for the study. The blood was obtained either in the pre-eruptive state when Koplik spots were present or during the early eruptive stage. Bacteriological culture of the blood on various media recommended for the growth of organisms from measles, showed no growth. Plasma from 15 cases was used and no changes in pressure under either aerobic or anaerobic conditions were noted. (e) Several experiments were done with plasma obtained from miscellaneous diseases of doubtful etiology and among them were 5 cases of rheumatic fever. Negative results were again obtained and bacteriological culture showed no organisms.

In none of the experiments were the changes greater than those due to experimental error.

We conclude that in our experiment respiration as measured by Warburg's method is not a general finding in plasma infected with filtrable viruses and that the virus character of the disease cannot be demonstrated by this method.

We acknowledge our indebtedness to Dr. Ethel Ronzoni for her great assistance and we are also indebted to Dr. Durant of the University of Missouri and Dr. A. E. Bott, of the Corn Belt Serum Company, East St. Louis, Illinois, for enabling us to get the hog cholera plasma.

4659

Studies in Carbohydrate Utilization by Organisms of the Genus Mycobacterium.

MALCOLM H. MERRILL. (Introduced by Moyer S. Fleisher.)

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By means of direct quantitative carbohydrate determinations employing the Shaffer-Hartmann blood sugar method I have shown there is a rather wide utilization of carbohydrates by organisms of the genus Mycobacterium.

The reaction changes both in plain broth and carbohydrate broth cultures of the organisms of this genus are toward progressive increase in alkalinity. The reaction change is less rapid in the presence of utilizable carbohydrates. This increase in alkalinity whether in plain broth or carbohydrate broth cultures has been shown to be associated with an increase in the ammonia content of the media. This increase in ammonia is in most cases approximately equivalent

to the increase in the titrable alkalinity. In other cases other substances either acid or alkaline in character, which are apparently derived from protein cleavage, are involved to some extent in the causation of the reaction changes and changes in titratable alkalinity. Such changes are accounted for by the ammonia increase equally as well in the carbohydrate broth cultures as in the plain broth cultures.

The ammonia production was found to be distinctly less for the production of a given amount of growth in the presence of utilizable carbohydrates. This diminished ammonia production was associated with a diminution in the degree of reaction change of the media. Also the higher the carbohydrate concentration, so long as it is within the limits that will permit growth, the less the ammonia increase and the less the reaction change of the media during the production of a constant amount of growth. Thus not only the presence, but also the concentration of a carbohydrate, is a factor determining the degree of protein sparing action it exerts.

The presence of utilizable carbohydrate does not directly have any effect upon the reaction change of the media. Utilizable carbohydrates apparently affect the reaction changes only to the extent that they alter protein cleavage by the organisms. Thus there is no accumulation of cleavage products of the carbohydrates that in any way alters the pH of the medium. This contrasts strikingly with the carbohydrate utilization by most bacteria belonging to other genera.

The utilization of carbohydrates by the organisms of the group studied is characterized by a gradual decrease in the carbohydrate contained in the media until it completely disappears. There is no inhibition of the growth of the organisms at any time by products of the carbohydrate cleavage, such as is the case in the majority of organisms, the carbohydrate utilization of which has been studied.

The CO_2 produced has been shown to vary directly as the growth of the organisms in carbohydrate-containing as well as carbohydrate-free media. The CO_2 produced also varies directly as the carbohydrate utilized in the carbohydrate-containing media, and in most cases more carbon dioxide was recovered than could have been derived from the carbohydrate disappearing. This may be compared to a 10% to 18% yield of possible carbon dioxide recovered from cultures of acid-producing organisms as *B. coli* and *Staphylococcus aureus*. Far more carbon dioxide was found to be liberated per mg. of ammonia produced in the presence than in the absence of utilizable carbohydrates.

No organic acid cleavage products of the carbohydrate utilization could be demonstrated either in media with varying concentrations

of the carbohydrates or in the presence of varying quantities of available oxygen.

These organisms could not be grown under anaerobic conditions. Cultures grown in limited oxygen supply grew until all the molecular oxygen was used and no further growth, carbohydrate utilization, or reaction changes of the media were demonstrable even after 2 months additional incubation. Carbohydrate utilization thus apparently takes place only in the presence of molecular oxygen.

The explanation suggested in the preliminary report,[1] namely that if the carbohydrate molecule is attacked at all it is oxidized completely to carbon dioxide and water, without any intermediate products appearing in the media, explains all phenomena observed relative to carbohydrate utilization by these organisms.

4660

Effects of Combined Administration of Extracts of Anterior Lobe of Pituitary and of Potassium Iodide on Thyroid Gland.

MARTIN SILBERBERG. (Introduced by L. Loeb.)

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In former investigations from this laboratory Loeb,[1] Gray[2] and Rabinovitch[3] have shown that potassium iodide may exert a stimulating effect on the thyroid gland of the guinea pig. It does not prevent compensatory hypertrophy, but may modify its character; in the normal gland it may increase the mitotic activity as much as 40-60 times, and quite commonly increases it 20 times. Furthermore, it produces a slight increase in the size of the acinus cells and a slight softening of the colloid and a very marked increase in the number of phagocytes in the colloid. Loeb[4] has shown that oral administration of anterior pituitary substance (Armour & Co.) prevents compensatory hypertrophy of the thyroid gland and McCordock[5] has shown that it prevents the hyperplasia caused by potassium iodide. However, if instead of oral administration of anterior

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[5] McCordock, H. A., *Am. J. Path.*, 1929, v.