

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. Szuromi, Sacha Vignieri **SR. EDITORIAL FELLOW** Andrew M. Sugden (UK) **SR. EDITORS** Gemma Alderton (UK), Caroline Ash (UK), Brent Grocholski, Pamela J. Hines, Di Jiang, Marc S. Lavine (Canada), Yevgeniya Nusinovich, 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 Silis **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** Lucy Hicks, Cathleen O'Grady **CONTRIBUTING CORRESPONDENTS** Warren Cornwall, Andrew Curry (Berlin), Ann Gibbons, 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), Joshua Sokol, Emily Underwood, Gretchen Vogel (Berlin), Lizzie Wade (Mexico City) **CAREERS** Donisha Adams, Rachel Bernstein (Editor), Katie Langin (Associate Editor) **COPY EDITORS** Julia Cole (Senior Copy Editor), Cyra Master (Copy Chief) **ADMINISTRATIVE SUPPORT** Meagan Weiland

Creative Director Beth Rakuskas

**DESIGN MANAGING EDITOR** Marcy Atarod **GRAPHICS MANAGING EDITOR** Alberto Cuadra **PHOTOGRAPHY MANAGING EDITOR** William Douthitt **WEB CONTENT STRATEGY MANAGER** Kara Estelle-Powers **DESIGN EDITOR** Chrystal Smith **DESIGNER** Christina Aycock **GRAPHICS EDITOR** Nirja Desai **INTERACTIVE GRAPHICS EDITOR** Kelly Franklin **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 **WEB DESIGNER** Jennie Pajecowski

## 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 & ANALYSIS** 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 **PRODUCTION SPECIALIST** Kristin Wowk **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 Dhene

**ASSOCIATE DIRECTOR, BUSINESS DEVELOPMENT** Justin Sawyers **GLOBAL MARKETING MANAGER** Allison Pritchard **DIGITAL MARKETING MANAGER** Aimee Aponte **JOURNALS MARKETING MANAGER** Shabana 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 **PRODUCT DEVELOPMENT MANAGER** Scott Chernoff **PUBLISHING TECHNOLOGY MANAGER** Michael Di Natale **SR. PRODUCT ASSOCIATE** Robert Koepke **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 ROW** Goncalves **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

**DIRECTOR, COPYRIGHT, LICENSING AND SPECIAL PROJECTS** Emilie 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  
SciencePodcast@aaas.org  
ScienceVideo@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 \$)

