

JOURNAL OF BACTERIOLOGY

VOLUME 140 • NUMBER 2 • NOVEMBER 1979

EDITORIAL BOARD

Simon Silver, Editor-in-Chief (1982)
Washington University, St. Louis, Mo.

Stanley C. Holt, Editor (1982)
University of Massachusetts, Amherst

Elizabeth McFall, Editor (1980)
New York University, New York, N. Y.

Allen T. Phillips, Editor (1980)
*Pennsylvania State University,
University Park*

Samuel Kaplan, Editor (1983)
University of Illinois, Urbana

Donald P. Nierlich, Editor (1982)
University of California, Los Angeles

Paul S. Sypherd (1984)
University of California, Irvine

Mark Achtman (1979)
James N. Adams (1979)
Nina Agabian (1980)
James Akagi (1979)
David Apirion (1979)
Arthur I. Aronson (1979)
Gad Avigad (1980)
Stephen D. Barbour (1979)
Jeffrey M. Becker (1980)
Claire M. Berg (1980)
Douglas E. Berg (1980)
Richard S. Berk (1980)
Harriet Bernheimer (1980)
Dale C. Birdsell (1981)
Edwin Boatman (1980)
Winfried Boos (1979)
H. D. Braymer (1979)
Jean Brechley (1980)
Patrick J. Brennan (1981)
George H. Brownell (1980)
Richard O. Burns (1980)
A. M. Chakrabarty (1980)
Peter J. Chapman (1979)
G. William Claus (1979)
Don B. Clewell (1980)
John W. Costerton (1980)
John E. Cronan, Jr. (1980)
Lolita Daneo-Moore (1981)
Dana L. Diedrich (1980)
Walter J. Dobrogosz (1979)
Patrick R. Dugan (1980)
Charles Earhart (1981)
A. Eisenstark (1979)
Alan D. Elbein (1979)
David P. Fan (1981)
Walton L. Fangman (1981)
W. R. Finnerty (1979)
John D. Foulds (1979)

J. F. Gardner (1981)
Bijan K. Ghosh (1981)
David T. Gibson (1981)
Harry E. Gilleland, Jr. (1979)
Helen Greer (1980)
Walter R. Guild (1981)
Tadayo Hashimoto (1979)
Gerald L. Hazelbauer (1981)
Joy Hochstadt (1980)
Bruce Holloway (1979)
Phillip Hylemon (1979)
Karin Ihler (1981)
Joseph Inselburg (1981)
Robert J. Kadner (1979)
Eva R. Kashket (1981)
Donald L. Keister (1980)
David E. Kennell (1980)
Bruce C. Kline (1980)
Jordan Konisky (1981)
Thomas G. Lessie (1979)
K. Brooks Low (1979)
Donald R. Lueking (1981)
Carolyn MacGregor (1981)
P. T. Magee (1980)
Manley Mandel (1981)
Robert E. Marquis (1979)
Barry Marrs (1981)
Neil H. Mendelson (1981)
Sally Ann Meyer (1981)
Gene E. Michaels (1980)
Robert V. Miller (1981)
Walter G. Niehaus, Jr. (1981)
Hiroshi Nikaïdo (1981)
John H. Nordin (1979)
Michio Oishi (1980)
Sunil Palchaudhuri (1979)
Leo Parks (1979)

Martin Pato (1981)
Olga Pierucci (1981)
Patrick J. Piggot (1981)
William S. Reznikoff (1979)
Palmer Rogers (1981)
Antonio H. Romano (1979)
Burton Rosan (1981)
Barry P. Rosen (1980)
Robert Rownd (1980)
Harold L. Sadoff (1980)
Milton H. Saier, Jr. (1979)
Abigail Salyers (1981)
Gene A. Scarborough (1979)
June Scott (1981)
Irwin H. Segel (1979)
Jane K. Setlow (1981)
Peter Setlow (1981)
J. A. Shapiro (1979)
David Sherratt (1980)
Douglas W. Smith (1980)
Issar Smith (1981)
Dieter G. Soll (1979)
A. L. Sonenshein (1980)
Eric J. Stanbridge (1981)
Dwight Stinnett (1979)
Roger Storck (1981)
Stanley Streicher (1980)
John L. Swanson (1981)
Robert L. Switzer (1979)
F. Robert Tabita (1981)
Kenneth N. Timmis (1981)
Bonnie M. Tyler (1981)
James A. Wechsler (1981)
David White (1980)
Clifford A. Woolfolk (1979)
Henry C. Wu (1981)
Howard Zalkin (1979)

Robert A. Day, *Managing Editor*
Gisella Pollock, *Assistant Managing Editor*
Linda M. Illig, *Production Editor*
1913 I St., NW, Washington, DC 20006

EX OFFICIO

Willis A. Wood, *President* (1979-1980)
J. Mehzen Joseph, *Secretary*

Albert Balows, *President-Elect* (1979-1980)
Brinton M. Miller, *Treasurer*

The *Journal of Bacteriology* (ISSN 0021-9193), a publication of the American Society for Microbiology, 1913 I St., N.W., Washington, D.C. 20006, is devoted to the advancement and dissemination of fundamental knowledge concerning bacteria and other microorganisms. Instructions to Authors are published in the January issue each year. The *Journal* is published monthly, and the twelve numbers are divided into four volumes per year. The nonmember subscription price is \$115 per year. Single copies are \$10. The member subscription price is \$22 per year. Correspondence relating to subscriptions, reprints, defective copies, availability of back issues, lost or late proofs, disposition of submitted manuscripts, and general editorial matters should be directed to the ASM Publications Office, 1913 I St., N.W., Washington, D.C. 20006 (area 202 833-9680).

