

INFECTION AND IMMUNITY

VOLUME 72 • FEBRUARY 2004 • NUMBER 2

Alison D. O'Brien, *Editor in Chief* (2004)
Uniformed Services University of the Health Sciences

Joseph T. Barbieri, *Editor* (2006)
Medical College of Wisconsin

James B. Bliska, *Editor* (2008)
State University of New York, Stony Brook

Drusilla L. Burns, *Editor* (2007)
U.S. Food and Drug Administration

John D. Clements, *Editor* (2004)
Tulane Medical Center

Victor J. DiRita, *Editor* (2004)
University of Michigan Medical School

Ferric C. Fang, *Editor* (2007)
University of Washington School of Medicine

James B. Kaper, *Minireview Editor* (2008)
University of Maryland School of Medicine

Stefan H. E. Kaufmann, *Editor* (2004)
Max Planck Institute for Infection Biology

Thomas R. Kozel, *Editor* (2005)
University of Nevada

William A. Petri, Jr., *Editor* (2004)
University of Virginia School of Medicine

Joseph F. Urban, Jr., *Editor* (2008)
USDA Agricultural Research Service

Jeffrey N. Weiser, *Editor* (2007)
University of Pennsylvania

EDITORIAL BOARD

David W. K. Acheson (2004)
Luis Actis (2006)
Rod Adam (2005)
John H. Adams (2005)
Tony Aebischer (2005)
Klaus Aktories (2005)
John F. Alderete (2005)
Judith E. Allen (2005)
Judith A. Appleton (2006)
Glen D. Armstrong (2004)
Sandra K. Armstrong (2005)
Abdu F. Azad (2005)
Alan G. Barbour (2004)
Peter F. Barnes (2006)
Andreas J. Bäuml (2005)
Blaine L. Beaman (2006)
James M. Beck (2005)
Jorge L. Benach (2004)
Jorge A. Benitez (2004)
Luiz E. Bermudez (2006)
William Bishai (2006)
Steven Blanke (2004)
Ian Bloomfield (2005)
Christian Bogdan (2006)
Carolyn H. Bohach (2005)
Gregory A. Bohach (2005)
Subbarao Bondada (2005)
Dov L. Boros (2005)
Kenneth L. Bost (2006)
Michael Brennan (2006)
Robert R. Brubaker (2005)
David Briles (2006)
Donald E. Burgess (2004)
Robert A. Burne (2005)
Jerry M. Bussse (2006)
Gerald Byrne (2006)
Felipe C. Cabello (2004)
Richard Calderone (2005)
Harlan D. Caldwell (2004)
Joseph V. Califano (2006)
Andrew Camilli (2004)
Anthony A. Campagnari (2006)
Arturo Casadevall (2005)
Kris Chadee (2005)
W. LaJean Chaffin (2006)
John Chan (2006)
Sandra P. Chang (2005)
Ambrose Cheung (2005)
Ashok K. Chopra (2006)
Nicholas P. Cianciotto (2005)
P. Patrick Cleary (2005)
Steven Clegg (2005)