Takuzo Aida, *U. of Tokyo*  
Leslie Aiello, *Wenner-Gren Foundation*  
Deji Akinwande, *UT Austin*  
Judith Allen, *U. of Manchester*  
Marcella Alsan, *Harvard U*  
Sebastian Amigorena, *Institut Curie*  
James Analytis, *UC Berkeley*  
Trevor Archer, *NIEHS, NIH*  
Paola Arlotta, *Harvard U*  
David Awschalom, *U. of Chicago*  
Clare Baker, *U. of Cambridge*  
Delia Baldassarri, *NYU*  
Nenad Ban, *ETH Zürich*  
Franz Bauer, *Pontificia U. Católica de Chile*  
Ray H. Baughman, *UT Dallas*  
Carlo Beenakker, *Leiden U*  
Yasmine Belkaid, *NIAD, NIH*  
Philipp Benfey, *Duke U*  
Kiros T. Berhane, *Columbia U*  
Bradley Bernstein, *Mass. General Hospital*  
Joseph J. Berry, *NREL*  
Alessandra Biffi, *Harvard Med.*  
Chris Bowler, *École Normale Supérieure*  
Ian Boyd, *U. of St. Andrews*  
Emily Brodsky, *UC Santa Cruz*  
Ron Brookmeyer, *UCLA (\$)*  
Christian Büchel, *UKE Hamburg*  
Dennis Burton, *Scripps Res.*  
Carter Tribley Butts, *US Irvine*  
György Buzsáki, *NYU School of Med.*  
Mariana Byndloss, *Vanderbilt U. Med. Ctr*  
Annmarie Carlton, *UC Irvine*  
Nick Chater, *U. of Warwick*  
Ling-Ling Chen, *SIBCB, CAS*  
M. Keith Chen, *UCLA*  
Zhijian Chen, *UT Southwestern Med. Ctr.*  
Ib Chorkendorff, *Denmark TU*  
James J. Collins, *MIT*  
Robert Cook-Deegan, *Arizona State U.*  
Virginia Cornish, *Columbia U.*  
Carolyn Coyne, *U. of Pitt.*  
Roberta Croce, *VU Amsterdam*  
Ismaila Dabo, *Penn State U.*  
Jeff L. Dangl, *UNC*  
Chiara Daraio, *Caltech*  
Nicolas Dauphas, *U. of Chicago*  
Christian Davenport, *U. of Michigan*  
Frans de Waal, *Emory U.*  
Claude Desplan, *NYU*  
Sandra Diaz, *U. Nacional de Córdoba*  
Ulrike Diebold, *TU Wien*  
Stefanie Dimmeler, *Goethe-U. Frankfurt*  
Hong Ding, *Inst. of Physics, CAS*  
Dennis Discher, *UPenn*  
Jennifer A. Doudna, *UC Berkeley*  
Raissa M. D'Souza, *UC Davis*  
Bruce Dunn, *UCLA*  
William Dunphy, *Caltech*  
Scott Edwards, *Harvard U.*  
Todd Ehlers, *U. of Tübingen*  
Jennifer Eliseeff, *Johns Hopkins U.*  
Andrea Encalada, *U. San Francisco de Quito*  
Nader Engheta, *U. of Penn.*  
Karen Ersche, *U. of Cambridge*  
Beate Escher, *UFZ & U. of Tübingen*  
Harry Evertt, *U. of Cambridge*  
Vanessa Ezenwa, *U. of Georgia*  
Michael Feuer, *GWU*  
Toren Finkel, *U. of Pitt. Med. Ctr.*  
Gwenn Flowers, *Simon Fraser U.*  
Peter Fratzl, *Max Planck Inst. Potsdam*  
Elaine Fuchs, *Rockefeller U.*  
Jay Gallagher, *U. of Wisconsin*  
Daniel Geschwind, *UCLA*  
Sandra González-Bailón, *UPenn*  
Elizabeth Grove, *U. of Chicago*  
Nicolas Gruber, *ETH Zürich*  
Hua Guo, *U. of New Mexico*  
Taekjip Ha, *Johns Hopkins U.*  
Sharon Hammes-Schiffer, *Yale U.*  
Wolf-Dietrich Hardt, *ETH Zürich*  
Louise Harra, *U. Coll. London*  
Jian He, *Clemson U.*  
Carl-Philipp Heisenberg, *IST Austria*  
Ykä Helariutta, *U. of Cambridge*  
Janet G. Hering, *Eawag*  
Heather Hickman, *NIAD, NIH*  
Hans Hilgenkamp, *U. of Twente*  
Kai-Uwe Hinrichs, *U. of Bremen*  
Deirdre Hollingsworth, *U. of Oxford*  
Randall Hulet, *Rice U.*  
Auke Ijspeert, *EPFL*  
Akiko Iwasaki, *Yale U.*  
Stephen Jackson, *USGS & U. of Arizona*  
Erich Jarvis, *Rockefeller U.*  
Peter Jonas, *IST Austria*  
Matt Kaerberlein, *U. of Wash.*  
William Kaelin Jr., *Dana-Farber Cancer Inst.*  
Carter Kammen, *UC Berkeley*  
V. Narry Kim, *Seoul Nat. U.*  
Robert Kingston, *Harvard Med.*  
Nancy Knowlton, *Smithsonian Institution*  
Etienne Koechlin, *École Normale Supérieure*  
Alex L. Kolodkin, *Johns Hopkins U.*  
Julija Krupic, *U. of Cambridge*  
Gabriel Lander, *Scripps Res. (\$)*  
