phase of about 2h occurs before the development of respiratory activity. During the next phase of development, lasting about 2h, the equation below suggests the effective mitochondrial mass is doubling every 20min.

The results have been described in terms of a simple model that introduces the concept of mitochondrial mean generation time. For particular conditions it has been possible to derive the equation:

$$\mu_m = \frac{\mu_q \cdot \mu_b}{\mu_q + \mu_b}$$

where μ represents mean generation time and the suffixes m, b and q relate respectively to mitochondrial mass, cell mass and Q_{O_2} .

The results suggest that the systems may offer a useful approach to the study of the synthesis of mitochondrial components, particularly after removal from the inhibitors of nucleic acid synthesis. Such an approach is not possible with *petite*-positive yeasts. The high rate of synthesis of respiratory components suggests it may be possible to label macromolecular species to a high specific activity.

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Metabolism of Pyridine by Soil Bacteria

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Although degradation of pyridine by micro-organisms has been known for over 50 years (Funchess, 1917) and the formation of ammonia from pyridine by an actinomycete has been reported (Moore, 1949), other investigators (Ensign & Rittenberg, 1963; Houghton, 1969; Stafford & Callely, 1970) have not identified other products or metabolic intermediates.

Enrichment techniques were used to isolate two bacteria, *Bacillus* strain 4 and *Nocardia* strain Z1, from soil, and these were found to grow on a mineral salts medium containing pyridine (0.1%, v/v) as carbon, nitrogen and energy source. Cell-free extracts of these organisms would not attack pyridine under

any conditions. Washed cells rapidly oxidized pyridine and released 70% of the pyridine N as ammonia. 2-Fluoropyridine was not oxidized, suggesting involvement of the C-2 position in an early metabolic step. None of the isomeric monohydroxy- or dihydroxy-pyridines was metabolized by washed cells or cell-free extracts.

Nocardia cells, oxidizing pyridine at pH 6.0 in the presence of 10mM-semicarbazide, showed a diminished O_2 uptake and formed a semicarbazone. After conversion into the 2,4-dinitrophenylhydrazone the product was identified by mixed melting point, mass spectrometry, paper chromatography, t.l.c. and catalytic hydrogenation to 5-aminovaleate as the glutaric semialdehyde derivative. Extracts contained high activities of a glutaric semialdehyde dehydrogenase, which were repressed 50-fold after growth on succinate. This enzyme, when partially purified, required thiol groups for activity, utilized both nicotinamide nucleotides, but was specific for glutaric semialdehyde. The product of the dehydrogenase was identified by paper chromatography and g.l.c. of the dimethyl ester as glutaric acid. The formation of a C₅ saturated intermediate indicates that pyridine metabolism in *Nocardia* strain Z1 occurs by a ring fission adjacent to the nitrogen atom together with ring reduction.

Cells of *Bacillus* strain 4 produced successively formamide and then formate when pyridine oxidation was inhibited by 0.2mM-cyanide. Extracts contained high activities of a formamide-specific amidase. The remainder of the carbon skeleton was tentatively identified as succinic semialdehyde, suggesting ring cleavage between C-2 and C-3 (Nyns *et al.*, 1969; Cain *et al.*, 1970). Succinic semialdehyde dehydrogenase activity was elevated 50-fold over that found in succinate-grown cells or in certain mutants that were unable to metabolize pyridine.

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