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BIOLOGICAL SCIENCES COMMUNICATION PROJECT

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VOLUME III. EXOBIOLOGY

SECOND EDITION



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SCIENTIFIC PUBLICATIONS OF THE  
BIOSCIENCE PROGRAMS DIVISION

VOLUME III EXOBIOLOGY  
SECOND EDITION

by

Frances Hong and Jean Pulliam

of the  
Biological Sciences Communication Project

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The George Washington University Medical Center

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PREFACE

As the amount of scientific information continues to "explode", bibliographies have become an important means by which science administrators and research scientists can maintain a current awareness of their primary and relative fields of interest. In addition to listing the available literature, bibliographies can be used to identify scientists, laboratories, and institutions conducting research in similar disciplines, and to examine the growth and changing directions of research in specific subject areas.

The second edition of Scientific Publications of the Bioscience Programs Division of the National Aeronautics and Space Administration consists of six volumes: Volume I, Behavioral Biology, Volume II, Environmental Biology, Volume III, Exobiology, Volume IV, Physical Biology, Volume V, Planetary Quarantine, and Volume VI, Bioscience Communications. Each principal investigator was requested to contribute his current list of publications resulting from research supported by the Bioscience Programs Division, and to edit the citations included in last year's bibliography.

Publications appearing in the serial literature, monographs, and books, through 1967 were used in compiling this bibliography. Theses, doctoral dissertations, unpublished speeches and lectures, and articles "in press" were omitted. Each volume contains a list of citations arranged chronologically according to authors names, a permuted title index, and author index, and a senior author and laboratory directory.

Through the cooperation of the authors and extensive library research on the part of our staff, we have been able to acquire reprints or copies of most of the cited publications. Based on these documents many corrections have been made in publication dates, pagination, and author order. It also became apparent that several of the publications cited last year were not supported by the Bioscience Programs Division, we have deleted these.

The authors gratefully acknowledge the technical assistance of Mrs Roger Allen, Bert Kenyon, III and of the secretarial staff in the preparation of this report.

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Cambridge, Massachusetts 02138

Harvard University (Harvard U., Dept. Biol.)  
Dept. of Biology  
22 Divinity Avenue  
Boston, Massachusetts 02138

Indiana University (Ind U , Dept. Geol.)  
Dept. of Geology  
Bloomington, Indiana 47401

Jet Propulsion Laboratory (JPL)  
California Institute of Technology  
4800 Oak Grove Drive  
Pasadena, California 91103

Massachusetts Institute of Technology (M.I.T., Dept Chem.)  
Dept of Chemistry  
Cambridge, Massachusetts 02139

National Aeronautics and Space Administration (NASA, Ames)  
Ames Research Center  
Moffett Field, California 94035

National Aeronautics and Space Administration (NASA, OSSA)  
Bioscience Programs Division, OSSA  
Washington, D C. 20456

National Biomedical Research Foundation (Nat Biomed Res  
8600 16th Street Found )  
Silver Spring, Maryland 20910

New York University (NYU, Med Cent )  
Medical Center  
New York, New York 10016

Pennsylvania State University (Penn State, Dept Phys )  
Dept. of Physics  
University Park, Pennsylvania 16802

Princeton University Observatory (Princeton Obs )  
265 Fitz Randolph Road  
Princeton, New Jersey 08540

Purdue University (Purdue U )  
Lafayette, Indiana 47907

Randolph-Macon Woman's College (Randolph-Macon Woman's Coll )  
Dept. of Biology  
Lynchburg, Virginia 24505

Research Institute for Advanced Studies (Res. Inst Adv. Stud )  
Martin Marietta Corporation  
1450 South Rolling Road  
Baltimore, Maryland 21227

Salk Institute for Biological Studies (Salk Inst Biol Stud )  
San Diego, California 92101

Smithsonian Institution (Smithsonian)  
Astrophysical Observatory  
60 Garden Street  
Cambridge, Massachusetts 02138

Stanford University (Stanford, Dept Elec Eng )  
Dept of Electrical Engineering  
Palo Alto, California 94304

Stanford University (Stanford, Med Cent )  
Medical Center  
School of Medicine  
Palo Alto, California 94304

State University of New York at Buffalo (State U.N.Y., Buffalo,  
School of Medicine Sch Med )  
Dept. of Medicine  
Buffalo, New York 14214

Syracuse University (Syracuse, Dept Zool.)  
Dept. of Zoology  
Syracuse, New York 13210

University of Arizona (U Arizona)  
Lunar and Planetary Laboratory  
Tucson, Arizona 85721

