

PRESIDENT OF THE ACADEMY

Marcia K. McNutt

INTERIM EDITOR-IN-CHIEF

Natasha V. Raikhel

ASSOCIATE EDITORS

Richard Eisenberg
 Alan Fersht
 Dolores R. Piperno
 Christine E. Seidman
 Neil H. Shubin
 Solomon H. Snyder
 B. L. Turner II
 Peter K. Vogt
 Stephen T. Warren
 David A. Weitz

EDITORIAL BOARD

Animal, Nutritional, and Applied Microbial Sciences

Stephen M. Beverley
 David L. Denlinger
 John J. Eppig
 Caroline S. Harwood
 R. Michael Roberts
 Linda J. Saif

Anthropology

Richard G. Klein
 C. Owen Lovejoy
 James F. O'Connell
 Elsa M. Redmond

Applied Mathematical Sciences

Peter J. Bickel
 David L. Donoho
 Donald J. Geman
 Donald B. Rubin
 James A. Sethian
 Bin Yu

Applied Physical Sciences

Gabriel Aeppli
 Zachary Fisk
 Angel Rubio
 John D. Weeks

Astronomy

Neta A. Bahcall

Biochemistry

Michael R. Botchan
 F. Ulrich Hartl
 Stephen C. Kowalczykowski
 Michael A. Marletta
 Kiyoshi Mizuuchi
 Brenda A. Schulman
 James A. Wells

Biophysics and Computational Biology

David Baker
 Adriaan Bax
 Axel T. Brunger
 Yale E. Goldman
 Angela M. Gronenborn
 Barry H. Honig
 Robert Langer
 Michael Levitt
 Susan Marqusee
 J. Andrew McCammon
 Peter B. Moore
 Joseph D. Puglisi
 John W. Sedat
 Michael F. Summers

Cellular and Developmental Biology

Denis Duboule
 Brigid L. M. Hogan
 Satyajit Mayor
 Roeland Nusse
 Michael Rosbash
 Gertrud M. Schüpbach

Cellular and Molecular Neuroscience

David E. Clapham
 Nancy Y. Ip
 Yuh-Nung Jan
 Jeremy Nathans
 Charles F. Stevens
 Joseph S. Takahashi
 Gina Turrigiano

Chemistry

Stephen J. Benkovic
 Michael L. Klein
 Raphael D. Levine
 Thomas E. Mallouk
 Tobin J. Marks
 Catherine J. Murphy
 Peter J. Rossky

Computer and Information Sciences

William H. Press

Earth, Atmospheric, and Planetary Sciences

Donald E. Canfield
 Thure E. Cerling
 W. G. Ernst
 Jean Jouzel
 A. R. Ravishankara
 Lisa Tauxe
 Mark H. Thieme

Economic Sciences

Paul R. Milgrom
 Roy Radner
 Jose A. Scheinkman

Engineering Sciences

Alexis T. Bell
 James J. Collins
 Pablo G. Debenedetti
 Evelyn L. Hu
 Rakesh K. Jain
 John A. Rogers
 John H. Seinfeld

Environmental Sciences and Ecology

Edward F. DeLong
 Robert E. Dickinson
 James A. Estes
 Alan Hastings
 David M. Karl
 Nancy Knowlton
 Simon A. Levin
 François M. M. Morel
 Mary Power
 Andrea Rinaldo
 David W. Schindler

Evolutionary Biology

May R. Berenbaum
 W. Ford Doolittle
 Scott V. Edwards
 Douglas J. Futuyma
 Daniel L. Hartl
 David M. Hillis
 Hopi E. Hoekstra
 David Jablonski
 Richard E. Lenski
 Gene E. Robinson

Joan E. Strassmann
 Nils C. Stenseth

Genetics

Kathryn V. Anderson
 Sue Biggins
 John Carlson
 Iva S. Greenwald
 Philip C. Hanawalt
 Mary-Claire King
 Douglas E. Koshland
 Jasper Rine
 Allan C. Spradling

