

proposed  
alternative for  
pages 63 & 64

Modification of NASA Organization....etc.

The Life Sciences Advisory Committee affirms the present location of Life Sciences within the Office of Space Science as optimal for operation in association with essentially all other scientific research activities of NASA. The Committee strongly recommends, however, that because of the great diversity of Life Sciences responsibilities, the special importance of medical staff to space flight operations, and of the unique importance of biomedical scientific activities to both the science and the operations of long duration/planetary space flights, the NASA Director for Life Sciences should have direct access to the Office of the Administrator, NASA, for planning and budgetary consultations. In fact, serious considerations should be given to movement of Life Sciences from OSS to independent Office status, reporting directly to the NASA Administrator.

Considering the extensive diversity of responsibilities of the Life Sciences, this committee recognizes the administrative difficulties involved in establishing a perfect location for the Office of Life Sciences within the NASA organizational structure. Its present location within the Office of Space Science is appropriate for one of the two primary functions (planetary biology) of the Life Sciences, but not the other (the support of man in space). Furthermore,

Life Sciences is presently placed at the Division level, which is less than adequate considering its functional interrelationships and scope within the Agency. Another unfortunate effect is that Division level acts to down-grade the level of professional competence within the Life Sciences with adverse effects not only on existing personnel, but on the attractiveness of the NASA Life Sciences as a future field for young professional prospects.

On the other hand, in its former location in what was then the Office of Manned Space Flight, the Life Sciences Office was well placed for the other of its primary functions, the support of man in space, but not for its planetary biology. It did have two advantages in OMSF, however. It had a direct administrative pathway to the NASA Administrator to accommodate the management of Life Sciences matters outside the functions of OMSF; and it retained the title "Office" and was headed by a "first line" director, thus allowing a higher level of management relationships for all of its internal working levels, and greater prestige value for the aerospace life sciences disciplines.

Prior to 1962, the location of the Life Sciences as a NASA Office at the Associate Administrator level apparently resulted in some remoteness from all other NASA activities, at least at that time. Hence, it was disbanded and split three ways, an arrangement which also proved to be unsatisfactory. Consequently, in December, 1970, it was reunified as the Life Sciences and placed within OMSF.



While this committee would find it presumptuous to attempt to advise NASA management on an exact organizational location for the Life Sciences, we can suggest at least two possible alternatives which we feel merit further study in attempting to correct these problems. One is to move the Office of Life Sciences to the NASA Administrator's staff level. It would retain its budget and operate a small Division in the Office of Space Science, and one in the Office of Space Transportation Systems. Relationships with the other NASA Offices would be by designated liaison representatives, or could be expanded to similar small Divisions on the basis of need.

The other concept is to maintain the Life Sciences in OSS, but re-establish a direct pathway to the Administrator and elevate its stature to its former level in OMSF.

No doubt, other alternatives exist and should be examined. Any suggestion to be considered, however, should recognize that the Life Sciences is inherently an administratively anomalous organization within NASA in that it ~~is a single disciplinary unit whose functions~~ cut horizontally across major organizational lines. Furthermore, past experience has shown that a single united NASA Life Sciences (and consequently preservation of this anomaly) is a necessity in the interest of efficiency, economy and coherence of its work. The anatomical and physiological reasons for this reside, basically, in the fact that the Life Sciences is a small disciplinary identity in an agency which is devoted predominately to the physical sciences and engineering, and is organized accordingly.

While these "hard" sciences are so heavily represented in the Agency that their division into functional and subspeciality units is mandatory for efficient operation, the Life Sciences is too small and becomes too fragmented for efficient function if it is similarly divided. (The same would be true of a physical sciences effort in a life sciences agency.) Yet, the NASA Life Sciences is indispensable to NASA's goals; and in several areas of Agency operations.

An additional criterion which must be given serious consideration stems from the fact that the aerospace orientation of the life sciences professions is unique to the usual interests and concerns of the life sciences community, itself. It is for this reason that the NASA Life Sciences must be in a prestigious enough position to lead and support the space oriented specialization of its component disciplines if future competence is to be assured.

Consequently, in any organizational placement proposed, the Life Sciences should:

1. be preserved as a single entity.
2. be given the necessary organizational and management channels to function fully and smoothly across organizational lines.
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*ACKNOWLEDGES THE RATIONALE OF*

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STARTS p. 64 IN PLACE OF

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Shirley

(Popma's pages just arrived.  
Note that I had softened the  
comment on B-18. But there still  
needs to be more substance. I'll  
phone you after looking over Popma's  
stuff.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

CAMBRIDGE, MASSACHUSETTS 02139

Room 1-110

September 18, 1978

Dr. S. P. Vinograd  
Life Sciences Division  
NASA Headquarters  
Washington, D. C. 20546

Dr. John Spizizen  
Dept. of Microbiology  
Scripps Clinic and Research Foundation  
La Jolla CA 92093

Dear Sherm and John,

Here are some suggested revisions on the final draft of the LSAC report:

✓ page 37, line 5: "Robotics and Machine Intelligence -----"

✓ page 37, middle of page, add new item (1), renumber others:  
"(1). How should the errors and reliability of the human operators and human monitors be characterized and measured? Is the assumption of "independence of component failures" now widely employed in nuclear plant reliability analysis valid for human errors such as may occur in NASA systems?"

N O page 55, first paragraph. There is no mention of aeronautics. Should "and aeronautics" be added following "space" in line 4.

- ✓ page 59, line 6. relevation?!

✓ page 77, line 3. Add comma after "analyses".

✓ page 77, 5th line of 3rd paragraph. Delete "is uniquely a NASA project and".

- ✓ page 81, line 8. "error".

- ✓ page B-13, line 4. "- - -and/or other sensors, manipulator arms, and --- - - -".

- ✓ page B-14, second paragraph, line 6. "-----devices. In -----". (delete "but this research is salient.")

- *NEW CHANGE* ✓ page B-18, line 8. "2. Automated crew station design. The goals of this project *NEW CHANGE BY SHERRIDAN* should be made more clear". (delete "It is not --- accomplishing").

- ✓ page B-18, line 13. "----Swedish Sel-Spot and similar instruments currently used in rehabilitation engineering".



