponte **JOURNALS MARKETING MANAGER** Shawana Arnold **MARKETING ASSOCIATES** Tori Velasquez, Mike Romano, Ashley Hylton **DIGITAL MARKETING SPECIALIST** Asleigh Rojanavongse **SENIOR DESIGNER** Kim Huynh

DIRECTOR AND SENIOR EDITOR, CUSTOM PUBLISHING Sean Sanders **ASSISTANT EDITOR, CUSTOM PUBLISHING** Jackie Oberst

DIRECTOR, PRODUCT & PUBLISHING DEVELOPMENT Chris Reid **DIRECTOR, BUSINESS STRATEGY AND PORTFOLIO MANAGEMENT** Sarah Whalen **ASSOCIATE DIRECTOR, PRODUCT MANAGEMENT** Kris Bishop **SR. PRODUCT ASSOCIATE** Robert Koepeke **DIGITAL PRODUCT STRATEGIST** Michael Hardesty **SPJ ASSOCIATE** Samantha Bruno Fuller

DIRECTOR, INSTITUTIONAL LICENSING Iquo Edim **ASSOCIATE DIRECTOR, RESEARCH & DEVELOPMENT** Elisabeth Leonard **MARKETING MANAGER** Kess Knight **SENIOR INSTITUTIONAL LICENSING MANAGER** Ryan Rexroth **INSTITUTIONAL LICENSING MANAGER** Marco Castellani **MANAGER, AGENT RELATIONS & CUSTOMER SUCCESS** Judy Lillibridge **SENIOR OPERATIONS ANALYST** Lana Guz **FULFILLMENT COORDINATOR** Melody Stringer **SALES COORDINATOR** Josh Haverlock

DIRECTOR, GLOBAL SALES Tracy Holmes **US EAST COAST AND MID WEST SALES** Stephanie O'Connor **US WEST COAST SALES** Lynne Stickrod **US SALES MANAGER, SCIENCE CAREERS** Claudia Paulsen-Young **US SALES REP, SCIENCE CAREERS** Tracy Anderson **ASSOCIATE DIRECTOR, ROW** Roger Gonçalves **SALES REP, ROW** Sarah Lelarge **SALES ADMIN ASSISTANT, ROW** Bryony Cousins **DIRECTOR OF GLOBAL COLLABORATION AND ACADEMIC PUBLISHING RELATIONS, ASIA** Xiaoying Chu **ASSOCIATE DIRECTOR, INTERNATIONAL COLLABORATION** Grace Yao **SALES MANAGER** Danny Zhao **MARKETING MANAGER** Kilo Lan **ASCA CORPORATION, JAPAN** Kaoru Sasaki (Tokyo), Miyuki Tani (Osaka) **COLLABORATION/CUSTOM PUBLICATIONS/JAPAN** Adarsh Sandhu

OSAKA **COLLABORATION/CUSTOM PUBLICATIONS/JAPAN** Adarsh Sandhu

DIRECTOR, COPYRIGHT, LICENSING AND SPECIAL PROJECTS Emilee David **RIGHTS AND LICENSING COORDINATOR** Jessica Adams **RIGHTS AND PERMISSIONS ASSOCIATE** Elizabeth Sandler **CONTRACTS AND LICENSING ASSOCIATE** Lili Catlett

MAIN HEADQUARTERS

Science/AAAS
1200 New York Ave. NW
Washington, DC 20005

SCIENCE INTERNATIONAL

Clarendon House
Clarendon Road
Cambridge, CB2 8FH, UK

SCIENCE CHINA

Room 1004, Culture Square
No. 59 Zhongguancun St.
Haidian District, Beijing, 100872

SCIENCE JAPAN

ASCA Corporation
Sibaura TY Bldg, 4F, 1-14-5
Shibaura Minato-ku
Tokyo, 108-0073 Japan

EDITORIAL

science_editors@aaas.org
NEWS
science_news@aaas.org

INFORMATION FOR AUTHORS

sciencemag.org/authors/
science-information-authors
REPRINTS AND PERMISSIONS
sciencemag.org/help/
reprints-and-permissions

MEDIA CONTACTS

scipak@aaas.org

MULTIMEDIA CONTACTS

SciencePodcast@aaas.org
ScienceVideo@aaas.org

INSTITUTIONAL SALES

AND SITE LICENSES
sciencemag.org/librarian

PRODUCT ADVERTISING

& CUSTOM PUBLISHING
advertising.sciencemag.org/
products-services
science_advertising@aaas.org