Second class postage paid at Washington, DC 20006, and at additional mailing offices.
Made in the United States of America.
Copyright © 1979, 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., P.O. Box 765, Schenectady, New York 12301, 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.

Author Index

- Aguilar, Juan, 320
Alderman, Edward M., 369
Alexander, James K., 643
An, Gynheung, 400
Anderson, James J., 351
Aschhoff, H. J., 408
Ausubel, Frederick M., 597
- Begg, K. J., 388
Belaich, J. P., 377
Bender, Robert A., 612
Bird, Stephanie C., 597
Blakemore, R. P., 720
Boronat, Albert, 320
Bott, Kenneth F., 742
Brandriss, Marjorie C., 498, 504
Braun, Phyllis C., 666
Brawley, James V., 649
Burke, John M., 525
- Calderone, R. A., 666
Chiu, Teh-hsing, 547
Colletti, Clare, 452
Conti, S. F., 634
Contreras, Inez, 612
Cozzarelli, Nicholas R., 424
Cruden, Diana Loeb, 687
- Dabbs, Eric R., 734
Danilenko, Valery N., 359
D'Ari, Richard, 381
de Graaf, Frits K., 415
Dermoun, Z., 377
Dills, Stevens S., 369
Dobrogosz, Walter J., 369
Donachie, W. D., 388
Durbin, Karen J., 597
- Eberle, H., 445
Evans, I. M., 445
- Farrar, W. Edmund, Jr., 713
Fazel, Akram M., 580
Ferro, Adolph J., 649
Finnerty, W. R., 707
Fives-Taylor, Paula, 525
Forrest, N., 445
Foster, John W., 607
Friesen, James D., 400
- Gallant, Jonathan, 671
Gassen, H. G., 408
George, Jacqueline, 381
Gibson, Jane, 508
- Goldenbaum, Paul E., 459
Goman, Michael, 479
Gómez-Eichelmann, M. C., 574
Gorrell, T. E., 687
Gotto, John W., 327
Goulian, Mehran, 333
Grillo, John F., 508
- Hall, Gail A., 459
Hall, Michael N., 342
Hasan, Syed M., 745
Hastings, J. W., 532
Heller, Klaus B., 395
Henner, Dennis J., 555
Henry, Susan, 612
Hoburg, A., 408
Hsu, Steven C., 547
Huisman, Olivier, 381
- Janssen, Kaaren A., 597
Jeffery, William R., 490
Jensen, Roy A., 580
Junker, Dianne D., 547
- Käppeli, O., 707
Kenkel, Thomas, 543
Kensten, H., 408
Kinney, Dennis M., 607
Koshland, Daniel E., Jr., 567
Kreuzer, Kenneth N., 424
- LaMarre, Arthur G., 634
Lawrence, A., 445
Lawrence, Lowell J., 634
Linn, Thomas, 479
Lomovskaya, Natalie D., 359
Lutkenhaus, J. F., 388
- Magasanik, Boris, 498, 504
Makemson, J. C., 532
Mancuso, David J., 547
Manderschied, U., 408
Mannarelli, B., 655
Mansour, James, 612
Maratea, D., 720
Margolskee, Robert F., 597
Markovetz, A. J., 687
Martinez-Salas, E., 388
McGinness, T., 730
McNeill, William F., 713
Melton, Thoyd, 369
Mendelsohn, Cathy L., 699
Miller, Jeffrey B., 567
Moat, Albert G., 607
- Moran, Charles P., Jr., 742
Morrison, D. A., 655
- Nisen, Perry, 588
Nishino, Toyokazo, 671
Novotny, Charles P., 525
- Oertel, Wolfgang, 333
Oxender, Dale L., 351
- Palmer, Linda, 671
Pato, Martin L., 518
Perlak, Frederick J., 699
Peskin, Adele P., 597
Purucker, Mary, 588
- Rezee, Anna, 415
Rittenberg, Sydney C., 620
Roa, Michèle, 680
Rosen, Barry P., 745
Rosson, Reinhardt A., 620
Rubens, Craig E., 713
- Salmond, G. P. C., 388
Sargentini, Neil J., 436
Savić, Dragutin J., 311
Scaife, John, 479
Shalit, Peter, 671
Shapiro, Lucille, 588, 612
Silhavy, Thomas J., 342
Smith, Kendric C., 436
Steinberg, William, 555
Straley, Susan C., 634
- Tabita, F. Robert, 327, 452
Taylor, Barry L., 567
Thorne, Curtis B., 699
Trela, John M., 543
Troost, Thomas R., 359
- Van Baalen, Chase, 327
van Tiel-Menkveld, Gerda J., 415
Vicente, M., 388
- Waber, Lewis J., 468
Wake, R. G., 730
Warrick, Hans M., 567
Wehr, Timothy, 671
Wilson, James M., 351
Wilson, T. Hastings, 395
Wolfe, R. S., 720
Wood, Harland G., 468
Wróblewski, Henri, 738