

EDITORIAL BOARD

J. R. PORTER, *Editor* (1961)
State University of Iowa
Iowa City, Iowa

DAVID M. BONNER (1963)
Yale University
New Haven, Connecticut

WILLIAM W. FERGUSON (1963)
Michigan Department of Health
Division of Laboratories
Lansing 4, Michigan

EVELYN L. OGINSKY (1963)
University of Oregon Medical School
Portland, Oregon

WILLIAM J. CROMARTIE (1963)
University of North Carolina Medical School
Chapel Hill, North Carolina

WERNER BRAUN (1959)
Rutgers University
New Brunswick, New Jersey

H. A. BARKER (1959)
University of California
Berkeley, California

G. BERTANI (1959)
University of Southern California School of Medicine
Los Angeles, California

J. L. ETCHELLS (1959)
U. S. Food Fermentation Laboratory
North Carolina State College
Raleigh, North Carolina

C. E. VAN ROOYEN (1959)
Department of Bacteriology
Dalhousie University
Halifax, Nova Scotia

G. P. YOUMANS (1959)
Northwestern University Medical School
Chicago, Illinois

HILARY KOPROWSKI (1960)
The Wistar Institute
Philadelphia 4, Pennsylvania

R. Y. STANIER (1960)
University of California
Berkeley, California

O. B. WEEKS (1960)
University of Idaho
Moscow, Idaho

B. D. DAVIS (1961)
Harvard Medical School
Boston 15, Massachusetts

C. W. EMMONS (1961)
National Institutes of Health
Bethesda 14, Maryland

C. D. COX (1961)
University of South Dakota
School of Medicine
Vermillion, South Dakota

C. F. ROBINOW (1961)
Department of Bacteriology
University of Western Ontario
London, Canada

E. J. ORDAL (1961)
University of Washington
Seattle, Washington

RICHARD DONOVICK (1961)
The Squibb Institute for Medical Research
New Brunswick, New Jersey

W. D. McELROY (1962)
Johns Hopkins University
Baltimore, Maryland

MORRIS F. SHAFFER (1962)
Department of Microbiology
Tulane University Medical School
New Orleans, Louisiana

WILLIS A. WOOD (1962)
Department of Agricultural Chemistry
Michigan State University
East Lansing, Michigan

LOUIS DS. SMITH (1962)
Department of Botany and Bacteriology
Montana State College
Bozeman, Montana

Ex officio

CHARLES A. EVANS, President of the Society (1960), University of Washington, Seattle, Washington.
HERALD R. COX, Vice President (1960), Lederle Laboratories, Inc., Pearl River
E. M. FOSTER, Secretary, University of Wisconsin, Madison, Wisconsin.
J. H. BAILEY, Treasurer, Sterling-Winthrop Research Institute, Rensselaer, New York.