September 18, 1978

-✓ page B-18, line 17. "----be quite helpful, especially where computer-based displays are----".

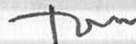
-✓ page B-19, line 10. "manipulation".

-✓ page B-20, line 15. "---- can size of supporting hardware components be reduced?"

-✓ page B-38, last line. "---- sudden transients (in emergencies)".

-✓ Finally, my title has recently been changed, as below. If convenient the committee membership list might be modified accordingly.

Sincerely,



Thomas B. Sheridan  
Professor of Engineering and  
Applied Psychology

TBS:jt

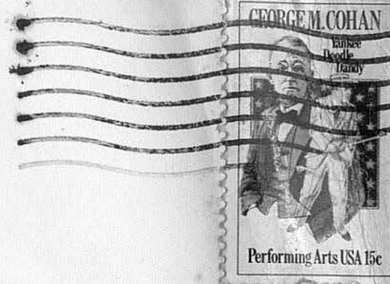
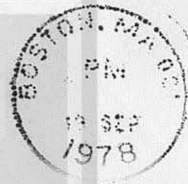
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735 1-110



Dr. S. P. Vinograd  
Life Sciences Division  
NASA Headquarters  
Washington DC 20546

SB



STATE OF ILLINOIS  
DEPARTMENT OF  
REGISTRATION AND EDUCATION  
Joan G. Anderson, Director  
Springfield

BOARD OF NATURAL RESOURCES  
AND CONSERVATION  
Joan G. Anderson, Chairman

GEOLOGY.....L. L. Sloss

CHEMISTRY.....H. S. Gutowsky

ENGINEERING.....

BIOLOGY.....Thomas Park

FORESTRY.....Stanley K. Shapiro

UNIVERSITY OF ILLINOIS

Dean William L. Everitt

SOUTHERN ILLINOIS UNIVERSITY

Vice President John C. Guyon



# ILLINOIS NATURAL HISTORY SURVEY

Natural Resources Building

Telephone: 333-6880

Urbana, Illinois 61801

Area Code 217

DR. GEORGE SPRUGEL, JR., Chief

September 11, 1978

Dr. G. Donald Whedon, Director  
National Institute of Arthritis, Metabolism,  
and Digestive Diseases  
National Institutes of Health  
Bethesda, Maryland 20014

Dear Don,

This is in response to your letter of September 7 written under the aegis of one of your other hats--that of Chairman, NASA Life Sciences Advisory Committee.

I did not respond to Sherm Vinograd's earlier letter concerning the second draft of the "Future Directions" document for NASA because I have no serious quarrel with those portions of the report which I read carefully and feel competent to evaluate.

While I did not read the remainder with such care, I did note a few typos, such as the misspelling of CELSS on page 33, para. j., line 5 and of pilot error on page 81, line 8. However, I assumed a number of folks would spot and report those trivial items.

With warm personal regards.

Sincerely yours,

*George Sprugel, Jr.*  
George Sprugel, Jr.  
Chief

GS:aa

cc: S. Vinograd

*Hi Sherm!*





## ROUTING AND TRANSMITTAL SLIP

Date

1/9/79

TO: (Name, office symbol, room number,  
building, Agency/Post)

Initials

Date

1. Dr. Vinograd ✓

2. Dr. Holloway

3. Dr. Spizizen

4. Dr. Hayes

5.

Action	File	Note and Return
Approval	For Clearance	Per Conversation
As Requested	For Correction	Prepare Reply
Circulate	For Your Information	See Me
Comment	Investigate	Signature
Coordination	Justify	

## REMARKS

This letter was missed by me (tucked under something) in my "important" pile. It is the only response we have received thus far to our LSC labor but, I trust, a significant one. Nierenberg is the new (one year) Chairman of NASA's Advisory Council.

D.W.

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)

G. Donald Wnecon, M.D., Director

National Institute of Arthritis,

Metabolism, and Digestive Diseases

Room No.—Bldg.  
9A-52/51Phone No.  
499-5677

5041-102

☆ U. S. GPO: 1978-0-261-647 3354

OPTIONAL FORM 41 (Rev. 7-76)  
Prescribed by GSA  
FPMR (41 CFR) 101-11.206



DAVID S. SAXON  
*President of the University*

WILLIAM A. NIERENBERG  
*Director*  
*Scripps Institution of Oceanography*

LA JOLLA, CALIFORNIA 92093  
Phone: (714) 452-2826  
Cable: SIOCEAN  
TWX: 910-337-1271

December 13, 1978

G. Donald Whedon, M.D.  
Director  
National Institute of Arthritis, Metabolism,  
and Digestive Diseases  
National Institutes of Health  
Bethesda, Maryland 20014

Dear Dr. Whedon:

Thank you very much for your report. I have now read it.  
I enjoyed reading it not only because of my responsibilities,  
but because of its contents and well written nature.

I think there is no question that this report will play  
an important role in our deliberations.

Sincerely,

  
William A. Nierenberg

WAN:djh

cc: Mr. Nathaniel Cohen  
Dr. John Naugle



DEPARTMENT OF  
HEALTH, EDUCATION, AND WELFARE

PUBLIC HEALTH SERVICE  
NATIONAL INSTITUTES OF HEALTH, BLDG. 31 RM. 9A52  
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HEW-394



Dr. Sherman Vinograd  
Director of Medical Sciences  
Code SBR-3  
NASA Headquarters  
Washington, DC 20546





National Aeronautics and  
Space Administration

Washington, D.C.  
20546

Reply to Attn of: SBR-3

Herewith the chrysalis - and just about on schedule. This second draft has been pretty heavily reworked, especially in the Body and Executive Summary sections. It now contains all of its parts, and appears to be permanently organized after much writing, cogitation, discussion, and rewriting by the Editorial Team.

Please examine it carefully and forward your comments via telephone or mail to Don, John, John, Harry or me. Telephone calls will be reimbursed if you forward the bills to my office. Please give special attention, not only to the part or parts you have written, but also to the Body and Executive Summary since it is most important that the views and recommendations therein represent the position of the entire Committee. The Editorial Team feels reasonably certain that major discrepancies have been ironed out through personal communications and rewrites, but please register any lingering disagreements if there are any.

