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## Sugar Dissimilation by *Shigella paradysenteriae* Variety Sonne

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THE GERMICIDAL ACTION OF  $\alpha$ -ALKYLATED  
FUROIC ACIDS

N. O. CALLOWAY, H. GILMAN AND C. H. WERKMAN

A series of alkylated furoic acids has recently been synthesized by means of the Friedel-Crafts reaction. In a study on the germicidal action of these compounds it has been found that some of them are of relatively high germicidal efficiency. This study was carried out on a virulent strain of *Staphylococcus aureus* using a modified Anderson-McClintic technic.

The following phenol coefficients were found for the various alkylated acids: Methyl furoic acid, 2.7; *iso*-propylfuroic acid, 9; *tert.*-butylfuroic acid, 19; and *tert.*-amylfuroic acid, 20. This work is being continued with related heterocyclic types including derivatives of pyrrole, thiophen and furan.

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SUGAR DISSIMILATION BY SHIGELLA PARADY-  
SENTERIAE VARIETY SONNE

HOWARD REYNOLDS, C. S. McCLESKEY AND C. H. WERKMAN

Colonies of *Shigella paradysenteriae* var. Sonne are characterized on lactose and sucrose agar media by the formation of papillae after several days' incubation at 37° C. Organisms in the papillae dissimilate lactose or sucrose with the formation of acid within 24 hours, whereas the remaining organisms in the colony fail to show acid production on china blue-rosolic acid differential medium. The acid papillae appear blue on a pink colony. In a liquid medium containing sucrose or lactose, alkaline organisms reach a maximum after two to six days followed by a decline of alkaline organisms with a marked increase of acid producing forms (rapid variant).

Study was made of the daily progress of sucrose and lactose dissimilation under aerated, anaerobic (under N<sub>2</sub>) and aerobic (grown in flasks exposed to air) conditions.

Under aerobic conditions the total utilization of sucrose is small and varies between five and ten per cent over periods of five to eight days. During a period of two to six days there is little or

no increase in acidity, and the alkaline population reaches a maximum and begins to decline, then a sudden increase in acidity occurs accompanied by the appearance of the rapid variant in large numbers. When such a culture is aerated, the total utilization of sucrose increases from thirty-five to sixty per cent during similar periods. The decrease in sugar content of the medium takes place largely during one twenty-four hour period following an initial period of twenty-four to forty-eight hours when there is little utilization.

When the fermentation is brought about by the rapid variant (inoculation from acid colonies), under aerobic conditions, there is again little utilization of sucrose, generally less than ten per cent. The increase in bacterial count and acidity as well as utilization of sugar is largely confined to the first day. When the same type of fermentation is aerated, the changes in sugar content, acidity and bacterial count occur largely during the first day as in the aerobic fermentation. The total sugar utilization is much greater, rising as high as sixty per cent in eight days.

In order to study the course of the fermentation of sucrose in more detail, and aerated fermentation was started in a six-liter flask. Samples were withdrawn daily for the differential count, determination of sugar and products, namely, succinic, formic, lactic and acetic acids, alcohol and carbon dioxide.

In this experiment the alkali count reached a maximum during the second twenty-four hour period and the acid count during the succeeding day. When the products as determined were plotted against the sugar utilized it was found that the transformation from the alkaline to the acid types was accompanied by a pronounced change in the rate of production of the chief products. This fact indicates that there is a difference in the physiology of the two forms of *Shigella paradysenteriae*.

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## THE LIBRIFORM FIBERS IN THE ROOTS AND CROWNS OF MEDICAGO AND MELILOTUS

J. N. MARTIN AND AUSTIN O. SIMONDS

The libriform fibers, long known to be especially prominent in many of the Leguminosae, particularly the papilionaceae, constitute