SUSTAINING MEMBERS

Society of American Bacteriologists

- ABBOTT LABORATORIES.....North Chicago, Ill.
 ACME METAL PRODUCTS, INC.....Chicago, Ill.
 ALBIMI LABORATORIES.....New York, N. Y.
 ALOE SCIENTIFIC.....St. Louis, Mo.—Calif.
 AMERICAN AGAR AND CHEMICAL Co.
 San Diego, Calif.
 AMERICAN CAN Co.....Maywood, Ill.
 AMERICAN CYANAMID Co. (AGRIC. DIV.)
 Princeton, N. J.
 AMERICAN INSTRUMENT Co., INC.
 Silver Spring, Md.
 AMERICAN OPTICAL Co.....Buffalo, N. Y.
 AMERICAN SCIENTIFIC LABORATORIES, INC.
 Madison, Wisc.
 AMERICAN STERILIZER Co.....Erie, Pa.
 ANCHOR SERUM Co.....St. Joseph, Mo.
 ANHEUSER-BUSCH, INC.....St. Louis, Mo.
 ARMOUR LABORATORIES.....Chicago, Ill.
 AYERST LABORATORIES.....New York, N. Y.
 BALTIMORE BIOLOGICAL LABORATORY
 Baltimore, Md.
 BAUSCH AND LOMB OPTICAL Co...Rochester, N. Y.
 BECTON, DICKINSON AND Co....Rutherford, N. J.
 BELCO GLASS, INC.....Vineland, N. J.
 BORDEN FOODS Co.....Syracuse, N. Y.
 BRAMHALL, DEANE Co.....New York, N. Y.
 BRINKMANN INSTRUMENT, INC.
 Great Neck, L. I., N. Y.
 BRISTOL LABORATORIES, INC....Syracuse, N. Y.
 BUCKMAN LABORATORIES, INC...Memphis, Tenn.
 BURGESS PUBLISHING Co....Minneapolis, Minn.
 BURROUGHS WELLCOME AND Co.
 New York, N. Y.
 CARWORTH FARMS, INC.
 New City, Rockland County, N. Y.
 CASE LABORATORIES, INC.....Chicago, Ill.
 CHILEAN IODINE EDUCATIONAL BUREAU, INC.
 New York, N. Y.
 CIBA PHARMACEUTICAL PRODUCTS, INC.
 Summit, N. J.
 COCA COLA Co.....Atlanta, Ga.
 COLORADO SERUM Co.....Denver Colo.
 COMMERCIAL SOLVENTS CORP...Terra Haute, Ind.
 CONSOLIDATED LABORATORIES, INC...Chicago, Ill.
 CORNING GLASS WORKS.....Corning, N. Y.
 CORN STATE LABORATORIES, INC...Omaha, Neb.
 COULTER ELECTRONICS, INC.....Chicago, Ill.
 CUTTER LABORATORIES.....Berkeley, Calif.
 DIFCO LABORATORIES, INC.....Detroit, Mich.
 DIVERSEY CORP.....Chicago, Ill.
 DOW CHEMICAL Co.....Midland, Mich.
 EBERBACH CORP.....Ann Arbor, Mich.
 E. I. DU PONT DE NEMOURS & Co., INC.
 Wilmington, Del.
 FALCON PLASTICS.....Culver City, Calif.
 FISHER SCIENTIFIC Co., EIMER AND AMEND
 New York, N. Y.
 FLEISCHMANN LABORATORIES....Stamford, Conn.
 GENERAL BIOLOGICAL SUPPLY HOUSE, INC.
 Chicago, Ill.
 HAMILTON MFG. Co.....Two Rivers, Wisc.
 HEINICKE INSTRUMENT CORP.
 Hollywood, Fla.
 HOFFMANN-LA ROCHE, INC.....Nutley, N. J.
 HUNTINGTON LABORATORIES, INC.
 Huntington, Ind.
 HYLAND LABORATORIES....Los Angeles, Calif.
 HYNSON, WESTCOTT AND DUNNING
 Baltimore, Md.
 INTERNATIONAL EQUIPMENT Co....Boston, Mass.
 INTERNATIONAL MINERALS AND CHEMICAL CORP.
 Chicago, Ill.
 KEWAUNEE MANUFACTURING Co...Adrian, Mich.
 KIMBLE GLASS DIVISION, OWENS-ILLINOIS GLASS
 Co.....Toledo, Ohio
 LABLINE, INC.....Chicago, Ill.
 LEDERLE LABORATORIES.....Pearl River, N. Y.
 E. LEITZ, INCORPORATED.....New York 1, N. Y.
 ELI LILLY AND Co.....Indianapolis, Ind.
 LOURDES INSTRUMENT CORP....Brooklyn, N. Y.
 MERCK SHARP AND DOHME RESEARCH LABORA-
 TORIES.....Rahway, N. J.
 MILES LABORATORY.....Elkhart, Ind.
 MILLIPORE FILTER CORP.....Watertown, Mass.
 PHILIP MORRIS, INC.....RICHMOND, Va.
 NATIONAL DAIRY RESEARCH LABORATORIES, INC.
 Oakdale, Long Island, N. Y.
 NEW BRUNSWICK SCIENTIFIC Co.
 New Brunswick, N. J.
 NITRAGIN Co., INC.....Milwaukee, Wisc.
 NORWICH PHARMACAL Co., RESEARCH LABORA-
 TORIES.....Norwich, N. Y.
 ORTHO RESEARCH FOUNDATION...Raritan, N. J.
 PARKE, DAVIS AND Co.....Detroit, Mich.
 CHAS. PFIZER AND Co., INC...New York, N. Y.
 PITMAN-MOORE Co., DIV. OF ALLIED LABORA-
 TORIES, INC.....Indianapolis, Ind.
 PROCTER & GAMBLE Co.....Cincinnati, Ohio
 PROFESSIONAL TAPE Co., INC...RIVERSIDE, ILL.
 RED STAR YEAST AND PRODUCTS Co.
 Milwaukee, Wisc.
 SCHERING CORP.....Bloomfield, N. J.
 CARL SCHLEICHER AND SCHUELL Co.
 Keene, N. H.
 JOS. SCHLITZ BREWING Co....Milwaukee, Wisc.
 SCHWARZ LABORATORIES, INC.
 Mount Vernon, N. Y.
 SCIENTIFIC GLASS APPARATUS Co., INC.
 Bloomfield, N. J.
 SCIENTIFIC PRODUCTS.....Evanston, Ill.
 JOSEPH E. SEAGRAM AND SONS, INC.
 Louisville, Ky.
 G. D. SEARLE & Co.....Chicago, Ill.
 SELAS CORPORATION OF AMERICA
 Philadelphia, Pa.
 SHERMAN LABORATORIES.....Detroit, Mich.
 SMITH, KLINE AND FRENCH LABORATORIES
 Philadelphia, Pa.
 IVAN SORVALL, INC.....Norwalk, Conn.
 SQUIBB INSTITUTE FOR MEDICAL RESEARCH
 New Brunswick, N. J.
 STANDARD SCIENTIFIC SUPPLY CORP.
 New York, N. Y.
 SWIFT & COMPANY.....Chicago, Ill.
 TAKAMINE LABORATORY, INC.....Clifton, N. J.
 ARTHUR H. THOMAS Co....Philadelphia, Pa.
 UPJOHN Co.....Kalamazoo, Mich.
 VESTAL LABORATORIES, INC.....St. Louis, Mo.
 VICO PRODUCTS Co.....Chicago, Ill.
 WALLERSTEIN Co., INC.....New York, N. Y.
 WILLIAM R. WARNER AND Co...New York, N. Y.
 WILL CORP.....Rochester, N. Y.
 WILLIAMS AND WILKINS Co....Baltimore, Md.
 WILMOT-CASTLE Co.....Rochester, N. Y.
 WINTHROP-STEARNS, INC.....New York, N. Y.
 WISCONSIN ALUMNI RESEARCH FOUNDATION
 Madison, Wisc.

JOURNAL OF BACTERIOLOGY

The *Journal of Bacteriology* is an official publication of the Society of American Bacteriologists. It is devoted to the advancement and dissemination of fundamental knowledge concerning bacteria and other microorganisms.

The *Journal* is published monthly and the twelve numbers are divided into two volumes (January–June and July–December). The subscription price is \$16.00 per year, including Bacteriological Reviews (\$16.50 in Canada \$17.50 in postal union and other foreign countries). Members of the Society of American Bacteriologists may receive the *Journal* as part of their dues. All subscriptions should be renewed promptly with the Publishers or their Agents, since a supply of back issues cannot be guaranteed. Renewals and new subscriptions begin with the first volume of the year when subscription is received. If any issue is out of print when the order is received, a pro rata adjustment will be made in the invoice.

Inquiries concerning subscriptions, lost copies, reprints, change of address, and other business matters concerning *Journal of Bacteriology* should be addressed to Williams & Wilkins Co., 428 E. Preston St., Baltimore 2, Maryland.

Matters concerning the Society of American Bacteriologists should be addressed to the Society of American Bacteriologists, Office of the Executive Secretary, 19875 Mack Avenue, Detroit 36, Michigan

INSTRUCTIONS TO AUTHORS

Authors are asked to follow the instructions given below in order to reduce costs and to keep corrections at a minimum.

CORRESPONDENCE. Manuscripts must be submitted in duplicate (original and one carbon) to the *Journal of Bacteriology*, Medical Laboratories, The State University of Iowa, Iowa City, Iowa. All material should be sent by first class mail in flat form—not folded or rolled. The *Journal* cannot assume responsibility for manuscripts.

GENERAL POLICY. It is understood that any manuscript submitted is a report of unpublished original research, which is not being considered for publication elsewhere. A manuscript accepted and published by the *Journal* must not be published again in any form without the consent of the Publisher and Editor.

Each manuscript will be reviewed by one or more members of the Editorial Board. Anonymity of referees is preserved in order that their criticisms may be frank and objective. The chief purpose of review is to help the authors avoid mistakes in their

papers and to publish work that is a credit to themselves and the *Journal*.

Authors are asked to limit manuscripts since it may be necessary to charge for space in excess of 20 printed pages. Corrections in proofs in excess of 5 per cent of the original manuscript will be charged to authors. Authors submitting manuscripts from overseas are advised to appoint someone in U.S.A. to correct proofs.

FORM OF MANUSCRIPT. Manuscripts must be typewritten in double or triple space, with wide margins, and on paper suitable for ink corrections. Manuscripts should be proofread carefully before they are submitted. Following a brief and concise introduction a paper (but not notes) should, in general, be divided into the following parts in the order indicated: MATERIALS AND METHODS or EXPERIMENTAL METHODS; RESULTS; DISCUSSION; ACKNOWLEDGMENTS; SUMMARY; REFERENCES. Authors should consult a current issue of the *Journal* for further details concerning the accepted form. The

Journal reserves the privilege of editing manuscripts to make them conform with the adopted style, or of returning them to authors for revision.

Manuscripts for NOTES must be less than five hundred words and present the results of original research accompanied by adequate supporting data. Contributors should observe the bibliographical procedure adopted for notes in current issues of the *Journal*.