With regard to the Executive Summary section, the general structure consists of a series of relatively terse recommendations, each followed (in most instances) by a short rationale. The "rationale" paragraphs will be in italics in the final version but, unfortunately, this was not possible for the draft. In some cases, the recommendations seemed clear enough not to require a statement of rationale, so what you see is not necessarily alternate paragraphs of each. The end result is that the draft gives no clues to distinguish recommendation from rationale, although each is a separate paragraph. Ergo, the Executive Summary may require a bit more effort to read, but the content of the paragraphs should make their identities apparent.





Since there will be no more Editorial Team meetings, I would particularly appreciate being kept informed of your comments. Since I will be recording all changes for the final document, I want to be certain that all comments are considered, resolved and/or incorporated by the Editorial Team, and that none is overlooked.

Please forward your corrections and observations so that we have them by September 15 because we will be "going to press" immediately thereafter. Don Whedon will add his preface when the majority of your comments are in.

I might add that NASA administration is extremely interested in this document, so much that both John Naugle and Noel Hinners have requested a copy of the second draft (with appropriate assurances that it will not be taken as final). In addition, Don was asked to attend a meeting of the NASA Advisory Council (NAC) in LaJolla on August 17-19 to give a verbal report on it.

This final stage of our LSAC project is perhaps the easiest, but probably also the most important. Considering that the report will not only consist of the advice and observations themselves, but will also represent the face of the life sciences community in giving them, such relative subtleties as syntax, balance, smoothness, shades of meaning, anticipated effects, etc. will also merit attention. In my own opinion, the Committee has a very respectable, even formidable, document in the making here. Advocacy is strong and justified but not out-sized, and both positive and negative points are, for the most part, properly tempered, supported by the commentary and constructively stated. I believe the content clearly reflects the uniquely detailed insight which this Committee has into the activities of the NASA Life Sciences.

Only the final stage of maturation to adulthood remains ("adulthood" should really be a legitimate word) and that should yield to no more than a few hours of concentrated effort, even including time to adapt to this odd ball MTSC manuscript.

Strangely enough, we still do not have a new LSAC, but we expect a flurry of action to take place in this regard just after the NAC meeting.

Again, all of your work on the Committee is most sincerely appreciated.

With best regards,

S. P. Vinograd, M.D.  
Director Medical Sciences  
Life Sciences Division  
Executive Secretary, LSAC





Dr. Vinograd

November 30, 1978

Dr. Robert A. Frosch  
Administrator, National Aeronautics  
and Space Administration  
NASA Headquarters (Code A)  
Washington, DC 20546

Dear Dr. Frosch:

I take pleasure in sending you a copy of the review, just completed, of the NASA Life Sciences Program by the Life Sciences Advisory Committee of the NASA Advisory Council. The Committee examined as closely as an "outside" group can, the past and present activities and responsibilities of Life Sciences, but it did so with the intent of helping the Administrators of NASA to look positively toward the future, as indicated by title of the Report, "Future Directions for the Life Sciences in NASA."

As written in the Preface, the purposes of the study by the Committee were:

- (1) to provide NASA management with a concise picture (as we see it) of the major elements of the Life Sciences program and problems,
- (2) to indicate the special, singular nature of the biological/medical concerns and efforts within the engineering and physical science programs which make up the bulk of NASA's activities, and
- (3) to provide a series of suggestions in recommendation form as a basis for attempting to handle more effectively the important responsibilities of Life Sciences.

While we hope that you will read as much of the Report as possible, since with the aid of Appendices a fairly comprehensive picture of Life Sciences activities is provided, your principal initial interest is likely to be focused on the first sections and particularly upon the Executive Summary. Therein appear a number of general and specific recommendations, each followed (*in italics*) by its rationale or background. Such criticisms as may be implied are entirely intended to be constructive. We trust that they will be viewed clearly as suggestions with a helpful design.



Page 2 - Dr. Frosch, November 30, 1978

The Committee joins me in expressing full enjoyment of our experience with NASA staff and the hope that earlier as well as now we may have provided useful service. As you possibly are aware, most of us have completed our appointments with this Report. If any amplification, explanation or discussion of any section of the Report would seem valuable, we shall, of course, be available to provide such comment, either in writing or in person.

With all best wishes.

Sincerely yours,

G. Donald Whedon, M.D.  
Director

National Institute of Arthritis,  
Metabolism, and Digestive Diseases  
and

Chairman, Life Sciences Advisory Committee

Enclosure

cc:

Dr. Sherman P. Vinograd ✓





IDENTICAL LETTERS SENT TO:

Dr. Robert A. Frosch  
Administrator, National Aeronautics  
and Space Administration  
NASA Headquarters (Code A)  
Washington, DC 20546

Dr. Alan M. Lovelace  
Deputy Administrator  
National Aeronautics and  
Space Administration  
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Washington, DC 20546

Dr. John E. Naugle  
Chief Scientist  
National Aeronautics and  
Space Administration  
NASA Headquarters (Code P)  
Washington, DC 20546

Dr. Noel W. Hinners  
Associate Administrator for Space Sciences  
National Aeronautics and Space Administration  
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Director  
Scripps Institution of Oceanography  
University of California, San Diego  
Mail Code A-010  
LaJolla, CA 92093

cc:

Dr. Sherman P. Vinograd  
Director of Medical Sciences  
National Aeronautics and  
Space Administration  
NASA Headquarters (Code SBR-3)  
Washington, DC 20546





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HEALTH, EDUCATION, AND WELFARE

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Dr. Sherman P. Vinograd  
Director of Medical Sciences  
National Aeronautics and  
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Washington, DC 20546





# *The Connecticut Agricultural Experiment Station*

123 HUNTINGTON STREET BOX 1106 NEW HAVEN, CONN. 06504 (203) 787-7421

*Founded 1875*

*Putting science to work for society*

Dec, 12, 1978

S.P. Vinograd MD  
NASA  
Washington, D.C.

Dear Sherm,

Thanks **y**ou for your v~~ery~~ nice letter to the committee.  
Like you, I hope that it is useful to NASA.

Sherm, if we worked well together, it is due in large part to the climate that you provided for us. You are a bright and able guy, and it shows in your relations with the committee. It has been my pleasure to work with you.