University of California at Berkeley (U. C , Berkeley, Dept  
Dept of Chemistry Chem )  
Berkeley, California 94720

University of California at Berkeley (U C., Berkeley, Dept  
Dept of Soils & Plant Nutrition Soils & Plant Nutri.)  
Berkeley, California 94720

University of California at San Diego (U. C , San Diego)  
Dept of Chemistry  
P O. Box 109  
La Jolla, California 92039

University of California (U C , Scripps)  
Dept of Marine Biology  
Scripps Institution of Oceanography  
La Jolla, California 92307

University of California at Los Angeles (UCLA, Dept Bacteriol.)  
Dept of Bacteriology  
Los Angeles, California 90024

University of California at Los Angeles (UCLA, Inst. Geophys  
Institute of Geophysics and Planetary Physics & Planet Phys.)  
Los Angeles, California 90024

University of Chicago (U Chicago, Enrico Fermi Inst )  
Enrico Fermi Institute for Nuclear Studies  
5630 Ellis Avenue  
Chicago, Illinois 60637

University of Chicago (U. Chicago, Dept Pathol.)  
Dept. of Pathology  
Chicago, Illinois 60637

University College (University Coll )  
Space Structure Research  
Dept of Physics  
London, England

University of Detroit (U Detroit, Dept Chem )  
Dept. of Chemistry  
4001 West McNichols Road  
Detroit, Michigan 48221

University of Florida (U. Fla )  
College of Medicine  
Dept of Pediatrics  
Gainesville, Florida 32601

University of Glasgow (U Glasgow)  
Dept of Chemistry  
Glasgow, Scotland

University of Houston (U Houston, Dept Biol.)  
Dept of Biology  
Houston, Texas 77004

University of Houston (U Houston, Dept. Chem )  
Dept of Chemistry  
Cullen Boulevard  
Houston, Texas 77004

University of Illinois at Chicago Circle (U. Ill. at Chicago,  
Dept of Chemistry Dept Chem )  
Box 4348  
Chicago, Illinois 60680

University of Liverpool (U Liverpool)  
The Robert Robinson Laboratories  
Liverpool, England

University of Maryland (U Md., Dept Chem )  
Dept of Chemistry  
College Park, Maryland 20740

University of Melbourne (U Melbourne)  
Parkville, Victoria, Australia

University of Miami (U Miami, Inst Mol Evol.)  
Institute of Molecular Evolution  
521 Anastasia Avenue  
Coral Gables, Florida 33134

University of Missouri (U Mo , Coll Agr )  
College of Agriculture  
Columbia, Missouri 65201

University of Missouri (U Mo , Rolla)  
Rolla, Missouri 65401

University of Rochester (U Rochester)  
Rochester, New York 14627

University of Wisconsin (U. Wisconsin)  
Medical Science Building  
Dept of Pharmacology  
Madison, Wisconsin 53706

Woods Hole Oceanographic Institution (Woods Hole Oceanogr Inst.)  
Dept. of Chemistry and Geology  
Woods Hole, Massachusetts 02543

Yale University (Yale)  
New Haven, Connecticut 06520

Yale University (Yale, Sch. Med )  
School of Medicine  
333 Cedar Street  
New Haven, Connecticut 06510

Yale University (Yale, Dept Mol. Biophys.)  
Dept. of Molecular Biophysics  
Box 2166  
Yale Station  
New Haven, Connecticut 06520

## JOURNALS PUBLISHING EXOBIOLGY ARTICLES

The following is an alphabetical list of 129 journals which have published 521 articles resulting from research supported by the Exobiology Program of NASA's Bioscience Programs Division, from 1960 through 1967. The numbers following each journal title indicate the total number of articles found in that particular periodical:

During this 8-year period 77 or 60% published only 1 article each, 39 or 30% published less than 10 articles each. The 2 journals publishing the largest number of articles were "Nature" (68) and "Science" (58). The remaining 11 journals published from 10 to 28 articles each

Aerospace Medicine (1)  
American Biology Teacher (1)  
American Journal of Botany (2)  
American Journal of the Diseases of Children (1)  
American Mathematical Monthly (1)  
American Mineralogists (1)  
American Scientist (2)  
Analytical Biochemistry (3)  
Analytical Chemistry (18)  
Annals of the New York Academy of Sciences (9)  
Applied Optics (1)  
Archives of Biochemistry and Biophysics (10)  
Astronautics and Aeronautics (6)  
Astronomical Journal (5)  
The Astrophysical Journal (7)  
Australian Journal of Chemistry (2)  
Bacteriological Proceedings (11)  
Bild der Wissenschaft (1)  
Biochemical and Biophysical Research Communications (7)  
Biochemistry (5)  
Biochimica et Biophysica Acta (10)  
Biologie du Sol (1)  
Biophysical Journal (1)  
Bioscience (3)  
Brookhaven Symposia on Biology (1)  
Bulletin de L'Academie Royale de Medecine de Belgique (1)  
Bulletin of the Chemical Society of Japan (9)  
Bulletin Societes Chimiques Belges (1)  
Canadian Journal of Microbiology (1)  
Carnegie Magazine (1)  
Chemical Communications (8)  
Chemical Geology (1)  
Chemistry (1)  
Chimia (1)  
Cold Spring Harbor Symposia on Quantitative Biology (1)  
Communications of the Lunar and Planetary Laboratory (2)  
Comparative Biochemistry and Physiology (3)  
Cryogenic Technology (1)

Currents in Modern Biology (3)  
 Engineering & Science (1)  
 Enzymologia (2)  
 Europeo (Milan) (1)  
 Evolution (1)  
 Experimental Cell Research (2)  
 Federation Proceedings (10)  
 Food Technology (1)  
 Genetics (2)  
 Geochimica et Cosmochimica Acta (14)  
 Geologische Rundschau (1)  
 Geologiska föreningens i Stockholm förhandlingar (1)  
 Harvard Alumni Bulletin (1)  
 Helvetica Chimica Acta (2)  
 Icarus (14)  
 Immunochemistry (3)  
 Indian Journal of Biochemistry (1)  
 Industrial Research (1)  
 Industry (1)  
 IEEE Transactions on Circuit Theory (1)  
 Investigative Ophthalmology (1)  
 Journal of the American Chemical Society (28)  
 Journal of the American Oil Chemists' Society (3)  
 Journal of Applied Microbiology (1)  
 Journal of the Arkansas Medical Society (1)  
 Journal of Bacteriology (16)  
 Journal of the Biological Chemistry (9)  
 Journal of the British Interplanetary Society (1)  
 Journal of Cell Biology (2)  
 Journal of Chemical Physics (1)  
 Journal of Chromatography (1)  
 Journal of Experimental Zoology (1)  
 Journal of Gas Chromatography (6)  
 Journal of General Microbiology (1)  
 Journal of General Physiology (1)  
 Journal of Geophysical Research (10)  
 Journal of Heterocyclic Chemistry (1)  
 Journal of Immunology (1)  
 Journal of Inorganic and Nuclear Chemistry (1)  
 Journal of Molecular Biology (4)  
 Journal of Morphology (1)  
 Journal of the Optical Society of America (1)  
 Journal of Organic Chemistry (8)  
 Journal of Paleontology (1)  
 Journal of Physical Chemistry (1)  
 Journal of Reproduction and Fertility (2)  
 Journal of Sedimentary Petrology (1)  
 Journal of Spacecraft and Rockets (1)  
 Journal of Theoretical Biology (2)  
 Journal of Ultrastructure Research (2)

Kobunshi Kagaku (Chemistry of High Polymers) (1)  
 Life Sciences (1)  
 Lipids (1)  
 Meddeleser Fra Dansk Geologisk Forening (1)  
 Meteoritika (2)  
 National Geographic (1)  
 Nature (68)  
 Naturwissenschaften (4)  
 Nucleonics (1)  
 Palaeontologische Zeitschrift (1)  
 Parasitology (1)  
 Pediatric Research (1)  
 Photochemistry and Photobiology (1)  
 Physical Review (1)  
 Phytochemistry (1)  
 Planetary and Space Science (4)  
 Plant Physiology (1)  
 Planta (1)  
 Proceedings of the Astronautical Society (1)  
 Proceedings of the Lunar and Planetary Colloquium (5)  
 Proceedings of the National Academy of Sciences, U.S. (11)  
 Proceedings of the Society for Analytical Chemistry (1)  
 Proceedings of the Society for Experimental Biology and Medicine (1)  
 Publications of the Astronomical Society of the Pacific (1)  
 Radiation Research (6)  
 Review of Palaeobotany and Palynology (1)  
 Rochester Review (1)  
 Saturday Review (1)  
 Science (58)  
 Science Journal (1)  
 Science Teacher (1)  
 Scientific American (1)  
 Separation Science (1)  
 Space Science Reviews (5)  
 Space World (1)  
 Technology Review (MIT) (1)  
 Tetrahedron (4)  
 Tetrahedron Letters (9)  
 Verhandlungen der Internationalen Vereinigung für Theoretische und  
 Angewandte Limnologie (1)  
 Yale Journal of Biology and Medicine (1)  
 Zeitschrift für Naturforschung (2)