

JOURNAL OF BACTERIOLOGY

VOLUME 189 • DECEMBER 2007 • NUMBER 23

Philip Matsumura, *Editor in Chief and
Minireview Editor* (2011)
University of Illinois at Chicago

Michael W. W. Adams, *Editor* (2011)
University of Georgia, Athens, Ga.

Judith P. Armitage, *Editor* (2010)
University of Oxford, Oxford, U.K.

Peter J. Christie, *Editor* (2011)
*University of Texas Health Science
Center, Houston, Tex.*

Piet de Boer, *Editor* (2012)
*Case Western Reserve University School of
Medicine, Cleveland, Ohio*

Richard L. Gourse, *Editor* (2012)
University of Wisconsin, Madison, Wis.

William G. Haldenwang, *Editor* (2010)
*University of Texas Health Science Center,
San Antonio, Tex.*

Roberto Kolter, *Cover Editor* (2008)
Harvard Medical School, Boston, Mass.

Charles P. Moran, Jr., *Editor* (2009)
*Emory University School of Medicine,
Atlanta, Ga.*

Staffan Normark, *Editor* (2011)
*Swedish Institute for Infectious Disease Control,
Solna, Sweden*

Douglas H. Ohlendorf, *Editor* (2011)
University of Minnesota, Minneapolis, Minn.

George A. O'Toole, *Editor* (2012)
Dartmouth Medical School, Hanover, N.H.

John S. Parkinson, *Editor* (2010)
University of Utah, Salt Lake City, Utah

Martin Rosenberg, *Editor* (2011)
Promega Corp., Madison, Wis.

Thomas J. Silhavy, *Editor* (2008)
Princeton University, Princeton, N.J.

EDITORIAL BOARD

Brian Ahmer (2009)
Clifton E. Barry III (2007)
Bonnie Bassler (2007)
Andreas Baumler (2007)
J. Thomas Beatty (2007)
Robert Belas (2009)
Robert Bender (2009)
Howard Berg (2007)
Peter Bergquist (2007)
Harris D. Bernstein (2007)
Andrew Binns (2008)
David Blair (2007)
Winfried Boos (2009)
Ian R. Booth (2007)
Bob Bourret (2008)
Volkmar Braun (2007)
Richard Brennan (2008)
Harald Brüssow (2008)
Martin Buck (2008)
Stephen Busby (2009)
Sherwood Casjens (2009)
Michael Chandler (2009)
Dhruba K. Chattoraj (2009)
Gorden Churchward (2009)
Fevzi Daldal (2009)
Dennis Dean (2009)
Pieter de Haseth (2009)
Diego de Mendoza (2007)
Wim DHaeze (2009)
Eduardo Diaz (2008)
Timothy Donohue (2009)
Charles Dorman (2009)
Adam Driks (2007)
David Dubnau (2009)
Gary Dunny (2009)
Michael Feiss (2008)
James Ferry (2009)
Alain Filloux (2009)
S. H. Fisher (2009)
Enrique Flores (2007)

Claire Fraser (2007)
Laura Frost (2009)
George Fuchs (2007)
Barbara Funnell (2009)
Clay Fuqua (2009)
Jose Luis Garcia (2007)
Joanna Goldberg (2009)
Mark Gomelsky (2007)
Susan Gottesman (2009)
Dennis Grogan (2009)
Gary Gussin (2007)
Eric J. Hansen (2008)
Klaus Hantke (2009)
Graham Hatfull (2009)
Robert P. Hausinger (2009)
Michael Hecker (2007)
John Helmann (2007)
Roger Hendrix (2007)
Antonia Herrero (2008)
Darren E. Higgins (2008)
Ann Hochschild (2008)
Allen Honeyman (2007)
Timothy Hoover (2008)
James Imlay (2009)
Urs Jenal (2008)
Robert Kelly (2008)
Saleem Khan (2009)
Per Klemm (2007)
Karl Klose (2007)
Theresa M. Koehler (2008)
Robert G. Kranz (2007)
Kenneth Kreuzer (2007)
Lee Kroos (2009)
Joseph Lam (2008)
Erich Lanka (2009)
Robert LaRossa (2007)
John A. Leigh (2008)
John D. Lipscomb (2008)
Olga Lomovskaya (2009)
Joseph Lutkenhaus (2009)