Yours sincerely

James G. Horsfall





The Connecticut Agricultural  
Experiment Station  
P. O. Box 1106  
New Haven, Connecticut 06504



S.P. Vinograd MD

National Aeronautics and Space Administration

Washington, D. C. 20546

SB





STANFORD UNIVERSITY MEDICAL CENTER

STANFORD, CALIFORNIA 94305 • (415) 497-2300

STANFORD UNIVERSITY HOSPITAL  
Endocrinology/Hypertension  
Room M-204

September 12, 1978

S.P. Vinograd, M.D.  
Director Medical Sciences  
Life Sciences Division  
Executive Secretary, LSAC  
National Aeronautics and Space  
Administration SBR-3  
Washington, D.C. 20546

Dear Dr. Vinograd:

I thoroughly enjoyed reading the second draft of the "Future Directions" document of the LSAC-NASA. I feel that the manuscript is generally excellent and I extend my congratulations to the Editorial Committee.

I have only two corrections to make. (1) On page 24 (Cardiovascular), fifth line from the bottom, the last word should be hypotension (not hypertension); (2) on page A-40, second paragraph, third line from the end, the word "encumbrance" is misspelled.

I am delighted with the results of our efforts and again wish to convey my congratulations to the Committee.

With best wishes,

Sincerely yours,

John Luetscher, M.D.

JAL:dr

*Copy to Dr. Whedon*







# *The Connecticut Agricultural Experiment Station*

123 HUNTINGTON STREET BOX 1106 NEW HAVEN, CONN. 06504 (203) 787-7421

*Founded 1875*

*Putting science to work for society*

Sept. 8, 1978

Dr. S.P. Vinograd

NASA

Dear Dr. Vinograd,

Thanks for the semifinal copy of our report. It shows the results of much cogitation. As far as I can see, it is in elegant shape.

Good hunting. Good luck.

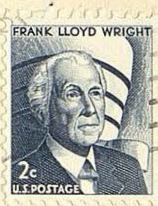
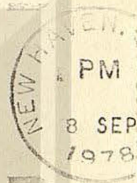
Yours sincerely

James G. Horsfall





The Connecticut Agricultural  
Experiment Station  
P. O. Box 1106  
New Haven, Connecticut 06504



Dr. S.P. Vinograd

NASA

Washington, D.C. 20546

SB





AN ADDITIONAL CRITERION WHICH MUST BE ~~THE~~  
GIVEN SERIOUS CONSIDERATION STEMS FROM THE FACT THAT  
THE AIRSPACE ORIENTATION OF THE LIFE SCIENCES  
PROFESSIONS IS UNIQUE TO THE USUAL INTERESTS AND  
CONCERN OF THE LIFE SCIENCES COMMUNITY, ITSELF.

IT IS FOR THIS REASON THAT THE NASA LIFE SCIENCES MUST  
BE IN A <sup>PRESTIGIOUS ENOUGH</sup> ~~PERIOD~~ POSITION TO <sup>LEAD AND</sup> ~~SUPPORT~~ THE SPACE ORIENTED  
SPECIALIZATION OF ITS COMPONENT DISCIPLINES IF FUTURE  
COMPETENCE IS TO BE ASSURED.



# ROUTING AND TRANSMITTAL SLIP

Date

9/17/78

TO: (Name, office symbol, room number, building, Agency/Post)		Initials	Date
1.	LSAC Editorial Team		
2.	<i>Dr. Vinograd</i>		
3.			
4.			
5.			

Action	File	Note and Return
Approval	For Clearance	Per Conversation
As Requested	For Correction	Prepare Reply
Circulate	For Your Information	See Me
Comment	Investigate	Signature
Coordination	Justify	

## REMARKS

Since our LSAC editorial team is limited to one day, beginning at 9 a.m. in 9A52 of Building 31 at NIH, and I shall be a little late (welcoming speech at a symposium elsewhere in the building) and Harry H. has to leave at 1 p.m., the attached material is offered as an agenda or track to follow, at least to start. It covers only the Exec. Summary section but also lists some general problems.

Don Whedon

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
G. Donald Whedon, M.D., Director	9A-52/51
National Institute of Arthritis,	Phone No.
Metabolism, and Digestive Diseases	496-5877

5041-102

★ U.S. GPO: 1977-241-530/3152

OPTIONAL FORM 41 (Rev. 7-76)

Prescribed by GSA  
FPMR (41 CFR) 101-11.206

Executive Summary

Number the recommendations ? 1, 2, 3, 4, etc.

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DEPARTMENT OF  
HEALTH, EDUCATION, AND WELFARE

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HEW-394



Dr. Sherman Vinograd  
Director of Medical Sciences  
Code: SBR-3  
NASA Headquarters  
Washington, DC 20546

SPECIAL  
ATTENTION





THE UNIVERSITY OF ROCHESTER

## MEDICAL CENTER

SCHOOL OF MEDICINE AND DENTISTRY • SCHOOL OF NURSING  
STRONG MEMORIAL HOSPITAL

601 ELMWOOD AVENUE  
ROCHESTER, NEW YORK 14642  
AREA CODE 716

DEPARTMENT OF RADIATION BIOLOGY  
AND BIOPHYSICS

1 September 1978

S. P. Vinograd, M.D.  
Director Medical Sciences  
Life Sciences Division  
Executive Secretary, LSAC  
National Aeronautics and Space Administration  
Washington, DC 20546

Dear Sherm:

I have read the second draft of the LSAC report and am writing to suggest some minor changes in the section on Blood. In general the suggestions have to do with diplomacy.

### Suggestions:

Page A-50, line 8: Insert "were" after hemolysis. Remove parentheses, place period after series, line 9. Omit "were not sustained". Capitalize "the" to make a new sentence: "The experience in the Skylab ...".

Page A-55, line 18: Omit "regulation". Line 19, insert "for simulation" after potential of line 18. Omit the model. The sentence should read: "It appears to have limited potential for simulation in that current understanding of erythropoiesis has major limitations." Omit the sentence in parentheses, "Effective simulations ...".

Page A-57, ¶B: Omit the sentence: "Some senior people are highly regarded, e.g., Crosby of Scripps."

Page A-58, line 4: Change efforts on to "studies of".

Page A-59, line 8: endothelium.