CLASSIFIED ADVERTISING

advertising.sciencemag.org/
science-careers
advertise@sciencecareers.org

JOB POSTING CUSTOMER SERVICE

employers.sciencemag.org
support@sciencecareers.org

MEMBERSHIP AND INDIVIDUAL

SUBSCRIPTIONS
sciencemag.org/subscriptions

MEMBER BENEFITS

aaas.org/membercentral

AAAS BOARD OF DIRECTORS

CHAIR Steven Chu
PRESIDENT Claire M. Fraser
PRESIDENT-ELECT Susan G. Amara
TREASURER Carolyn N. Ainslie

CHIEF EXECUTIVE OFFICER

Sudip Parikh

BOARD

Cynthia M. Beall
Rosina M. Bierbaum
Ann Bostrom
Stephen P.A. Fodor
S. James Gates, Jr.
Laura H. Greene
Kaye Husbands Fealing
Maria M. Klawe
Robert B. Millard
Alondra Nelson
William D. Provine

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
James Analytis, U. of California, Berkeley
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
Peter Bearman, Columbia U.
Carlo Beenakker, Leiden U.
Yasmine Belkaid, NIAID, NIH
Philip Benfey, Duke U.
Gabriele Bergers, VIB
Bradley Bernstein, Mass. General Hospital
Alessandra Biffi, Harvard Med. School
Peer Bork, EMBL
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 (\$) **Tom Misteli, NCI, NIH**
Christian Büchel, UKE Hamburg
Dennis Burton, Scripps Research
Carter Tribley Butts, U. of California, Irvine
György Buzsáki, New York U. School of Med.
Blanche Capel, Duke U.
Annmarie Carlton, U. of California, Irvine
Nick Chater, U. of Warwick
Zhijian Chen, UT Southwestern Med. Ctr.
Ib Chorkendorff, Denmark TU
James J. Collins, MIT
Robert Cook-Deegan, Arizona State U.
Alan Cowman, Walter & Eliza Hall Inst.
Carolyn Coyne, U. of Pittsburgh
Roberta Croce, VU Amsterdam
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.
Claude Desplan, New York U.
Sandra Diaz, Universidad Nacional de Córdoba
Ulrike Diebold, TU Wien
Hong Ding, Inst. of Physics, CAS
Jennifer Dionne, Stanford U.
Dennis Discher, U. of Penn.
Gerald Dorn, 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 Eiseleff, Johns Hopkins U.
Tim Elston, U. of North Carolina
Andrea Encalada, U. San Francisco de Quito
Nader Egheta, U. of Penn.
Karen Ersche, U. of Cambridge
Barry Everitt, U. of Cambridge
Vanessa Ezenwa, U. of Georgia
Michael Feuer, The George Washington U.
Toren Finkel, U. of Pittsburgh Med. Ctr.
Gwen Flowers, Simon Fraser U.
Peter Fratzl, Max Planck Inst. Potsdam
Elaine 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, U. of South Florida
Elizabeth Grove, U. of Chicago
Nicolas Gruber, ETH Zürich
Hua Guo, U. of New Mexico
Kip Guy, U. of Kentucky College of Pharmacy
Taekjip Ha, Johns Hopkins U.
Christian Haass, Ludwig Maximilians U.
Sharon Hammes-Schiffer, Yale U.
Wolf-Dietrich Hardt, ETH Zürich
Louise Harra, U. College London
Jan He, Clemson U.
Carl-Philipp Heisenberg, IST Austria
Ykä Helariutta, U. of Cambridge
Janet G. Hering, Eawag
Hans Hilgenkamp, U. of Twente
Kai-Uwe Hinrichs, U. of Bremen
Lora Hooper, UT Southwestern Med. Ctr.
Fred Hughson, Princeton U.
Randall Hulet, Rice U.
Auke Ijspeert, EPFL
Akiko Iwasaki, Yale U.
Stephen Jackson, USGS and U. of Arizona
Kai Johnson, EPFL
Peter Jonas, IST Austria
Matt Kaerberlein, U. of Washington
William Kaelin Jr., Dana-Farber Cancer Inst.
Daniel Kammen, U. of California, Berkeley
V. Narry Kim, Seoul Nat. U.
Robert Kingston, Harvard Med. School
Nancy Knowlton, Smithsonian Institution
Etienne Kochkin, Ecole Normale Supérieure
Alexander L. Kolodkin, Johns Hopkins U.