Michael A. Lazar, *UPenn*  
Wendell Lim, *UCSF*  
Luis Liz-Marzán, *CIC bioMAGUNE*  
Omar Lizardo, *UNC*  
Jonathan Losos, *Wash. U. in St. Louis*  
Ke Lu, *Inst. of Metal Res., CAS*  
Christian Lüscher, *U. of Geneva*  
Jean Lynch-Stieglitz, *Georgia Inst. of Tech.*  
David Lyons, *U. of Edinburgh*  
Fabienne Mackay, *QIMR Berghofer*  
Anne Magurran, *U. of St. Andrews*  
Asifa Majid, *U. of York*  
Oscar Marín, *King's Coll. London*  
Charles Marshall, *UC Berkeley*  
Christopher Marx, *U. of Idaho*  
David Masopust, *U. of Minnesota*  
Geraldine Masson, *CNRS*  
Jason Matheny, *Georgetown U.*  
Heidi McBride, *McGill U.*  
C. Robertson McClung, *Dartmouth*  
Rodrigo Medellín, *U. Nacional Autónoma de México*  
Jane Memmott, *U. of Bristol*  
C. Jessica Metcalf, *Princeton U.*  
Baoxia Mi, *UC Berkeley*  
Tom Mittlelb, *NCI, NIH*  
Alison Moustings-Reif, *NIEHS, NIH (\$)*  
Danielle Navarro, *U. of New South Wales*  
Daniel Nettle, *Newcastle U.*  
Daniel Newman, *UC Berkeley*  
Beatriz Noheda, *U. of Groningen*  
Helga Nowotny, *Vienna Sci., Res. & Tech. Fund*  
Rachel O'Reilly, *U. of Birmingham*  
Pilar Ossorio, *U. of Wisconsin*  
Andrew Oswald, *U. of Warwick*  
Isabella Paganò, *Istituto Nazionale di Astrofisica*  
Elizabeth Levy Paluck, *Princeton U.*  
Jane Parker, *Max Planck Inst. Cologne*  
Giovanni Parmigiani, *Dana-Farber Cancer Inst. (\$)*  
Daniel Pauly, *U. of British Columbia*  
Samuel Pfaff, *Salk Inst.*  
Julie Pfeiffer, *UT Southwestern Med. Ctr.*  
Philip Phillips, *UIUC*  
Matthieu Piel, *Institut Curie*  
Kathrin Plath, *UCLA*  
Martin Plenio, *Ulm U.*  
Katherine Pollard, *UCSF*  
Elvira Poloczanska, *Alfred-Wegener-Inst.*  
Julia Pongratz, *Ludwig Maximilians U.*  
Philippe Poulin, *CNRS*  
Jonathan Pritchard, *Stanford U.*  
Lei Stanley Qi, *Stanford U.*  
Trevor Robbins, *U. of Cambridge*  
Joeri Rogelj, *Imperial Coll. London*  
Amy Rosenzweig, *Northwestern U.*  
Mike Ryan, *UT Austin*  
Miquel Salmeron, *Lawrence Berkeley Nat. Lab*  
Nitin Samarth, *Penn State U.*  
Erica Ollmann Saphire, *La Jolla Inst.*  
Joachim Saur, *U. of Köln*  
Alexander Schier, *Harvard U.*  
Wolfram Schlenker, *Columbia U.*  
Susannah Scott, *UC Santa Barbara*  
Anuj Shah, *U. of Chicago*  
Vladimir Shalaev, *Purdue U.*  
Jie Shan, *Cornell U.*  
Beth Shapiro, *UC Santa Cruz*  
Jay Shendure, *U. of Wash.*  
Steve Sherwood, *U. of New South Wales*  
Brian Shoichet, *UCSF*  
Robert Sillico, *JHU School of Med.*  
Lucia Sivilotti, *U. Coll. London*  
Alison Smith, *John Innes Centre*  
Richard Smith, *UNC (\$)*  
Mark Smyth, *QIMR Berghofer*  
John Speakman, *U. of Aberdeen*  
Tara Spires-Jones, *U. of Edinburgh*  
Allan C. Spradling, *Carnegie Institution for Sci.*  
V. S. Subrahmanian, *Dartmouth*  
Ira Takas, *Columbia U.*  
Eriberto Takano, *U. of Manchester*  
Patrick Tan, *Duke-NUS Med. School*  
Sarah Teichmann, *Wellcome Sanger Inst.*  
Rocio Titiunik, *Princeton U.*  
Shubha Tole, *Tata Inst. of Fundamental Res.*  
Kimani Toussaint, *Brown U.*  
Wim van der Putten, *Netherlands Inst. of Ecology*  
Reinhold Veugeler, *KU Leuven*  
Bert Vogelstein, *Johns Hopkins U.*  
David Wallach, *Weizmann Inst.*  
Jane-Ling Wang, *UC Davis (\$)*  
Jessica Ware, *Amer. Mus. of Natural Hist.*  
David Waxman, *Fudan U.*  
Chris Wikle, *U. of Missouri (\$)*  
Terrie Williams, *UC Santa Cruz*  
Ian A. Wilson, *Scripps Res. (\$)*  
Yu Xie, *Princeton U.*  
Jan Zaanan, *Leiden U.*  
Kenneth Zaret, *UPenn School of Med.*  
Bing Xue, *Inst. of Biophysics, CAS*  
Xiaozei Zhuang, *Harvard U.*  
Maria Zuber, *MIT*