Page A-60, ¶3, line 2: "stress, composition of atmosphere and exercise/rest".

In the revised section on Radiation, I offer these comments:

Page A-64: Is it wise to refer to the National Academy of Sciences Report, or should this LSAC report be entirely free standing and



inclusive of all necessary information without need for reference to other publications?

Page A-66, ¶2: The paragraph is confusing. The first sentence describes three regions of HZE tracks, but the subsequent discussion does not unambiguously consider the three.

Further, I'm not convinced that the figures and tables are necessary or desirable, particularly since the other sections of the appendix do not utilize this format.

Best wishes in your work!

Sincerely,



Paul L. La Celle

PLL/lw





RADIATION BIOLOGY AND BIOPHYSICS  
SCHOOL OF MEDICINE AND DENTISTRY  
THE UNIVERSITY OF ROCHESTER  
ROCHESTER, NEW YORK 14642 U.S.A.



*Research  
And  
Education*



S. P. Vinograd, M.D.  
Director Medical Sciences  
Life Sciences Division  
Executive Secretary, LSAC  
National Aeronautics and Space Administration  
Washington, DC 20546

SB

ITEMS FOR PARTICULAR DISCUSSION ON 9/21/78 - WHEDON

Executive Summary

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The Life Sciences Program of NASA is complex, highly diverse, and fundamentally important to NASA's major goals. The importance of the program lies mainly in its support of basic biological research <sup>want</sup> relative to space, and of studies to supply the knowledge necessary to support and maintain the health of man whenever and wherever he goes in space. It supports and facilitates the national life sciences community in its utilization of space for scientific achievement, and it facilitates advancement of specialized areas of fundamental and forward-looking research in biology, the medical sciences and biomedical technology which fall uniquely within NASA's goals and objectives. <sup>THE LIFE SCIENCES PROGRAM</sup> It is central to these NASA responsibilities as well as to certain specific issues, such as planetary quarantine and protection, and to several supporting functions, such as providing guidance and direction on biomedical aspects of technology utilization, earth resources applications, and earth ecology concerns and obligations. <sup>THE HUMAN ASPECTS OF</sup> This relatively small program <sup>AT WELL AS CONCERNS ABOUT THE LEVEL OF LIFE IN THE UNIVERSE GIVES THE LIFE SCIENCES A</sup> has additional and unique significance out of proportion to its size because of public and Congressional interest in <sup>THESE MATTERS.</sup> the human side of achievements in space and because of the potential spin-off of space medicine technology to both medical practice and biomedical research on Earth.

In the view of the Life Science Advisory Committee, from its analysis described in this report, NASA should provide more attention and firm support to this program and should develop ways for it to function more effectively.



The Committee believes that the most useful way to optimize its review and make it meaningful to NASA management is to present a series of recommendations, each followed by its rationale (except where none is needed). This summary begins with a presentation of general recommendations concerning the operation and

alternative for  
page 55

The Life Sciences Program of NASA is complex, highly diverse, and fundamentally important to NASA's major goals. The importance of the program lies mainly in its support of <sup>BASIC BIOLOGICAL</sup> exobiological research and <sup>RELATIVE TO SPACE</sup> ~~of~~ studies to supply the knowledge necessary to support and maintain the health of man whenever and wherever he goes in space. <sup>IT SUPPORTS AND FACILITATES</sup> ~~It has further importance in~~ <sup>THE USE OF SPACE FOR SCIENTIFIC ACHIEVEMENT BY</sup> ~~its support and facilitation of~~ the National life sciences community <sup>IN ITS UTILIZATION OF SPACE FOR SCIENTIFIC ACHIEVEMENT</sup> ~~to utilize space for scientific achievement, and in~~ <sup>FACILITATES</sup> ~~its function to~~ advance <sup>PART OF</sup> specialized areas of fundamental and forward-looking research in biology, the medical sciences and biomedical technology which fall uniquely within NASA's goals and objectives. It is central to these NASA responsibilities as well as <sup>TO</sup> ~~1~~ certain specific issues, such as planetary quarantine and protection, and to several supporting functions, such as providing guidance and direction on biomedical aspects of technology utilization, earth resources applications, and earth ecology concerns and obligations. This relatively small program has additional and unique significance out of proportion to its size because of public and Congressional interest in the human side of achievements in space and because of the potential spin-off of space medicine technology to both medical practice and biomedical research on Earth.

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## INSTRUCTIONS FOR READING IBM MTSC MANUSCRIPT

The manuscript enclosed for your review has been typed on our IBM MTSC input typewriter. As a result, it contains numerous coding notations which should be disregarded when reading the copy. However, for your information, the function of these codes is explained below:

1. Disregard all superfluous s's and commas: these are simply signals which stop the typesetting element of the device and permit the operator to change type fonts, insert figures, and so forth.
2. Disregard x's: they are reference codes.
3. Disregard j's: they allow for margin justification.
4. Disregard c's: they allow for centering of headings.
5. Disregard l's: they allow for flush left headings.

One final note: The section of this manuscript titled "Executive Summary" is written so that each section contains recommendations and rationale for these recommendations. The rationale will be set in italics (and is so coded). This copy will not show these different types.

The right-hand margin of the Executive Summary has been marked (R) and (I). The (R) is a recommendation segment, the (I) is a rationale. This may help you in reading the MTSC copy. These notations were made after Dr. Vinograd's letter was written (reference paragraph 3).





