

PNAS

Proceedings of the National Academy of Sciences of the United States of America

www.pnas.org

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

Correspondence: PNAS, 500 Fifth Street, NW, NAS 340, Washington, DC 20001 USA or 2101 Constitution Avenue, NW, NAS 340, Washington, DC 20418 USA (for courier or express mail). E-mail: PNAS@nas.edu.

Information for Authors: See www.pnas.org. Editorial Board listing by discipline is available at www.pnas.org/misc/masthead.shtml.

Copyright: Volumes 90–102, copyright © 1993–2005 by the National Academy of Sciences of the United States of America, all rights reserved. Volumes 1–89, copyright as a collective work only; author(s) retains copyright to individual articles.

Requests for Permission: See www.pnas.org/misc/rightperm.shtml for details. Address requests to reproduce material published in Volumes 1–89 to the original author(s); e-mail other requests to PNASpermissions@nas.edu, fax 1-202-334-2739, 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 1-978-750-4470, 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. **Microforms:** Contact UMI at www.umi.com or P.O. Box 1346, Ann Arbor, MI 48106-1346 USA. This journal is printed on acid-free paper effective with Volume 84, Issue 1.

Advertising: Sarah Frances Scarborough, PNAS Advertising Sales, 500 Fifth Street, NW, NAS 340, Washington, DC 20001 USA. Phone 1-202-334-2348, fax 1-202-334-1346, e-mail sscarborough@nas.edu.

Subscriptions: Address correspondence to: PNAS, % AIP, P.O. Box 50324, St. Louis, MO 63150-3284 USA. For subscription help, e-mail subs@aip.org, phone 1-516-576-2270, or visit www.pnas.org. Subscriptions are entered on a calendar-year basis. The 2005 rates for print are as follows—in the U.S.: personal, \$275; institutional, \$1,395—U.S. by First Class at a surcharge of \$160—elsewhere (institutional includes expedited delivery): personal, \$425; institutional, \$1,725—elsewhere by expedited delivery at a surcharge of \$300. **Exclusive Agent for Subscribers in Japan:** USACO Corporation, 17-12 Higashi-Azabu, 2-Chome, Minato-ku, Tokyo 106-0044, Japan. Phone 81 3 3505 3256, fax 81 3 3505 6282, e-mail agent@usaco.co.jp. **Change of Address:** Notify the Circulation Office 6 weeks in advance and list the old and new addresses. PNAS is not responsible for nonreceipt of issues because of an improper address, unless a change of address is on file. **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 2 issues per calendar year for the same subscriber. **Single Copies:** \$40 per issue in the U.S., \$50 elsewhere. **Canadian GST:** Registration Number R-133130880.

Postmaster: Send address changes to PNAS, % AIP, P.O. Box 503284, St. Louis, MO 63150-3284 USA. Periodicals postage paid at Washington, DC, and additional mailing offices.

PNAS is available online at www.pnas.org. PRINTED IN THE USA

President of the Academy
Ralph J. Cicerone

Editor-in-Chief
Nicholas R. Cozzarelli

Senior Editor
Solomon H. Snyder

Associate Editors
Alan Fersht
Jack Halpern

Editorial Board
Susan G. Amara
Hans C. Andersen
Kathryn V. Anderson
Francisco J. Ayala
Linda M. Bartoshuk
Roger N. Beachy
Barry J. Beaty
Michael L. Bender
Stephen J. Benkovic
May R. Berenbaum
Bruce J. Berne
David Botstein
Patrick O. Brown
Charles R. Cantor
Stephen R. Carpenter
Maarten J. Christeels
Thomas W. Cline
Enrico Coen
John M. Coffin
Stanley N. Cohen
Peter Cresswell
James E. Dahlberg
Eric H. Davidson
Pietro V. De Camilli
Francisco de la Cruz
Charles A. Dinarello
W. Ford Doolittle
Charles T. Esmon
Douglas T. Fearon
Christopher B. Field
L. B. Freund
Fred H. Gage
Joseph L. Goldstein
Shafira Goldwasser
Harry B. Gray
Philip P. Green
E. Peter Greenberg
Diane E. Griffin
Mark T. Groudine
Jeffrey C. Hall
Philip C. Hanawalt
Susan Hanson
Robert Haselkorn
Peter M. Howley
Richard L. Haganir
Tony Hunter
Vernon Martin Ingram
L. L. Iversen
Rudolf Jaenisch

Ronald W. Jones
David Julius
Richard V. Kadison
James P. Kennett
Robion C. Kirby
Alexander M. Klibanov
Edward D. Korn
Robert A. Lamb
Ramon Latorre
N. M. Le Douarin
Robert J. Lefkowitz
Michael Levitt
Steven E. Lindow
George H. Lorimer
Philip W. Majerus
Tak Wah Mak
Geoffrey W. Marcy
Paul C. Martin
Joan Massagué
Stephen L. Mayo
John J. Mekalanos
Barbara J. Meyer
Kiyoshi Mizuuchi
Paul L. Modrich
Salvador Moncada
Peter B. Moore
Nancy A. Moran
Newton E. Morton
Bernard Moss
Shigetada Nakanishi
Jeremy Nathans
Masatoshi Nei
Tomoko Ohta
Eric N. Olson
Gordon H. Orians
Peter Palese
Richard D. Palmiter
William E. Paul
Stanley B. Prusiner
Dale Purves
Charles M. Radding
Marcus E. Raichle
Douglas C. Rees
Jeffrey W. Roberts
R. Michael Roberts
David D. Sabatini
Jeremy A. Sabloff
Randy Schekman
Michael Sela
Obaid Siddiqi
David O. Siegmund
William S. Sly
Edward E. Smith
Ralph M. Steinman
Charles F. Stevens
M. S. Swaminathan
Joseph S. Takahashi
Hans Thoenen
Janet Thornton
Robert Tjian
Barry M. Trost
Nicholas J. Turro
Inder M. Verma

Peter K. Vogt
Kenneth W. Wachter
Peter Walter
Michael S. Waterman
Susan R. Wessler
Sue H. Wickner
William T. Wickner
Ryuzo Yanagimachi
George D. Yancopoulos

Publisher
Kenneth R. Fulton

Executive Editor
Diane M. Sullenberger

Acting Managing Editor
Daniel H. Salsbury

Editorial Staff
James B. Allison
Josiah W. Armour
Michael Campbell
Heather A. Ehlers
Carolyn Elliott
Cassandra Foster
Arijit Guha
Renita M. Johnson
Elise Laffman
Jaime Lees
Leslie Malone
Tom Myers
Andrew Pillifant
Evan Redmon
Allison Ross
Sarah B. Tegen
Yenu Wodajo

Production, Marketing, and Licensing Manager
George Kendall

Production Staff
Barbara A. Bacon
Timothy Bauer
Anne C. Field

Finance Manager
Simone Marshall-Campbell

Business Staff
Richard T. Johnson
Julia A. Little
Sarah L. Marrone
Sarah Frances Scarborough

Media Staff
Leikny V. Johnson
Regina Nuzzo
Oliver J. Yun
Nick Zagorski