Microbial Transformation of α -Picoline, 2-Ethylpyridine and α -Picolinate

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Many organisms isolated from soil by enrichment on methylpyridines have been shown to possess specificity in metabolizing these compounds (Shukla, 1970). An *Arthrobacter* sp. isolated by enrichment on α -picoline fails to metabolize β -picoline, γ -picoline, α -picolinate, 6-hydroxy- α -picoline and other pyridine derivatives. However, 2-ethylpyridine is readily oxidized by α -picoline-grown cells. Growth of the organism in media containing α -picoline results in the formation of a water-soluble yellow metabolite that appears to be an azaquinone type of compound. Incubation of α -picoline or 2-ethylpyridine with resting-cell suspensions in the presence of semicarbazide leads to accumulation of pyruvate and small quantities of α -oxoglutarate. A different keto acid accumulates when 2-ethylpyridine is metabolized in the presence of 1 mM-sodium arsenite. No keto acid accumulation occurred on incubation of α -picoline under similar conditions.

The α -picolinate-metabolizing Gram-negative spore-forming *Bacillus* sp. converts α -picolinate into 6-hydroxypicolinate. α -Oxoglutarate is the major metabolite accumulating in the presence of semicarbazide. α -Picolinate-grown or -induced cells readily oxidize 6-hydroxypicolinate.

These studies implicate 6-hydroxypicolinate as an intermediate in the oxidation of α -picolinate by the *Bacillus* sp. However, dihydroxypicoline derivatives or corresponding azaquinones may be intermediates of α -picoline degradation.

Shukla, O. P. (1970) *Proc. 39th. Annu. Meet. Soc. Biol. Chem. India*, p. 29

The Metabolic Factors Limiting the Growth of *Saccharomyces cerevisiae* Subjected to γ -Irradiation

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The cells of *Saccharomyces cerevisiae* exposed to γ -rays lost their ability to form colonies although they retained their ability to synthesize catalase, thus indicating the relative sensitivities of cell-division mechanisms and protein-synthesizing systems respectively. The budding process in yeast has been linked with a protein disulphide reductase acting specifically on the mannan-protein complex constituting the cell wall. Some of the characteristics of this enzyme, which has no resemblance to glutathione reductase,

will be presented. It has been observed that this is a particulate system associated with mitochondria. The cells rendered more resistant to irradiation by prior aeration had 2.5-fold greater activity of the protein disulphide reductase. The recovery of cells could be correlated with the adaptive mechanisms operative after irradiation. An assessment of induced synthesis of enzymes in γ -irradiated cells indicated that the particulate systems could not be formed, although supernatant enzymes could still be synthesized. Radiation also caused inactivation of these systems.

Bacterial Metabolism of Aromatic Compounds

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A soil *Pseudomonas* sp. and an *Achromobacter* sp. utilizing vanillin and benzaldehyde respectively as sole carbon source have been used to delineate the pathways through which these compounds are oxidized to the intermediates of the tricarboxylic acid cycle. Unlike *Pseudomonas acidovorans* (Toms & Wood, 1970), the washed-cell suspension of vanillin-grown *Pseudomonas* sp. oxidized catechol after a lag of 25 min. However, immediate and complete oxidation of catechol was observed with washed-cell suspensions of benzaldehyde-grown *Achromobacter* sp. These observations were confirmed with cell-free extracts. Incubation of protocatechuate and catechol with cell-free extract of *Achromobacter* sp. and *Pseudomonas* sp. resulted in the formation of β -oxoadipate. Since vanillin-grown *Pseudomonas* sp. could oxidize catechol only with lag, it may be concluded that the mechanism of its ring cleavage is different than that operative in *Achromobacter* sp. Attention has been drawn in recent years to the presence in microorganisms of multienzymes induced by and active on a range of related substrates (Kennedy & Fewson, 1968). The pattern of O_2 uptake, for a number of aromatic compounds, suggested that a few non-specific enzymes may be involved in the oxidation of a large number of aromatic compounds. A converging metabolic pathway for the complete degradation of vanillin and benzaldehyde in which β -oxoadipate is an intermediate has been proposed for both the organisms.

Kennedy, S. I. T. & Fewson, C. A. (1968) *J. Gen. Microbiol.* **53**, 259-273

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