# RICE UNIVERSITY

HOUSTON, TEXAS

77001

DEPARTMENT OF  
ENVIRONMENTAL SCIENCE AND ENGINEERING

P.O. BOX 1892  
TEL: (713) 527-8101

September 13, 1978

Dr. S. P. Vinograd  
Director of Medical Sciences  
Office of Life Sciences  
Headquarters, National Aeronautics and  
Space Administration  
Washington, D. C. 20546

Dear Sherm:

My comments on the second draft of our report, "Future Directions for the Life Sciences in NASA," are as follows:

- ✓ DISCREPANCY
1. In the introduction to Medical Sciences (p.22) the point should be clearly made that, although there is a gravitational biology program within Life Sciences with both basic and applied objectives, it will be desirable and probably mandatory that NASA use animal models to study and elucidate such phenomena as bone and muscle loss, fluid and electrolyte shifts, blood changes and the effects of and protection from radiation. I believe this concept is very important to rapid progress in solution of "man in space problems" and making it clear in the medical sciences section should add significant justification for further space flight experiments e.g. Spacelab, Shuttle/Salyut, Space Science Platform.
  2. Last paragraph p. 14 and last paragraph on p. 57-58.  
✓ WHEN WE  
DEAL WITH  
TEAM  
Too much has been made of the "merit" of the large NIH review system for NASA's purposes and the small review system under AIBS sponsorship. NASA gets what NASA pays for and they are paying AIBS to form small committees now. At one time, starting in about 1968, the AIBS formed several large specialty area life sciences committees for peer review of proposals and the committees did a superior job and they did have the breadth and expertise required. The committees ranged from physical biology to environmental biology and from microbes and plants to man. NASA never had a better SR&T program than during that time. The tone of the present statements results in

praise for NIH and an unwarranted, and I assume unintended, slap at the AIBS.

- ✓ 3. Last paragraph, p. 33.

Modify the last sentence and add an additional sentence as follows:

*Incl.*

Much information needs...technology: atmosphere control and regeneration, water purification and reuse, waste control and conversion and food production and processing. Progress in these areas will require basic ~~and applied~~ research in several more conventional areas such as microbiology, plant and animal physiology, agriculture, and closed system ecology.

CELSS not CELLS in line 5 same paragraph.

- ✓ 4. Last sentence, paragraph 1, p. 40.

*NO - Hayes*

Add the following sentence to paragraph 1:

However, this is not to say that fundamental research in the biological sciences does not contribute (and in many cases is necessary for) achievement of applied objectives. Examples are use of animal models for understanding health effects on man and basic physiology, growth and development studies on plants and animals to provide the basis for regenerative life support system development.

- ✓ 5. Last sentence, paragraph 2, p. 41.

Please substitute the following for the last part of subject sentence:

*Accept. Incl. Hayes*

...results impossible, and space biology has, as a consequence, gotten a "bad name" in some quarters.

- ✓ 6. Last two sentences, paragraph 2, p. 46.

*Accept. Incl.*

Substitute the following two sentences for those cited above:

A specialized plant experimental facility of limited scope and flexibility is being prepared. The plant facility as presently planned will have limited ability to support other plant investigations.

- ✓ 7. 2nd line, paragraph 1, p. 56.

*OK*

...Summary presents a series of...





✓ 8. 5th line, paragraph 1, p. 57.

OK  
...isolated from biomedical/bioscience input...

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SECTION OF  
REFERENCES  
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✓ 10. 1st line, paragraph 2a, p. 71.

REVISION  
utilization of joint terrestrial and animal models...

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REJECT  
Hypers  
A similar sentence, indicating that gravitational biology will contribute to the Medical Sciences, should be placed in the Executive Summary section on the Space Biology program. Every effort should be made to show the interrelatedness of life sciences programs which supports the philosophy of an integrated approach to the life sciences.

✓ 12. 5th line, paragraph 2, p. 80.

OK  
We will never have "entirely closed" systems. Suggest, ... system will be a regenerative, self-perpetuating independent system...

✓ 13. Space Biology, paragraph 2, p. 83.

Request substitution of the following for the present verbiage:

The program in Space Biology should be viewed as 1) primarily concerned with studying the unique effects of the space environment, especially gravity, on the physiology, growth, development and evolution of earth organisms, 2) responsible for development of the basic scientific information required for successful development of regenerative life support systems, and 3) a demonstration of the possible benefits of experimentation in space.

These limited objectives are consistent with the general goals of the Agency and with the fact that a broad research program in, for example, developmental biology, is clearly inappropriate within NASA. Planning of the above named activities requires special care, with the scope of the research topics being carefully specified to meet the stated objectives. A carefully structured program in Gravitational Biology can be fully consistent with this policy.®

✓ 14. 5th line, paragraph 1, p. C-6.

OK  
Hoyes  
...with a few notable exceptions...

✓ 15. 3rd sentence, paragraph 2, p. C-9.

Revised  
Hoyes  
Substitute the following sentence:

A few outstanding experiments have been performed; however, mission durations have generally been too short to permit the most important questions to be asked.

✓ 16. After line 6, paragraph 1, p. C-10.

Revised  
Hoyes  
Insert the following sentence after the sentence ending on line 6:

Such fundamental studies will provide much of the basis for understanding man's physiology and function in space environments. Research in...

Sherm, I feel strongly about the substantive changes I have recommended, especially about the space biology program and the implied criticism of the AIBS, otherwise I would not have responded to Don's letter requesting that replies be in the mail by the 15th. I received his letter in the afternoon mail on the 12th and must leave Houston for five days on the afternoon of the 14th. Hence, I have not had time to read the entire manuscript, which I had hoped to do.

The Editorial Team deserves many accolades, flowers, martinis and several blasts from trumpets for a job well done. I trust that my suggestions will receive favorable consideration. After only a brief review of the manuscript, I feel rewarded for the time and effort spent in my participation. We have produced a much needed document.

Sincerely,

*Ward*

C. H. Ward  
Professor

CHW/ml





**DEPARTMENT OF  
HEALTH, EDUCATION, AND WELFARE**

**PUBLIC HEALTH SERVICE  
NATIONAL INSTITUTES OF HEALTH, BLDG. 31 RM. 9A52  
BETHESDA, MARYLAND 20014**

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Dr. Sherman Vinograd  
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Washington, DC 20546



STANFORD UNIVERSITY MEDICAL CENTER

STANFORD, CALIFORNIA 94305 • (415) 497-2300

STANFORD UNIVERSITY HOSPITAL

September 12, 1978

Endocrinology/Hypertension  
Room M-204

G. Donald Whedon, M.D.  
Chairman, Life Sciences Advisory Committee,  
NASA  
Department of Health, Education, and Welfare  
Public Health Service  
National Institutes of Health  
Building 31, Room qA52  
Bethesda, Maryland 20014

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I am delighted with the results of our efforts and again wish to convey my congratulations to the Committee.

With best wishes,

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JAL:dr

*Copy to Dr. Vinograd*



6/8/78



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We will never have "entirely closed" systems. Suggest, ... system will be a regenerative, self-perpetuating independent system...