Jenifer L. Coburn (2005)
R. John Collier (2006)
Terry D. Connell (2006)
Andrea Cooper (2004)
Cynthia Cornelissen (2006)
Peggy Cotter (2006)
Timothy L. Cover (2005)
Christopher W. Cutler (2006)
Jim E. Cutler (2005)
Cecil Czerkinsky (2004)
Steven J. Czinn (2005)
Charles J. Czuprynski (2004)
Toni Darville (2004)
George S. Deepe, Jr. (2004)
Donald R. Demuth (2006)
Eric Y. Denkers (2005)
Vojo Deretic (2006)
Aravinda de Silva (2005)
Dirk A. E. Dobbelaere (2004)
Hazel Dockrell (2006)
Mark Doherty (2004)
Judith E. Domer (2004)
Roman Dziarski (2005)
Kathryn Edwards (2004)
Stefan Ehlers (2006)
Toby K. Eisenstein (2005)
Karen Elkins (2004)
Masashi Emoto (2004)
Joanne Engel (2006)
N. Cary Engleberg (2004)
Peter B. Ernst (2005)
J. Christopher Fenno (2006)
Paul Fidel (2006)
Barry Fields (2005)
Scott G. Filler (2006)
JoAnne L. Flynn (2005)
Dara W. Frank (2006)
Carl Frasch (2005)
Matthias Frasch (2006)
Nancy E. Freitag (2005)
Ricardo T. Gazzinelli (2004)
Caroline Attardo Genco (2005)
Frances D. Gillin (2004)
Joanna B. Goldberg (2005)
Kenneth J. Goodrum (2004)
Brian Greenwood (2005)
Patricia Guerry-Kopecko (2005)
Paul A. Gulig (2005)
Carlos A. Guzman (2006)
Jörg Hacker (2004)
Constantine G. Haidaris (2004)
Thomas L. Hale (2005)

Thomas A. Hamilton (2006)
Emanuela Handman (2006)
Eric J. Hansen (2004)
David L. Hasty (2006)
Edward A. Havell (2005)
Jürgen Heesemann (2004)
Fred Heffron (2005)
Jürgen Hess (2004)
Darren E. Higgins (2005)
Sarah K. Highlander (2004)
Marcus A. Horwitz (2004)
Gary B. Huffnagle (2005)
Christopher A. Hunter (2004)
Christopher Huston (2004)
Kris Huygen (2006)
Lars Hviid (2006)
Matt Jackson (2004)
Ann Jerse (2006)
Thomas H. Kawula (2004)
Thomas R. Klei (2005)
Bruce S. Klein (2005)
Karl Klose (2005)
Dennis J. Kopecko (2004)
Howard K. Kuramitsu (2005)
Altaf Lal (2006)
David E. Lanar (2006)
Jean Langhorne (2005)
David Leiby (2004)
John M. Leong (2006)
Stuart Levitz (2005)
Hank A. Lockman (2006)
Jose L. Lopez-Ribot (2006)
Douglas Lowrie (2005)
David M. Lyerly (2006)
Barbara J. Mann (2006)
Richard T. Marconi (2005)
Mariosaria Marinaro (2005)
Helene Marquis (2006)
Carl F. Marrs (2005)
Carlos Martin (2005)
Anthony Maurelli (2005)
Bruce A. McClane (2004)
Beth McCormick (2005)
Dennis W. McGee (2005)
Marian McKee (2005)
John McKinney (2004)
David N. McMurray (2006)
John Mekalanos (2004)
Thomas F. Meyer (2004)
F. Chris Minion (2006)
Tim J. Mitchell (2006)
Harry L. T. Mobley (2004)

Robert L. Modlin (2004)
Heidrun Moll (2005)
J. Glenn Morris, Jr. (2005)
Richard P. Morrison (2005)
Steven L. Moseley (2005)
David M. Mosser (2006)
Rodney Moxley (2004)
Robert S. Munson (2004)
Juneann W. Murphy (2005)
Moon H. Nahm (2005)
Elizabeth Nardin (2006)
James P. Nataro (2005)
John Nedrud (2005)
Melody Neely (2006)
Simon L. Newman (2005)
Thalia I. Nicas (2004)
Karen A. Norris (2004)
Steven J. Norris (2006)
Bogdan Nowicki (2004)
Edwin V. Oaks (2005)
Tom G. Obrig (2006)
Joan C. Olson (2006)
Tom H. M. Ottenhoff (2005)
Michael J. Parmely (2004)
David W. Pascual (2005)
James C. Paton (2005)
Shelley Payne (2004)
Edward J. Pearce (2004)
Miércio E. A. Pereira (2005)
Guillermo I. Perez-Perez (2004)
John R. Perfect (2006)
Kenneth M. Peterson (2005)
Mario T. Philipp (2004)
Carol Pickett (2005)
Gerald B. Pier (2004)
Christopher V. Plowe (2006)
Matthew Pollack (2006)
Steven J. Projan (2005)
Justin D. Radolf (2005)
Lalita Ramakrishnan (2004)
Roger G. Rank (2004)
Rino Rappuoli (2005)
Jane E. Raulston (2005)
Jörg Reimann (2004)
Richard F. Rest (2005)
Ernst T. Rietschel (2004)
Luigina Romani (2005)
Roy Martin Roop II (2005)
David Sacks (2005)
James Samuel (2004)
Matyas Sandor (2006)
Ulrich E. Schaible (2006)