FIGURES AND TABLES. All illustrations and tabular matter must be in finished form for the printer, and not larger than 8½ x 11 inches. Drawings, curves, and similar material must be made with India ink approximately twice the size of the finished block, on plain white paper, bristol board, or light-blue lined paper. Do not use coordinate paper with green lines. Line cuts will usually be reduced for printing to 2½ inches in width. Lettering guides should be employed for all written material on drawings. Photographs submitted for reproduction should be glossy prints with strong contrasts, and the magnification should be indicated by a micron scale wherever possible. Number all figures consecutively, using Arabic numbers. In the text the word "figure" is written with a small initial letter, whereas in the legend it is capitalized and underlined.

Tables should be typed on separate pages and numbered consecutively with Arabic numbers. They should carry headings in lower case type underlined, and should be understandable without reference to the text. Duplication in the text of details shown in a table is not permitted. Excessive use of footnotes should be avoided. In the text the word "table" is written in lower case.

HEADINGS. Authors are requested to submit a running heading of 50 letters or less.

REFERENCES. In the text references are cited as: Smith and Jones (1953) (Smith and Jones, 1953), (Smith *et al.*, 1953). Where more than one paper by the same author(s) has appeared in the same year the references should be supplemented in the text and the bibliography by the letters *a*, *b*, etc., following the citation of the year (e.g., 1953*a*, 1953*b*). References at the end of the paper should be listed alphabetically, with the material in the following order: name of author(s) with initials following surname; year of publication; full title of paper, name of journal in abbreviated form according to current usage in the *List of Periodicals Abstracted by Chemical Abstracts*; volume number; first and last page of the paper. References to books should include the author's name, year of publication, title of book, edition, publisher, and place of publication. Literature citations should be restricted to closely pertinent papers. Citations of "unpublished data", "personal communication", and "in press" will not be accepted in the text or references without consent of the editor. Articles cited in the references must be either "accepted for publication" or already printed.

ABBREVIATIONS AND SYMBOLS. Where abbreviations or symbols are employed in

tabular material or in the text, authors are asked to use the following (*note* the absence of periods except after no.): A = angstrom unit; at wt = atomic weight; avg = average; cal = calorie; chem = chemical; cm = centimeter(s); coef = coefficient; conc = concentrate; const = constant; cm³ = centimeter cube, cubic centimeter (space); μ³ = cubic micron; mm³ = cubic millimeter; C = degree centigrade; diam = diameter; emf = electromotive force; ev = electron volt; fp = freezing point; fmp = fusion point; g = gram(s); hr = hour(s); in = inch; ID₅₀ = infect 50 per cent of inoculated group; kc = kilocycle; kg = kilogram; kv = kilovolt; LD₅₀ = lethal for 50 per cent of inoculated group; L = liter(s); log = logarithm; M = molarity; max = maximum; mp = melting point; m = meter; μg = microgram (0.001 mg; do not use gamma); μμ = micromicrogram; μmoles = micromoles; μ = micron; mg = milligram; ml = milliliter; mμ = millimicron; mv = millivolt; min = minimum or minute(s); mol wt = molecular weight; N = normality; no. = number; rpm = revolutions per minute; rps = revolutions per second; sec = second; sp gr = specific gravity; sq = square; cm² = square centimeter; μ² = square micron; mm² = square millimeter; std = standard; temp = temperature; v = volt. The letters L- and D- should be used only for the configuration of amino acids, carbohydrates, and their derivatives where the configuration has been definitely established. Abbreviation of chemical names and enzymes should be avoided. Proprietary substances and trade names must be accompanied by their chemical name.

NOMENCLATURE OF MICROORGANISMS. Binomial Latin names of microorganisms must be used in accordance with the International Rules of Nomenclature. Binomials should be underlined once in the typewritten copy. A specific name must not be used without an accompanying capitalized generic name. The generic name for each species should be written in full where it first occurs in the text, and again in the summary. Where the generic name appears frequently in the text it may be abbreviated by using the initial letter of the name. In general the nomenclature for bacteria presented in *Bergey's Manual of Determinative Bacteriology*, 7th Ed. (1957) is used. Where an author challenges this nomenclature his own judgment will be followed, but the name in *Bergey's Manual* should follow in parenthesis the first time the name is used in the text. When new bacterial names are proposed in manuscripts an international authority on nomenclature will be consulted for an opinion. Manuscripts containing new scientific names for protozoa and higher fungi will not be accepted by the *Journal*. Scientific epithets or trivial names should not be underlined in the manuscript. Strain numbers will not be accepted in the title of the paper.

REPRINTS. Reprints of articles will be furnished contributors when ordered in advance. A table showing cost of reprints and an order slip will be sent with the proof.