13. Space Biology, paragraph 2, p. 83.

Request substitution of the following for the present verbiage:

The program in Space Biology should be viewed as 1) primarily concerned with studying the unique effects of the space environment, especially gravity, on the physiology, growth, development and evolution of earth organisms, 2) responsible for development of the basic scientific information required for successful development of regenerative life support systems, and 3) a demonstration of the possible benefits of experimentation in space.

These limited objectives are consistent with the general goals of the Agency and with the fact that a broad research program in, for example, developmental biology, is clearly inappropriate within NASA. Planning of the above named activities requires special care, with the scope of the research topics being carefully specified to meet the stated objectives. A carefully structured program in Gravitational Biology can be fully consistent with this policy.



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...with a few notable exceptions...

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Substitute the following sentence:

A few outstanding experiments have been performed; however, mission durations have generally been too short to permit the most important questions to be asked.

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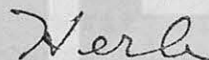
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Such fundamental studies will provide much of the basis for understanding man's physiology and function in space environments. Research in...

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Sincerely,



C. H. Ward  
Professor

CHW/ml





BROOKHAVEN NATIONAL LABORATORY  
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Upton, New York 11973

Office of the Director

(516) 345- 3332

September 13, 1978

G. Donald Whedon, M.D.  
Director  
National Institute of Arthritis,  
Metabolism and Digestive Diseases  
Department of Health, Education and Welfare  
National Institutes of Health  
Bethesda, Maryland 20014

Dear Don:

Many thanks for your letter of 7 September. I have scanned the report, and have read carefully the "Executive Summary," and of course my section on possible effects of space ionizing radiations. I have no changes to suggest in my section, largely because Sherm Vinograd and I have gone over it rather carefully in the past.

With respect to the Executive Summary, I have only a few comments concerning mainly the manner of presentation.

Page 55, second and third lines. Both "and extremely important," and "basic" <sup>YES</sup> ~~NO~~ represent red flags to some readers, and could be omitted without loss. The "extremely important" is really for the reader to judge, and the "basic" can be a turn off particularly to the reader oriented narrowly to the mission of NASA.

Page 55, line four from the bottom. Omit "and make it meaningful to" and substitute "for." <sup>NO</sup> Unnecessary, and makes it sound like NASA management has difficulty grasping ideas.

Pages 56 and 57. It would seem to me quite useful to put the entire "use of consultants" part closer to the end of "General Recommendations," and put the inhouse material first. It comes across as almost selfserving to have the first recommendations having to do with increasing the role of outside consultants and groups, especially LSAC. <sup>YES</sup>

Page 57, lines four and five. Delete the statement that the director is relatively isolated from biomedical input, and substitute the purpose of broadening inhouse capability. It comes across now as a real defect in the director, if he can't keep in contact. <sup>NO</sup>

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September 13, 1978

Page 61, second paragraph, last line. Change "performance" to "output" or some such. It sounds like present personnel aren't performing very well. *DATE*

Page 61, line six from the bottom. Change "just" to marginally." *YES*

Page 69, line three. Change "--using specialized accellerators with--," to, "using available specialized accellerators, of--." *YES - OUT*

Any reader would have to, and certainly I am impressed with the quality and extent of the recommendations made. They make a great deal of sense, and I expect that this report will be a definitive one with a sizable impact.

With best regards, I am

Sincerely yours,

*V. P. Bond*

V. P. Bond, M.D.  
Associate Director

ed1





# RICE UNIVERSITY

HOUSTON, TEXAS

77001

DEPARTMENT OF  
ENVIRONMENTAL SCIENCE AND ENGINEERING

P.O. BOX 1892  
TEL.: (713) 527-8101

September 13, 1978

Dr. S. P. Vinograd  
Director of Medical Sciences  
Office of Life Sciences  
Headquarters, National Aeronautics and  
Space Administration  
Washington, D. C. 20546

Dear Sherm:

My comments on the second draft of our report, "Future Directions for the Life Sciences in NASA," are as follows:

1. In the introduction to Medical Sciences (p.22) the point should be clearly made that, although there is a gravitational biology program within Life Sciences with both basic and applied objectives, it will be desirable and probably mandatory that NASA use animal models to study and elucidate such phenomena as bone and muscle loss, fluid and electrolyte shifts, blood changes and the effects of and protection from radiation. I believe this concept is very important to rapid progress in solution of "man in space problems" and making it clear in the medical sciences section should add significant justification for further space flight experiments e.g. Spacelab, Shuttle/Salyut, Space Science Platform.
2. Last paragraph p. 14 and last paragraph on p. 57-58.  
Too much has been made of the "merit" of the large NIH review system for NASA's purposes and the small review system under AIBS sponsorship. NASA gets what NASA pays for and they are paying AIBS to form small committees now. At one time, starting in about 1968, the AIBS formed several large specialty area life sciences committees for peer review of proposals and the committees did a superior job and they did have the breadth and expertise required. The committees ranged from physical biology to environmental biology and from microbes and plants to man. NASA never had a better SR&T program than during that time. The tone of the present statements results in

praise for NIH and an unwarranted, and I assume unintended, slap at the AIBS.

3. Last paragraph, p. 33.

Modify the last sentence and add an additional sentence as follows:

Much information needs...technology: atmosphere control and regeneration, water purification and reuse, waste control and conversion and food production and processing. Progress in these areas will require basic and applied research in several more conventional areas such as microbiology, plant and animal physiology, agriculture, and closed system ecology.

CELSS not CELLS in line 5 same paragraph.

4. Last sentence, paragraph 1, p. 40.

Add the following sentence to paragraph 1:

However, this is not to say that fundamental research in the biological sciences does not contribute (and in many cases is necessary for) achievement of applied objectives. Examples are use of animal models for understanding health effects on man and basic physiology, growth and development studies on plants and animals to provide the basis for regenerative life support system development.

5. Last sentence, paragraph 2, p. 41.

Please substitute the following for the last part of subject sentence:

...results impossible, and space biology has, as a consequence, gotten a "bad name" in some quarters.

