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Robert Shaffer  
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Genetics

**Facilities Grant Final Report**

The purpose of this memo is to provide information for the final report on the NASA facilities grant, more specifically, topic 5 of the Donald C. Holmes letter of December 14, 1965.

The new NASA portion of the Clinical Sciences Building houses research programs which involve the work of such persons as Dr. Joshua Lederberg, Dr. Elliott Levinthal, Dr. Barthold Halpern, Dr. John Westley, Dr. Sidney Liebes, and Dr. Lubert Stryer. There are, of course, many other persons involved directly and indirectly in the NASA programs, including those in interdisciplinary activities.

In response to topic 6, which concerns progress made by the grantee towards the goals established in the Memorandum of Understanding, Dr. Levinthal had described some of the research programs, their goals, and the values which are accruing to the research community and the public as the plurality of expectations begin to unfold. As Dr. Levinthal points out, "The greatest commitment of the NASA supported research group is to the development of computer managed instruments relevant to the automated biological laboratory (ABL) for planetary explorations."

The present effort places greater emphasis on basic science and less on hardware implementation. For example, greater efforts are being expended on the basic science of the Pasteur Probe and biological application of the techniques developed in connection with optical isomerism. Particularly relevant are ways of increasing the effectiveness of the ACME IBM/360-50 system to aid in the conception and design of ABL missions.

Our immediate objectives are to demonstrate the feasibility of a computer managed laboratory and research in optical chemical specificity. This effort uses mass spectrometry and gas chromatography as a primary, but not exclusive, model. In carrying out this demonstration existing computer facilities are being used, i.e., our laboratory LINC computer, the Stanford Computation Center facilities, and for the future, the Medical School (ACME), IBM/360-50 time shared system whose funding has now been approved by the NIH.

Gas chromatographic laboratory work on optical chemical specificity, related to the Pasteur Probe, is continuing. In addition, a number of specific applications of these techniques are beginning to emerge, and we are following through in collaborative programs involving various aspects of molecular

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biology. Thus, we have been able to find some evidence for the occurrence of D-amino acids in the free amino acid pool mammalian brain. Then, micro assays for bacterial cell wall constituents (especially D-alanine) are being perfected. The capacity of the t-RNA to transfer D-amino acids is being tested; oligopeptide substrates for enzymes of genetic interest in B-subtilis are being developed.

And in close connection with all of our work, development of systems to couple the gas chromatograph to a mass spectrometer and general systems for introduction of solid samples into a mass spectrometer and methods of surface microanalysis are being pursued.

DLS:jd

cc: J. Lederberg  
E. Levinthal ✓  
B. Halpern