Title: THE PHYSIOLOGY OF THE MALARIAL PARASITE

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Objective:

It is the purpose of this study to investigate in detail the anabolic and catabolic metabolism of rodent, simian, and human malarial parasites. Certain aspects of host metabolism, particularly those which bear directly on the host-parasite relationship, are also being examined.

Methods:

The metabolic pathways of the parasite and host cells are being examined using combinations of isotopic, spectrophotometric, and respirometric methodologies.

Progress:

The activities of glucose-6-phosphate dehydrogenase (G6PD), 6-phospho-gluconate dehydrogenase (6PGD), and tranketolase were studied in cell-free extracts of normal and Plasmodium berghei-infected mouse erythrocytes and host cell-free P. berghei. All preparations had activity. Electrophoretic evidence clearly indicate that the G6PD and 6PGD activities were of P. berghei origin. The high specific activity of transketolase in the P. berghei extract as compared to the other preparations showed that it was also of parasitic origin. The presence of phosphoriboisomerase and ribulose phosphate-3-epimerase were indirectly demonstrated. The data clearly support the conclusion that the malaria parasite, P. berghei has an active pentose cycle. A publication, in press, entitled "Malarial Parasite Metabolism: I. The Pentose Cycle in Plasmodium berghes." has resulted from this work.

Recent efforts have centered on the use of the French Pressure cell as a means of selectively rupturing the infected erythrocyte in hope of improving the quality of the isolated parasitic preparation. The data at present, are insufficient to permit any detailed conclusions to be drawn.

Methods for the investigation of glycolysis and the tricarboxylic acid cycle are in the process of being developed and on results are available at this time.

Studies on the metabolism of the simian and human parasites are still in the preliminary stages with no data available.

Summary:

A pentose cycle has been demonstrate in the rodent malarial parasite, Plasmodium berghei. Development of methodologies for further studies of the metabolism of P. berghei. P. coatneyi, and P. falciparum is currently in progress.