Janine Maddock (2008)
Michael E. Maguire (2009)
Michael Manson (2007)
William Margolin (2008)
M. G. Marinus (2008)
Silvia Marqués (2009)
Esperanza Martinez Romero (2008)
Mark McBride (2009)
Linda McCarter (2009)
Paul Messner (2009)
Leonard Mindich (2008)
Rajeev Misra (2009)
Donald Morrison (2009)
Tarek Msadek (2009)
Michiko Nakano (2009)
Justin Nodwell (2007)
Bernard Palsson (2009)
Rebecca Parales (2009)
James P. Pearson (2009)
Marta Perego (2008)
John Perkins (2008)
Gregory J. Phillips (2008)
Jacqueline Plumbbridge (2009)
Kit Pogliano (2009)
Philip S. Poole (2008)
David Popham (2009)
Kathleen Postle (2009)
Anthony R. Poteete (2009)
James Preston (2009)
Chester Price (2009)
Steven Projan (2007)
Reuben Ramphal (2009)
Christopher Rensing (2008)
Mikael Rhen (2007)
Fernando Rojo (2009)
Tony Romeo (2008)
Wilma Ross (2007)
Jean-Pierre Samama (2007)
Mário A. Santos (2009)
Olaf Schneewind (2009)

June Scott (2009)
Peter Setlow (2009)
William M. Shafer (2008)
Victoria Shingler (2009)
Deborah Siegel (2009)
Mitchell Singer (2009)
Mikael Skurnik (2009)
James Slauch (2009)
Lotte Sogaard-Andersen (2008)
Abraham Sonenshein (2009)
George Spiegelman (2007)
Valley J. Stewart (2009)
Ann Stock (2008)
Susan C. Straley (2009)
Michael Surette (2007)
David Thanassi (2009)
Nicolas Toro (2007)
Burkhard Tuemmler (2008)
John van der Oost (2008)
Mike Vasil (2007)
Wim Vermaas (2007)
Joerg Vogel (2008)
Uwe Volker (2009)
Gerrit Voordouw (2008)
Matthew Waldor (2009)
Judy Wall (2009)
Cecile Wandersman (2009)
Robert White (2008)
Chris Whitfield (2009)
JoAnn C. Williams (2009)
Malcolm Winkler (2007)
Rolf M. Wittich (2008)
Alan Wolfe (2009)
Daniel J. Wozniak (2009)
Kevin Young (2008)
Janice M. Zengel (2008)
Igor Zhulin (2009)
Peter Zuber (2009)

Samuel Kaplan, *Chairman, Publications Board* Linda M. Illig, *Director, Journals*
Jack Kenney, *Production Editor* Jennifer L. Owens, *Assistant Production Editor*

The *Journal of Bacteriology* (ISSN 0021-9193), a publication of the American Society for Microbiology (ASM), 1752 N St., N.W., Washington, DC 20036-2904, is devoted to the advancement and dissemination of fundamental knowledge concerning bacteria and other microorganisms. Instructions to authors are published in the first issue each year; reprints are available from the editors and the Journals Department. The *Journal* is published twice monthly, one volume per year. Nonmember print subscription prices (per year) are: \$955, U.S.; \$1,006, Canada (plus 6% GST, or 14% GST+HST where applicable); \$1,060, Europe; \$1,096, Latin America; \$1,101, rest of world. Member print subscription prices (per year) are: \$121 U.S.; \$172, Canada (plus 6% GST, or 14% GST+HST where applicable); \$226, Europe; \$262, Latin America; \$267, rest of world. Single copies are: \$50, nonmember; \$30, member (Canadians add 6% GST, or 14% GST+HST where applicable). For prices of electronic versions, contact the Subscriptions Unit, ASM. Correspondence relating to subscriptions, defective copies, missing issues, and availability of back issues should be directed to the Subscriptions Unit, ASM; correspondence relating to reprint orders should be directed to the Reprint Order Unit, ASM;

and correspondence relating to disposition of submitted manuscripts, proofs, and general editorial matters should be directed to the Journals Department, American Society for Microbiology, 1752 N St., N.W., Washington, DC 20036-2904. Phone: (202) 737-3600.

Claims for missing issues from residents of the United States, Canada, and Mexico must be submitted within 3 months after publication of the issues; residents of all other countries must submit claims within 6 months of publication of the issues. Claims for issues missing because of failure to report an address change or for issues "missing from files" will not be allowed.

Periodicals postage paid at Washington, DC 20036, and at additional mailing offices.

POSTMASTER: Send address changes to *Journal of Bacteriology*, ASM, 1752 N St., N.W., Washington, DC 20036-2904.

Made in the United States of America. Printed on acid-free paper.

doi:10.1128/JB.189.23.2007

CODEN: JOBAAAY

Copyright © 2007, American Society for Microbiology. All Rights Reserved.

The code at the top of the first page of an article in this journal indicates the copyright owner's consent that copies of the article may be made for personal use or for personal use of specific clients. This consent is given on the condition, however, that the copier pay the stated per-copy fee through the Copyright Clearance Center Inc., 222 Rosewood Drive, Danvers, MA 01923, for copying beyond that permitted by Sections 107 and 108 of the U.S. Copyright Law. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale.