Publications of the Planetary Biology Program
for 1976--A Special Bibliography

Compiled by
F. D. Bradley and R. S. Young

NASA Office of Space Science

MAY 1977

NASA
National Aeronautics and Space Administration
**PUBLICATIONS OF THE PLANETARY BIOLOGY PROGRAM FOR 1976**

**A SPECIAL BIBLIOGRAPHY**

Compiled by F.D. Bradley and R.S. Young

National Aeronautics and Space Administration
Washington, DC 20546

Office of Space Science
National Aeronautics and Space Administration
Washington, DC 20546

UNCLASSIFIED - UNLIMITED

UNCLASSIFIED

UNCLASSIFIED

37

$4.00

*For sale by the National Technical Information Service, Springfield, Virginia 22161*
INTRODUCTION

The Planetary Biology Program, within the Office of Space Science of the National Aeronautics and Space Administration, is the first and only integrated program to methodically investigate the planetary events which may have been responsible for, or related to, the origin, evolution, and distribution of life in the universe. Research supported by this program is divided into the seven areas listed below together with a statement of the principal objective of each research area.

**Chemical Evolution** - To understand how biologically significant organic molecules are synthesized under conditions presumed to have existed on the primitive earth before the advent of life or which may presently exist on other planets.

**Organic Geochemistry** - To analyze terrestrial and extraterrestrial material for organic molecules, biological structures, and other clues to the origin(s) of life on this and other planets.

**Life Detection** - To develop and implement techniques to search for, detect, and characterize life and life-related molecules on this and other planets.

**Biological Adaptation** - To understand the adaptive mechanisms used by terrestrial organisms to survive and/or grow in environmental extremes approaching those on other planets.

**Bioinstrumentation** - To design, develop, and test prototype spaceflight instruments which will be used to detect and characterize life and life-related molecules on the surface and in the atmosphere of other planets.

**Planetary Environments** - To develop analytical techniques which measure environmental parameters on other planets which are relevant to the search for life.

**Origin of Life** - To identify the sequence of events leading from the putative complex organic milieu in the primordial terrestrial oceans to the origin of the first living systems.

The arrangement of references in this bibliography follows the division of research described. Articles are listed alphabetically by author under the research area with which
they are most closely related. Only those publications which resulted from research supported by the Planetary Biology Program and which bear a 1976 publication date have been included. Abstracts, theses, and presentations are not included because of the preliminary and abbreviated nature of the former and the frequent difficulty of obtaining the latter.

Our intent in compiling this bibliography is twofold. First, we would like to provide the scientific community with an annual listing, beginning with 1975, of current publications resulting from research pursued under the auspices of NASA's Planetary Biology Program. Secondly, we hope to stimulate the exchange of information and ideas among scientists working in the different areas of the program. To facilitate the exchange process, we have identified, by asterisk, the author of each publication who is presently participating in the program. Current addresses for all principal investigators are given in the appendix.

We wish to thank all the participants of the Planetary Biology Program for their cooperative response to our request for an enumeration of their 1976 publications.
Chemical Evolution


---

^1Lederberg, J., Principal Investigator


*Ponnamperuma, C., Principal Investigator


---

1 Lederberg, J., Principal Investigator
2 Orgel, L.E., Principal Investigator


---

1Ponnamperuma, C., Principal Investigator

2Lederberg, J., Principal Investigator


Organic Geochemistry


---

1M. Calvin, Principal Investigator


1 M. Calvin, Principal Investigator


Life Detection


Biological Adaptation


Planetary Environments


Origin of Life


---

1 Jukes, T.H. Principal Investigator


---

1 Jukes, T.H., Principal Investigator


1Jukes, T.H., Principal Investigator


---

1Eirich, F.R., Principal Investigator


APPENDIX: PRINCIPAL INVESTIGATORS

Professor Elso S. Barghoorn
The Biological Laboratories
Harvard University
16 Divinity Avenue
Cambridge, MA 02138

Professor Ralph S. Becker
Department of Chemistry
University of Houston
Houston, TX 77004

Professor Klaus Biemann
Department of Chemistry
Massachusetts Institute of Technology
Cambridge, MA 02139

Professor William A. Bonner
Department of Chemistry
Stanford University
Stanford, CA 94305

Asst. Professor Charles W. Boylen
Department of Biology
Rensselaer Polytechnic Institute
Troy, NY 12181

Assoc. Professor Joseph Bragin
Department of Chemistry
California State University
5151 State University Drive
Los Angeles, CA 90032

Dr. A. L. Burlingame
Biomedical and Environmental Mass Spectrometry Resource
Space Sciences Laboratory
University of California
Berkeley, CA 94720
Professor Melvin Calvin  
Department of Chemistry  
University of California  
Berkeley, CA  94720

Mr. Glenn C. Carle  
Ames Research Center  
Code LPD  
Moffett Field, CA  94035

Professor L. E. Casida, Jr.  
Department of Microbiology and  
Cell Biology  
The Pennsylvania State University  
University Park, PA  16802

Dr. Sherwood Chang  
Ames Research Center  
Code LPE  
Moffett Field, CA  94035

Assoc. Professor John R. Cronin  
Department of Chemistry  
Arizona State University  
Tempe, AZ  85281

Professor James F. Danielli  
Department of Life Sciences  
Worcester Polytechnic Institute  
Worcester, MA  01609

Dr. Margaret O. Dayhoff  
National Biomedical Research Foundation  
Georgetown University Medical Center  
3900 Reservoir Road, N.W.  
Washington, DC  20007

Mr. Paul H. Deal  
Ames Research Center  
Code LPB  
Moffett Field, CA  94035

Dr. Donald L. DeVincenzi  
Ames Research Center  
Code LP  
Moffett Field, CA  94035
Dr. Frederick R. Eirich  
Department of Chemistry  
Polytechnic Institute of New York  
333 J Street  
Brooklyn, NY 11201

