

# PNAS

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

www.pnas.org

**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 (via U.S. postal service) or 2101 Constitution Avenue, NW, NAS 340, Washington, DC 20418 USA (via 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 90–101, copyright © 1993–2004 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); send other requests by e-mail to PNASpermissions@nas.edu, fax 1-202-334-2739, or letter addressed to: 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. 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 University Microfilms, Inc., 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

Bruce Alberts

## Editor-in-Chief

Nicholas R. Cozzarelli

## Associate Editors

Alan Fersht

Jack Halpern

## Editorial Board

Jan D. Achenbach

James P. Allison

Hans C. Andersen

Kathryn V. Anderson

Frederick M. Ausubel

Francisco J. Ayala

Linda M. Bartoshuk

Roger N. Beachy

Barry J. Beaty

Joseph A. Beavo

Michael L. Bender

Stephen J. Benkovic

May R. Berenbaum

Bruce J. Berne

Pamela J. Bjorkman

Piet Borst

David Botstein

Patrick O. Brown

Charles R. Cantor

Stephen R. Carpenter

Anthony Cerami

Maarten J. Chrispeels

Thomas W. Cline

John M. Coffin

Stanley N. Cohen

Peter Cresswell

James E. Dahlberg

Eric H. Davidson

Carl de Boer

Pietro V. De Camilli

W. Ford Doolittle

W. G. Ernst

Stanley Falkow

Christopher B. Field

Joseph L. Goldstein

Harry B. Gray

Philip P. Green

Mark T. Groudine

Philip C. Hanawalt

Susan Hanson

Robert Haselkorn

Peter M. Howley

Tony Hunter

Louis J. Ignarro

L. L. Iversen

Rudolf Jaenisch

H. Ronald Kaback

Richard V. Kadison

Richard M. Karp

Thomas J. Kelly

Robert P. Kirshner

Alexander M. Klibanov

Edward D. Korn

Ramon Latorre

N. M. Le Douarin

Michael Levitt

George H. Lorimer

Philip W. Majerus

Tak Wah Mak

Paul C. Martin

Joan Massagué

Diane Mathis

John J. Mekalanos

Barbara J. Meyer

Kiyoshi Mizuuchi

Paul L. Modrich

Peter B. Moore

Nancy A. Moran

Newton E. Morton

Bernard Moss

Shigetada Nakanishi

Jeremy Nathans

Masatoshi Nei

Roger A. Nicoll

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

Thomas J. Sargent

Randy Schekman

Matthew P. Scott

Michael Sela

Obaid Siddiqi

David O. Siegmund

William S. Sly

Edward E. Smith

Solomon H. Snyder

Ralph M. Steinman

Charles F. Stevens

M. S. Swaminathan

Harry L. Swinney

Hans Thoenen

G. David Tilman

Robert Tjian

Barry M. Trost

Nicholas J. Turro

Inder M. Verma

Peter K. Vogt

Kenneth W. Wachter

David C. Ward

Michael S. Waterman

Susan R. Wessler

Sue H. Wickner

William T. Wickner

Ryuzo Yanagimachi

## Publisher

Kenneth R. Fulton

## Executive Editor

Diane M. Sullenberger

## Managing Editor

Bridget C. Coughlin

## Deputy Managing Editor

Daniel H. Salsbury

## Editorial Staff

James B. Allison

Josiah W. Armour

Michael Campbell

Carolyn Elliott

Cassandra Foster

Arijit Guha

Julie Yun-Ju Huang

Renita M. Johnson

Tanya D. Johnson

Karen Keays

Elise Laffman

Jaime Lees

Leslie Malone

Tom Myers

Andrew Pillifant

Evan Redmon

Sarah B. Tegen

Yenu Wodajo

## Production, Marketing, and Licensing Manager

George Kendall

## Production Staff

Barbara A. Bacon

Timothy Bauer

Christina L. Colosimo

Anne 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

Oliver J. Yun