6. Last two sentences, paragraph 2, p. 46.

Substitute the following two sentences for those cited above:

A specialized plant experimental facility of limited scope and flexibility is being prepared. The plant facility as presently planned will have limited ability to support other plant investigations.

7. 2nd line, paragraph 1, p. 56.

...Summary presents a series of...





8. 5th line, paragraph 1, p. 57.

...isolated from biomedical/bioscience input...

9. 8th line, paragraph 2, p. 64.

has not had

10. 1st line, paragraph 2a, p. 71.

utilization of joint terrestrial and animal models...

11. 2nd sentence, paragraph 3, p. 73.

A similar sentence, indicating that gravitational biology will contribute to the Medical Sciences, should be placed in the Executive Summary section on the Space Biology program. Every effort should be made to show the interrelatedness of life sciences programs which supports the philosophy of an integrated approach to the life sciences.

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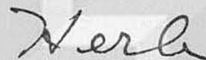
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HOUSTON, TEXAS

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SB-3

Dr. S. P. Vinograd  
Director of Medical Sciences  
Office of Life Sciences  
Headquarters, National Aeronautics and  
Space Administration  
Washington, D. C. 20546

## PREFACE

Although the time period, 20 years, since man's first entry into space is brief in terms of the known history of man on this planet, it is nevertheless a considerable span of years for a scientific endeavor. During this span the achievements have been extraordinary, from thoroughly reliable, repeated insertions of spacecraft into orbit, through well-controlled safe returns to Earth, linkage of vehicle to vehicle in space, several landings on and safe return from the Moon, ~~to~~ comfortable and productive orbital flights of up to three months. In all of this endeavor of spectacular engineering, ~~the biomedical aspects have necessarily been limited~~ <sup>TO SUPPORT THE ANALYSIS OF DATA AND RECORDING OF BIOLOGICAL ACTIVITY</sup> <sup>AND SECOND, THE DEVELOPMENT OF BIOLOGICAL EXPERIMENTAL PROCEDURES</sup> <sup>COLLECTED WITH</sup> mainly ~~to~~ the requirements for human safety during the flights thus far conducted. Not until the Skylab flights ~~was~~ <sup>BE</sup> a substantial effort mounted ~~to begin~~ <sup>1</sup> to observe with some precision human performance and physiological/medical functions in the strange environment of space. Outlines became visible but much substance remains to be filled in to make the picture clear. Now, as the requests for approval and support of experiments are beginning to come in for the Shuttle/Spacelab Program, we are at the threshold of a fine opportunity, in a more definitive effort, to learn how man's life functions and ~~other~~ <sup>OTHER</sup> fundamental biological processes are affected by weightlessness and other special characteristics of space. Even though the flights thus far planned are of short duration, the possibility is there to find significant leads for more specific life science studies in flights of longer duration--which hopefully will be supportable and conducted in the later 1980s.

®



Biological and medical consultation has been available to NASA in various forms, usually ad hoc, since the early 1960s. Formal establishment of the Life Sciences Advisory Committee took place in 1971. Since then the Committee has given the Director of Life Sciences and NASA administration a variety of recommendations on ~~particular subjects~~ <sup>PARTICULAR BIOLOGICAL ACTIVITIES</sup> as needed at the time. Finally, however, the Committee about 18 months ago decided to undertake an organized, extensive review of the Life Sciences Programs. A series of meetings of the full Committee and more recently of an editorial team has produced the present document.

The Committee was aware of a concurrent study being conducted by a special committee chaired by Dr. Neal Bricker, sponsored by the Space Science Board, Assembly of Mathematical and Physical Sciences, National Research Council/National Academy of Sciences. Some exchange of information took place between that study group and this Committee through attendance of two members of this Committee for a short time at the Snowmass workshop in August 1977, but the SSB/NAS Report has not yet been released as of the time of submission for publication of this Report.

The purpose of this study and accompanying Report, "Future Directions for the Life Sciences in NASA," is

- (1) to provide NASA management with a picture <sup>(as we see it)</sup> in one relatively concise document of the major elements of the Life Sciences program and problems,
- (2) to indicate the special singular nature of the biological/medical concerns and efforts among the engineering and physical science programs which make up the bulk of NASA's activities, and

(3) to provide a series of suggestions in recommendation form as a basis for attempting to handle more effectively the important responsibilities of Life Sciences.

<sup>abt</sup>  
~~Since few recommendations are likely to be easily effected, the usefulness of this document will likely be mainly as points of reference for dialogue and discussion, directed toward implementation.~~  
*WE BELIEVE, PRINCIPAL PRACTICAL IDEAS*  
*IMPLEMENTATION TO LIFE SCIENCES*  
*REVIEW OF THE LIFE SCIENCES, FOCUSING ON FUTURE NASA ACTIVITIES*

This Report is the final effort of most members of the current Life Sciences Advisory Committee, a major turnover of the Committee being anticipated. It is suggested that future LSAC members should, from time to time, review, revise and update this Report, as a means of stimulating a continuing, dynamic vitalization of Life Sciences programs and activities.

The Report is organized in two volumes; Volume I is essentially the body of the Report, and Volume II is a set of appendices which provide discussion in depth of the various program areas of Medical Sciences, Biomedical Systems and Operation, Biological Sciences and Payloads and Applications. The recommendations of the Committee are given in the Executive Summary; <sup>THESE ARE THE</sup> ~~they~~ and their accompanying rationales are presented in bare skeletal form, the detailed background being in the Appendices. Volume I also contains a section on Status and Projections in relatively slender form and closes with Perspective<sup>s</sup> for what we hope will be a healthy future for the Life Sciences in NASA.

<sup>THESE ARE THE</sup>  
I wish to express thanks to the members of the Committee for their intensely interested participation in the preparation of this Report <sup>and</sup> and, for the Committee, gratitude also to the many members of NASA Life Sciences staff who provided extensive information and data, not merely during the time of preparation of this Report but in excellent briefings and discussions at meetings of the Committee over the past several



years. I would especially like to convey the appreciation of the Committee to its Executive Secretary, Dr. Sherman P. Vinograd for his untiring and meticulous efforts in the preparation of this Report. The Committee acknowledges the fine work of Biotechnology, Inc. in final preparation and publication.

G. Donald Whedon, M.D., Chairman  
Life Sciences Advisory Committee

