



PLANS FOR WORK

Subject: Mechanism of the butyric acid - butyl alcohol fermentation.

(1) This project may be characterized as an investigation concerning the physiology of the anaerobic butyric acid - butyl alcohol bacteria. It is important industrially and agriculturally due to the fact that significant quantities of the 'solvents' butyl and isopropyl alcohols and acetone are produced by the dissimilation of raw materials such as corn and other grains. Moreover, it offers an excellent opportunity for a purely theoretical study of the intermediate mechanism of anaerobic fermentation. It is proposed that the scope of the project should be to present a complete and valid scheme showing all of the biological transformations occurring between the initial breakdown of glucose and the final products by this group of bacteria. Inasmuch as the project is concerned with a fundamental bacteriological problem it should make an important contribution to the knowledge of bacteriology and biochemistry. It is highly desirable to be able to present a complete picture of the changes occurring in this biological process. Although the problem is essentially theoretical, the findings may have unlimited practical application.

(2) Beginning with the work of Pasteur in 1861, numerous investigators have contributed fragments of information concerning the physiology and classification of the anaerobic butyric acid - butyl alcohol bacteria. My investigations concerning this problem were initiated in 1933 as a Research Fellow under the direction of Dr. C. H. Werkman, Professor of Bacteriology, Iowa State College,

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Ames, Iowa. During the period from 1933 to the present time the following studies have been made: (a) classification of the butyric acid - butyl alcohol bacteria on the basis of morphological, cultural and physiological characteristics; (b) factors involved in the occurrence of acetylmethylcarbinol or 2,3-butyleneglycol as end products of fermentation; (c) the influence of various nitrogenous substances on the production of 'solvents'; (d) the nitrogen requirements of the bacteria; (e) the influence of the hydrogen ion concentration of the medium on the course of the fermentation; and (f) and the role of pyruvic acid as an intermediate product. [Portions of the above studies were made with the assistance of Dr. G. L. Osburn and Dr. G. L. Stahly, formerly Research Fellows, Dept. of Bact., Iowa State College.]

Considering the nature of the project, it is impossible to predict, with any degree of certainty, the amount of time required for its completion. Considerable progress could be made during the course of one year of continuous research under favorable conditions.

(3) It is proposed that the study be made at Technische Hoogeschool, Delft, Holland, under the direction of Dr. A. J. Kuyver and with the association of Dr. C. H. Werkman, Iowa State College.

(4) It is proposed that the results of the investigation be published in the Journal of Bacteriology.

(5) My ultimate purpose as a student is to make contributions to the knowledge of the physiology and biochemistry of bacteria.