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STATUS REPORT NASA PROJECT NASr-221

SUBJECT: Fifth Quarter Report for the period April 1, 1965
to June 30, 1965

This quarter unfortunately was one of frustration in several aspects of the project and only during the last three weeks of the quarter were we able to make definite progress.

A. As stated in our last quarterly report, an attempt was made to transport to the United States by boat some large estivating fish from the Gambia River in Africa. In this effort I was unsuccessful. I had intended sailing a boat being built for me in England which was promised to be available by April 1st. The plan was to sail to Africa and then to the United States and with the aid of the French Biological Research Institute in Dakar, to secure a few really large fish in estivation in mud. However, the boat yard in England failed to deliver the boat for six additional weeks and because of this delay, the trip, as proposed, was not possible. Accordingly, the chief investigator was not only away from the project at the laboratories in the United States, but was unsuccessful in achieving the acquisition of a really large estivating fish.

B. Meanwhile, in the aquarium at the Colorado State University in the laboratory of Doctor Frank South the twelve lungfish of various sizes, previously reported, were becoming acclimated to their new environment and were beginning to

feed well. One male fish of medium size, who had been placed in with two female fish of equal size, viciously attacked both of the females and killed them, and died shortly thereafter himself of wounds received in return.

In addition, the rate of enlargement of the smaller fish is disappointing. It is apparent that it would not be practical under this grant to attempt to raise large lungfish from little ones. Because of these two experiences, therefore, we will revert to importing large sized lungfish from our sources in Uganda.

C. At the University of Colorado in Denver Doctor Jenkins has succeeded in perfecting chemical techniques for the extraction of lungfish tissues and we have on hand several vials of extract in the frozen state which we will soon subject to biological testing.

D. Meanwhile, we have enlisted the interest and aid of Doctor Kirvin Knox, Head of the Metabolic Research Laboratory, Colorado State University, who was undertaking to provide two types of biological study for us.

1. The Oxygen Consumption (basal metabolic rate) of non-estivating and estivating lungfish.
2. A test for the effect on the basal metabolic rate of guinea pigs of the extracts of Dr. Jenkins.

E. Our program from the coming quarter is now well established. We will take the two largest lungfish remaining in the aquarium, place them in suitable glass containers in water over a depth of mud, measure their metabolic rate by means of oxygen consumption and then enforce estivation in the manner

previously reported. The metabolic rate in the state of estivation will then be measured and the fish will be sacrificed, trying to bleed directly from the heart as much blood as will be possible to obtain. This blood will be separated into red cells and plasma and the plasma will be immediately extracted in the fresh state by Dr. Jenkins. These extracts will then be subjected to two biological screening tests.

- a. The basal metabolic rate of guinea pigs by Dr. Knox, as mentioned above.
- b. A change in the rate and degree of cooling tolerated by guinea pigs to be performed in the laboratory of Dr. Jenkins.

In summary, therefore, although not much progress was made on the project during the quarter important experience was obtained which has enabled us to definitively outline an immediate program which should bear fruit perhaps within the next quarter.

Very respectfully submitted,

Henry Swan, Chief Investigator