Human Environmental Sciences

Anthony J. Bebbington
 Ruth S. DeFries
 Susan Hanson
 Emilio F. Moran
 Robert J. Scholes
 B. L. Turner II

Immunology and Inflammation

Robert L. Coffman
 Peter Cresswell
 K. Christopher Garcia
 Tak Wah Mak
 Philippa Marrack
 Ruslan Medzhitov
 Carl F. Nathan
 Lawrence Steinman
 Tadatsugu Taniguchi
 Arthur Weiss

Mathematics

Robion C. Kirby
 Kenneth A. Ribet
 Srinivasa S. R. Varadhan

Medical Genetics, Hematology, and Oncology

Anton J. Berns
 Dennis A. Carson
 C. Thomas Caskey
 James E. Cleaver
 Joseph L. Goldstein
 Mark T. Groudine
 Tony Hunter
 Carol L. Prives
 Owen N. Witte

Medical Physiology and Metabolism

Christopher K. Glass
 Barbara B. Kahn
 Robert J. Lefkowitz
 David J. Mangelsdorf

Microbial Biology

John M. Coffin
 R. John Collier
 Stephen P. Goff
 E. Peter Greenberg
 Diane E. Griffin
 Ralph R. Isberg
 Michael B. A. Oldstone
 Peter Palese
 Lalita Ramakrishnan

Thomas E. Shenk
 Thomas J. Silhavy

Physics

Curtis G. Callan Jr.
 Anthony Leggett
 Herbert Levine

Physiology and Pharmacology

Richard W. Aldrich
 Susan G. Amara
 Francisco Bezanilla
 Arthur Karlin
 Gail Mandel

Plant Biology

David Baulcombe
 Philip N. Benfey
 Joseph R. Ecker
 June B. Nasrallah
 Krishna K. Niyogi
 Julian I. Schroeder

Plant, Soil, and Microbial Sciences

Julia Bailey-Serres
 Vicki L. Chandler
 Brian J. Staskawicz

Psychological and Cognitive Sciences

Renee Baillargeon
 Susan T. Fiske
 Michael S. Gazzaniga
 Susan Gelman
 Dale Purves
 Jennifer Richeson

Social and Political Sciences

Adrian Raftery
 Stephen W. Raudenbush
 Kenneth W. Wachter
 Mary C. Waters

Sustainability Science

Gregory P. Asner
 Anthony J. Bebbington
 F. Stuart Chapin III
 William C. Clark
 Ruth S. DeFries
 Susan Hanson
 Bonnie J. McCay
 Emilio F. Moran
 Hans Joachim Schellnhuber
 B. L. Turner II

Systems Neuroscience

Huda Akil
 Thomas D. Albright
 Robert Desimone
 Fred H. Gage
 Charles D. Gilbert
 Tony Movshon
 Marcus E. Raichle
 Peter L. Strick
 Leslie G. Ungerleider

Submission to PNAS

Authors (members and nonmembers) may submit their manuscripts directly to PNAS at www.pnascentral.org. Authors must recommend three appropriate Editorial Board members, three NAS members who are expert in the paper's scientific area, and five qualified referees. No Academy member sponsor is required.

PNAS (ISSN-0027-8424) is published weekly by the National Academy of Sciences.

Correspondence: PNAS, 500 Fifth Street, NW, NAS 340, Washington, DC 20001 USA. Email: PNAS@nas.edu.

Copyright: Volumes 90–105, copyright © 1993–2008 by the National Academy of Sciences of the United States of America, all rights reserved. Volumes 1–89 and 106–115, copyright as a collective work only; author(s) retains copyright to individual articles. **Requests for Permission:** See www.pnas.org/page/about/rights-permissions for details. Address requests to reproduce material published in Volumes 1–89 to the original author(s); email other requests to PNASpermissions@nas.edu, fax 202-334-2739, or PNAS Permissions Editor, 500 Fifth Street, NW, NAS 340, Washington, DC 20001 USA. Please cite the exact material to be reprinted and state specifically where it will be used.

