

MEMORANDUM

July 17, 1962

To: Raymond Bacchetti
Graduate Division

From: Joshua Lederberg
Genetics Department

This is in reply to your memorandum of July 12 concerning the preparation of a University-wide proposal to the National Aeronautics and Space Administration.

1. Space research projects in the Department of Genetics:

The exobiology laboratory has been organized within the Genetics Department with substantial support from NASA (Grant No. NSG 81-60). The purpose of the work in this laboratory is to establish the most effective approaches to the detection of planetary life, especially on Mars, through instrumentation to be landed on the surface of the planet in the Mariner and Voyager missions. We have been investigating the development of sensitive detection systems for enzymes, protein and nucleic acids from a functional, compositional and morphological standpoint. These devices would gather surface samples and conduct their analyses automatically, providing signals for telemetry from the planet back to the earth.

Our responsibilities fall in the following areas:

1. The evaluation of the relevance of targets for analytical determination.
2. The refinement of analytical procedures and their adaptation to the constraints of a planetary mission.
3. The design and development of prototype instrumentation.
4. The development of capability for authoritative advice on the fabrication of the flight instrumentation and on its integration into the space program.

To help serve these aims, the laboratory has two sections, a biochemical microbiological one, and an instrumentation-engineering one. These groups are working closely together with one another and in association with the other biochemical and instrumentational activities of the Genetics Department.

NASA - Training Grant

2. Utilization of doctoral students and faculty:

At the present time we do not have a doctoral program explicitly designed for the training of Ph. D. candidates in space research. Under our present program, however, a student interested in exobiology could pursue a degree program in genetic chemistry of terrestrial microorganisms and maintain close continuing contact with the exobiology program. The programmatic risks in actual exobiological studies are much too hazardous to warrant assigning doctoral students to them; instead, their studies can be directed to tangible programs in terrestrial biochemistry which may be expected to have a direct impact on the continuing development of exobiology. As we already have substantial fellowship support from the National Institutes of Health, the most appropriate application of NASA training grant support would probably be for students electing a mixed program with another department, for example Electrical Engineering, which might be related to our exobiological program through common instrumental interests. In future years, however, research training support more directly related to exobiology may also be desirable.

We may expect more pertinent requirements in the field of instrumentation. NASA has given preliminary approval to our application for facilities support for a laboratory of biomedical instrumentation which will be partly devoted to the development of improved instrumentation for exobiology, and partly for the more extensive application of such developments in other fields of biology and medicine. On the academic side, we anticipate cooperative arrangements with several of the engineering departments to enable doctoral students to react to the challenges of biomedical instrumentation. Within the framework of the present NASA training grant program, I would suggest that one or two of the traineeships be indicated as an allocation to this objective, leaving for future years more comprehensive training support.

We are hoping that NASA will eventually broaden the terms of its training grant program to include different kinds of opportunities than are already available to us from other sources - for example, the support of foreign fellows at any of several levels, and particularly, special fellowships for talented engineers with practical more than academic experience, who are interested in moving into exobiological and biomedical instrumentation.

I am enclosing some additional material that may help to illuminate the directions of our work.

JL:edf

cc: Dr. Levinthal

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