David Schauer (2004)
Dieter M. Schifferli (2005)
Larry S. Schlesinger (2006)
Michael Schmitt (2006)
Joseph D. Schwartzman (2006)
June R. Scott (2005)
Richard Silverstein (2004)
Pamela Long Claus Small (2005)
Clifford M. Snapper (2006)
Stanley M. Spinola (2005)
Samuel L. Stanley, Jr. (2006)
Michael N. Starnbach (2005)
Steffen Stenger (2006)
Joseph W. St. Geme (2005)
Scott Stibitz (2006)
Susan C. Straley (2004)
Michele Swanson (2006)
Carol O. Tacket (2004)
Christopher Taylor (2004)
Vernon Tesh (2005)
John G. Tew (2004)
Renee Tsois (2006)
Rodney K. Tweten (2005)
Gisou VanDer Goot (2004)
Thomas E. van Dyke (2004)
Frederik W. van Ginkel (2005)
Wesley C. Van Voorhis (2005)
Michael L. Vasil (2005)
Malabi M. Venkatesan (2006)
Meg Vickerman (2004)
Joseph M. Vinetz (2004)
H. Martin Vordermeier (2006)
Leigh R. Washburn (2004)
Alison Weiss (2005)
Rodney A. Welch (2005)
Michael R. Wessels (2004)
Lee M. Wetzler (2006)
A. Clinton White, Jr. (2006)
Theodore C. White (2006)
Brenda A. Wilson (2006)
Mary E. Wilson (2005)
Natalie Winter (2006)
David O. Wood (2005)
Donald Woods (2005)
Jon Woods (2005)
John H. Wyckoff III (2006)
Thomas A. Wynn (2004)
George S. Yap (2006)
Janet Yother (2006)
Douglas B. Young (2006)
Ming H. Yuk (2006)
Arturo Zychlinsky (2005)

Samuel Kaplan, *Chairman, Publications Board* **Linda M. Illig**, *Director, Journals*
Diane Smith, *Production Editor* **Amber Esplin**, *Assistant Production Editor*

Infection and Immunity (ISSN 0019-9567), 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 infections caused by pathogenic bacteria, fungi, and parasites. Instructions to authors are published in the January issue each year; reprints are available from the editors and the Journals Department. *Infection and Immunity* is published monthly, one volume per year. Nonmember print subscription prices (per year) are: \$644, U.S.; \$684, Canada (plus 7% GST, or 7% GST + 8% HST where applicable); \$746, Europe; \$773, Latin America; \$778, rest of world. Member print subscription prices (per year) are: \$78, U.S.; \$128, Canada (plus 7% GST, or 7% GST + 8% HST where applicable); \$176, Europe; \$202, Latin America; \$207, rest of world. Single copies are: \$50, nonmember; \$25, member (Canadians add 7% GST, or 7% GST + 8% 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 *Infection and Immunity*, ASM, 1752 N St., N.W., Washington, DC 20036-2904.

Copyright © 2004, American Society for Microbiology. All Rights Reserved.

Made in the United States of America. Printed on acid-free paper. DOI: 10.1128/IAI.72.2.2004 CODEN: INFIBR

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.