

NASA CR-101610

## General Technical Services, Inc.

*"Science is our business"*

8794 West Chester Pike  
Upper Darby, Penna. 19082

June 26, 1969

215: HI 9-2333  
JA 8-6093

**CASE FILE  
COPY**

Dr. George Jacobs  
Chief, for Physical Biology  
Bioscience Programs Division  
Code SB  
NASA Headquarters  
400 Maryland Avenue, S. W.,  
Washington, D. C. 20546

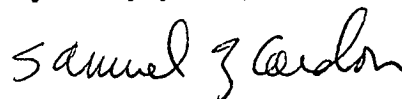
Subject: NASW 1815 - "Development of a Spectral  
Analyzer", Third Progress Report  
June 1969

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Dear Dr. Jacobs:

In accordance with the requirements of the referenced contract, this progress report is submitted, covering the period March 8, 1969 to June 7, 1969.

Very truly yours,



Samuel Z. Cardon  
Secretary - Treasurer

SZC:IG

Encls.

CC: (Progress Report):  
NASA Hdq. - Code SB (10)  
NASA Hdq. - Code UT (1)

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Dr. George Jacobs  
Chief, for Physical Biology  
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NASA Headquarters  
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Subject: NASW 1815 - "Development of a Spectral Analyzer",  
Third Progress Report, June 1969

Dear Dr. Jacobs:

In accordance with the requirements of the referenced contract, this progress report is submitted, covering the period March 8 to June 7, 1969.

## I. Summary of Work Performed

1. Work has continued on the glucose level in mammalian blood. Analyses have been done on 15 second samples of blood from ten rats. A forty second cycle is present. The amplitude changes are as great as 20 - 30 mg percent. The analyses have been done on each individual sample. Our previous results on the guinea pig, the mouse, and the human is again validated. A report is being prepared for publication in a physiological journal.

In collaboration with Dr. H. Unterberger of the University of Pennsylvania Medical School, some analyses have been done on two subjects, one with polycytemia. While the results are still fragmentary and inconclusive, very large oscillations have been found in the polycytemic subject. The significance is not known and an opportunity will be sought to repeat the experiment on other subjects with this condition as well as on other subjects with other metabolic abnormalities.

2. Experiments have been started with Bloch on the effects of hyperoxia on the flow of red cells in capillaries in the panniculus muscle of the mouse. Algire chambers have been placed in animals, in Bloch's laboratory and in our laboratory. Two animals have been taken up to 4 atmospheres of pure oxygen - in increments of 1 atmosphere for periods at one hour at each stage and one half hour at the highest pressure. No serious changes were seen in the microvasculature and one animal has survived for two weeks. One animal died the next day but he had been in poor condition at the start of the pressurization and appeared much improved at the end of the experiment. The experiments will be repeated for longer periods and higher pressures.

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3. Iberall presented a seminar on cardiovascular dynamics before a group at the Aeromedical Laboratory at Wright Field. He discussed the geometry of the arterial network, its DC and AC characteristics and control mechanisms. A NASA technical report covering this modelling is being prepared.

4. Iberall presented another seminar on homeokinesis before a group in the Biophysics Laboratory at Ohio State University. In addition to discussing the general principles of homeokinesis, he applied the concept to behavioral regulation as well. A paper covering this is being prepared for publication.

5. A meeting of our collaborative group was held in Atlantic City, April 13, 1969. Iberall, Bloch, Lipetz, and Urquhart summarized their work on homeokinesis, microcirculation, neurophysiology, and neuroendocrinology. Because of time limitations, Yates and Jacobowitz were not able to present their work. A second meeting was planned for June 25 - 26. Bloch has suggested some thought be given to a joint experimental program in which simultaneous studies would be made on a large animal containing an Algire chamber, to permit withdrawal of blood samples while the microvasculature was being observed and temperature, and cardiovascular functions were being monitored. The matter has been discussed in some detail among Bloch, Urquhart, Cardon, and Iberall.

McCulloch has begun investigations into the role of the central nervous system in cyclic long range behavior. Yates has been looking into the time dependence of hormones in relation to the time spectrum of body activities. (A detailed discussion was held June 25-26 and will be reported in the next progress report).

6. In this period, GTS was assigned an additional task under this contract, to determine the feasibility of adapting equipment for space study of plant growth (Arabidopsis experiment). An evaluation of existing equipment is being made and a proposal will be submitted shortly estimating the requirements and costs to complete the experiment.

## II. Principal Investigator

The principal investigator, A. S. Iberall, has devoted 124 hours to this program in this report period.

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### III. Scientific Meetings

A. S. Iberall and S. Cardon attended the annual meeting of the Microcirculatory Society in Atlantic City, April 12-13, 1969. Cardon gave a paper on "Dynamics in the Microvasculature".

A. S. Iberall and M. Weinberg attended the annual meeting of the Federation of Biological Societies in Atlantic City, April 13-18, 1969. The subjects discussed were endocrinology, metabolism, and microcirculation.

Very truly yours,



Samuel Z. Cardon  
Secretary - Treasurer

SZC:IG