Bacterial Dissimilation of Acetylene Dicarboxylic Acid

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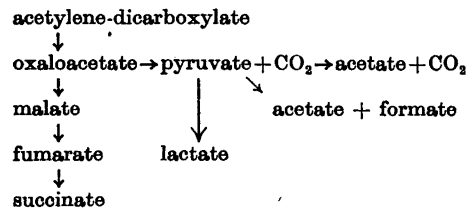
Very little is known about the biological conversion of acetylenic compounds. As part of an investigation of the biosynthesis and dissimilation of organic compounds containing acetylenic bonds, a facultative anaerobic bacterium has been isolated from sewage. The bacterium has been identified as a member of the family of *Enterobacteriaceae*. The organism grows on acetylene dicarboxylic acid as the only carbon source and ammonium-N as the only nitrogen source.

Acetylene dicarboxylic acid is converted by resting cell suspensions under anaerobic conditions to CO_2, lactate, succinate, acetate, formate and ethanol; the latter compound is produced in relatively small amounts. H_2 is hardly detectable. Occasionally fumarate will accumulate. The fermentation of glucose leads to the same end products, but relatively larger amounts of ethanol and H_2 are produced.

The non-gaseous products of the fermentations have been isolated either in the pure state or as the derivatives of *p*-bromophenacylbromide. The volatile products have been further identified by Duclaux distillation, ethanol as acetic acid after oxidation by chromic acid.

When the CO_2-evolution from acetylene dicarboxylic acid by resting cell suspensions is followed manometrically, a sharp break in reaction velocity is observed, at which time pyruvate can easily be detected. The pyruvic acid has been isolated and characterized as the 2,4-dinitrophenylhydrazone.

The results indicate that acetylene dicarboxylic acid is dissimilated by this bacterium according to the following scheme:



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Fumarate and malate are fermented anaerobically by resting cells with CO_2 production in correspondance with the above scheme.

The CO_2 output from acetylene dicarboxylic acid is completely inhibited by 2×10^{-2} M KF. Lower concentrations of KF, *viz.* 10^{-3}—10^{-2} M, cause a greater total output of CO_2 from the same substrate, concomitantly with a smaller total production of succinate.

In view of the above results it would appear that the initial reaction in the metabolism of acetylene dicarboxylic acid is a conversion to oxaloacetate followed by known pathways of metabolism of the latter substance.

The Mechanism of Formation of Bile Acids from Cholesterol

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A short review of recent work on the transformation of cholesterol into bile acids will be given.

Recent results have brought further support to the view that the steroid ring system is modified before the side chain degradation is completed [1], thus 3α,7α-dihydroxycoprostane is transformed into both cholic and chenodesoxycholic acid in the rat [2], whereas earlier work [3] has shown that chenodesoxycholic acid cannot be 12α-hydroxylated into cholic acid.

Furthermore 7α-hydroxycholesterol has been found to give rise to cholic acid as well as to chenodesoxycholic acid [4].

In this connection results obtained in studies on hydroxylated coprostanic acids and their possible role as intermediates in the formation of bile acids from cholesterol will be discussed [5,6].

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