Dr. Janos H. Fendler  
Department of Chemistry  
College of Science  
Texas A&M University  
College Station, TX 77843

Professor James E. Ferris  
Department of Chemistry  
School of Science  
Rensselaer Polytechnic Institute  
Troy, NY 12181

Professor Clair E. Folsome  
Laboratory for Exobiology  
Department of Microbiology  
University of Hawaii at Manoa  
2538 The Mall  
Honolulu, HI 96822

Dr. Sidney W. Fox, Director  
Institute for Molecular and Cellular Evolution  
University of Miami, 521 Anastasia  
Coral Gables, FL 33134

Mr. Herbert S. Ginoza  
Ames Research Center  
Code LPD  
Moffett Field, CA 94035

Professor Milton P. Gordon  
Department of Biochemistry  
1405 Health Sciences Building  
University of Washington  
Seattle, WA 98195

Mr. Milton R. Henrich  
Ames Research Center  
Code LPB  
Moffett Field, CA 94035
Assoc. Professor John M. Hayes  
Department of Chemistry  
Chemistry Building  
Indiana University  
Bloomington, IN 47401

Mr. Lawrence I. Hochstein  
Ames Research Center  
Code LPB  
Moffett Field, CA 94035

Professor Norman H. Horowitz  
Department of Biology  
California Institute of Technology  
Pasadena, CA 91109

Assoc. Professor Jerry Hubbard  
School of Biology  
Georgia Institute of Technology  
Atlanta, GA 30332

Dr. Richard D. Johnson  
Ames Research Center  
Code LB  
Moffett Field, CA 94035

Professor Thomas H. Jukes  
Space Sciences Laboratory  
University of California  
Berkeley, CA 94720

Professor Isaac R. Kaplan  
Department of Earth and Space Sciences  
3806 Geology Building  
University of California  
Los Angeles, CA 90024

Professor Dean H. Kenyon  
Department of Biology  
San Francisco State University  
San Francisco, CA 94132

Dr. Harold P. Klein  
Ames Research Center  
Code L  
Moffett Field, CA 94035
Dr. Bessel Kok  
Martin Marietta Laboratories  
Martin Marietta Corporation  
1450 South Rolling Road  
Baltimore, MD 21227

Assoc. Professor William R. Kuhn  
Department of Atmospheric and Oceanic Sciences  
University of Michigan  
Ann Arbor, MI 48109

Dr. James C. Lacey, Jr.  
Assoc. Professor of Biochemistry  
Laboratory of Molecular Biology  
University of Alabama in Birmingham  
The Medical Center  
University Station  
Birmingham, AL 35294

Mr. Janos K. Lanyi  
Ames Research Center  
Code LPB  
Moffett Field, CA 94035

Mr. James G. Lawless  
Ames Research Center  
Code LPE  
Moffett Field, CA 94035

Professor Joshua Lederberg  
Department of Genetics  
Stanford University School of Medicine  
Stanford, CA 94305

Dr. Gilbert V. Levin  
Biospherics Incorporated  
4928 Wyaconda Road  
Rockville, MD 20852

Dr. Elliott C. Levinthal  
Department of Genetics  
Stanford University School of Medicine  
Stanford, CA 94305
Assoc. Professor Russell E. MacDonald
Section of Biochemistry, Molecular
    and Cell Biology
Division of Biological Sciences
College of Agriculture and Life Sciences
Cornell University
Ithaca, NY 14853

Dr. Robert D. MacElroy
Ames Research Center
Code LPB
Moffett Field, CA 94035

Assoc. Professor Lynn Margulis
Department of Biology
Boston University
2 Cummington Street
Boston, MA 02215

Mr. Edward L. Merek
Ames Research Center
Code LPD
Moffett Field, CA 94035

Professor Stanley L. Miller
Department of Chemistry, B-017
University of California, San Diego
La Jolla, CA 92093

Professor Harold J. Morowitz
Department of Molecular Biosphysics
    and Biochemistry
Yale University
Box 1937, Yale Station
New Haven, CT 06520

Professor Bartholomew Nagy
Department of Geosciences
Laboratory of Organic Geochemistry
University of Arizona
Tucson, AZ 85721

Dr. Joseph Nagyvary
Department of Biochemistry and Biophysics
Texas A&M University
College Station, TX 77843
Professor Carl E. Sagan
Laboratory for Planetary Studies
Center for Radiophysics and Space Research
Cornell University
Ithaca, NY 14853

Professor J. William Schopf
Department of Geology
University of California
Los Angeles, CA 90024

Mr. Melvin P. Silverman
Ames Research Laboratory
Code LPD
Moffett Field, CA 94035

Professor Grant Gill Smith
Department of Chemistry
College of Science
Utah State University
Logan, UT 84321

Professor Walther Stoeckenius, M.D.
Cardiovascular Research Institute
School of Medicine
University of California
San Francisco, CA 94143

Assoc. Professor Frederick C. Wedler
Department of Chemistry
Rensselaer Polytechnic Institute
Troy, NY 12181

Mr. Fritz H. Woeller
Ames Research Center
Code LPD
Moffett Field, CA 94035

Professor Carl R. Woese
Department of Genetics and Development
College of Liberal Arts and Sciences
University of Illinois
Urbana, IL 61801
Dr. A.A. Yayanos
Physiological Research Laboratory
Scripps Institute of Oceanography
University of California, San Diego
La Jolla, CA 92093

Assoc. Professor John H. Yopp
Department of Botany
Southern Illinois University
Carbondale, IL 62901

Dr. Richard S. Young
Code SBL
National Aeronautics and Space Administration
Washington, DC 20546