Photocopies: PNAS is registered with the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923 USA, fax 978-750-4470, or www.copyright.com. Authorization to photocopy items for the internal or personal use of specific clients is granted by the National Academy of Sciences provided that the proper fee is paid directly to CCC.

Subscriptions: Send payments to PNAS, P.O. Box 936110, Atlanta, GA 31193-6110 USA. For subscription help, email pnas.subs@sheridan.com, phone 717-632-3535, or visit www.pnas.org/page/subscriptions/subscribers.

2018 Rates: Individual online only, \$235; institutional online only, \$525–8,880. Subscriptions are entered on a calendar-year basis. **International Subscribers:** Sales agent information can be found online at www.pnas.org/page/subscriptions/subs-faq#contact.

Change of Address: PNAS, Subscriber Services, PO Box 465, Hanover, PA 17331 USA. Phone 717-632-3535, email pnas.subs@sheridan.com. Please send notification 6 weeks in advance and list the old and new addresses.

Claims: Requests for replacement copies will not be honored more than 60 days after the issue date for domestic subscribers and not more than 90 days after the issue date for foreign subscribers. Claims will not be honored for more than two issues per calendar year for the same subscriber. To make a claim, email pnas.subs@sheridan.com or call 717-632-3535. **Canadian GST:** Registration Number R-133130880.

Postmaster: Send address changes to PNAS, Subscriber Services, PO Box 465, Hanover, PA 17331 USA. Periodicals postage paid at Washington, DC, and additional mailing offices.

PNAS is available online at www.pnas.org.

PNAS STAFF

Publisher

Kenneth R. Fulton

Executive Editor

Diane M. Sullenberger

Deputy Executive Editor

Daniel H. Salsbury

Senior Recruiting Editor

David Stopak

Recruiting Editor

Jennifer Robinson

Front Matter Editor

Gene Russo

Editorial Managers

Etta Kavanagh

Jacob Kendall-Taylor

Assistant Editorial Managers

Josiah W. Armour

Kathryn Murphy DeTura

Editorial Staff

James B. Allison

Carolyn M. Beans

Daniela Torres Checo

Pablo Luis Clemente

Brianna Costache

Abigail Fox

Samantha Fuller

Jenny Geyer

Julia Glueck

Rose Hallett

Jeffrey King

Rachel Laney

Matt Longabaugh

Tom Myers

Andrew Schroeder

Megan E. Shuler

Jacob D. Svobodny

Rachel VanValkenburg

Rocio Vidal-Ronchas

Senior Production Manager

Midori Baer

Editorial Production Manager

Sharon Jane Chua

Production Staff

Delaney Cruickshank

Elizabeth Griffith

Benjamin Jipson

Jennifer H. Nguyen

Kat Rodenhizer

Audrey Springer

Marketing Manager

Jackie Szmaja

Subscription Specialist

Kay McLaughlin

Marketing Staff

Salo Aburto

Media and Communications Manager

Prashant Nair

Media Staff

Brian M. Doctrow

Taylor Gedeon

Chris Samoray

Senior Financial and Administrative Officer

Anton L. Bandy

Business Staff

Kim Mann

Vilija B. Teel

Authorship

Authorship should be limited to those who have contributed substantially to the work. Authors must indicate their specific contributions to the published work; this information will be published as a footnote to the paper. The corresponding author must have obtained permission from all authors for the submission of each version of the paper and for any change in authorship.

Conflict of Interest

All authors, members, referees, and editors must disclose any association that poses a conflict of interest in connection with the manuscript. Authors must acknowledge all funding sources supporting the work. See www.pnas.org/site/authors/coi.xhtml for details.

Supporting Information

Authors may use supporting information to enhance their papers in PNAS by providing additional substantive material for online posting, but the main text of the paper must stand on its own merits.

Cover Images

Authors are encouraged to submit scientifically interesting and visually arresting images for the cover.

Information for Authors

Please see the complete Information for Authors, available online at www.pnas.org.

PNAS Online

PNAS articles are published daily at www.pnas.org in PNAS Latest Articles.

The articles in PNAS report original research by independent authors and have not been endorsed by the National Academies.