Julija Krupic, U. of Cambridge
Thomas Langer, Max Planck Inst. Cologne
Mitchell A. Lazar, U. of Penn.
Ottoline Leyser, U. of Cambridge
Wendell Lim, U. of California, San Francisco
Jiang Liu, Michigan State U.
Luis Liz-Marzán, CIC bioMaGUNE
Jonathan Losos, Washington U. in St. Louis
Ke Lu, Chinese Acad. of Sciences
Christian Lüscher, U. of Geneva
Jean Lynch-Stieglitz, Georgia Inst. of Tech.
Fabienne Mackay, U. of Melbourne
Anne Magurran, U. of St. Andrews
Oscar Marín, King's College London
Charles Marshall, U. of California, Berkeley
Christopher Marx, U. of Idaho
Geraldine Masson, CNRS
C. Robertson McClung, Dartmouth College
Rodrigo Medellín, U. Nacional Autónoma de México
Graham Medley, London School of Hygiene & Tropical Med.
Jane Memmott, U. of Bristol
Baohua Mi, U. of California, Berkeley
Edward Miguel, U. of California, Berkeley
Tom Misteli, NCI, NIH
Yasushi Miyashita, U. of Tokyo
Alison Mutschers-Reif, NIEHS, NIH (\$) **Daniel Nettle, Newcastle U.**
Daniel Neumann, U. of California, Berkeley
Beatriz Nothak, U. of Groningen
Helga Nowotny, Vienna Science, Research & Tech. Fund
Rachel O'Reilly, U. of Birmingham
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
Elizabeth Levy Paluck, Princeton U.
Jane Parker, Max Planck Inst. Cologne
Giovanni Parmigiani, Dana-Farber Cancer Inst. (\$) **Samuel Pfaff, Salk Inst. for Biological Studies**
Julie Pfeiffer, UT Southwestern Med. Ctr.
Matthieu Piel, Institut Curie
Kathrin Plath, U. of California, Los Angeles
Martin Plenio, Ulm U.
Katherine Pollard, U. of California, San Francisco
Elvira Poloczanska, Alfred-Wegener-Inst.
Julia Powaratz, Ludwig Maximilians U.
Philippe Poulin, CNRS
Jonathan Pritchard, Stanford U.
Félix A. Rey, Institut Pasteur
Trevor Robbins, U. of Cambridge
Joeri Rogge, Imperial College London
Amy Rosenzweig, Northwestern U.
Mike Ryan, U. of Texas at Austin
Mitsunori Saitou, Kyoto U.
Shimon Sakaguchi, Osaka U.
Miquel Salmeron, Lawrence Berkeley Nat. Lab
Nitin Samarth, Penn. State U.
Jürgen Sandkühner, Med. U. of Vienna
Alexander Schier, Harvard U.
Wolfram Schlenker, Columbia U.
Susannah Scott, U. of California, Santa Barbara
Rebecca Sear, London School of Hygiene & Tropical Med.
Vladimir Shalueva, Purdue U.
Jie Shan, Cornell U.
Beth Shapiro, U. of California, Santa Cruz
Jay Shendure, U. of Washington
Steve Sherwood, U. of New South Wales
Brian Shoichet, U. of California, San Francisco
Robert Siliciano, Johns Hopkins U. School of Med.
Lucia Sivilotti, U. College London
Alison Smith, John Innes Centre
Richard Smith, U. of North Carolina (\$) **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
V. S. Subrahmanian, Dartmouth College
Ira Tabas, Columbia U.
Sarah Teichmann, Wellcome Sanger Inst.
Rocio Titicuin, Princeton U.
Shubha Tole, Tata Inst. of Fundamental Research
Wim van der Putten, Netherlands Inst. of Ecology
Reinhold Vegeler, KU Leuven
Bert Vogelstein, Johns Hopkins U.
Kathleen Vohs, U. of Minnesota
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 Winkle, U. of Missouri (\$) **Terrie Williams, U. of California, Santa Cruz**
Ian A. Wilson, Scripps Research (\$) **Yu Xie, Princeton U.**
Jan Zaenen, Leiden U.
Kenneth Zaret, U. of Penn. School of Med.
Jonathan Zehr, U. of California, Santa Cruz
Xiaowei Zhuang, Harvard U.
Maria Zuber, MIT