of C_1 compounds, as proposed by Large & Quayle (1963).

Mutant PCT–57 grows well on ethanol, oxalate and succinate, but not on C_1 compounds, although serine–glyoxylate aminotransferase, hydroxypyruvate reductase, glycerate kinase and enzymes for the oxidation of C_1 compounds are present.

Methanol only supports growth when a C_2 compound (glyoxylate, glycollate or acetate) is present, thus indicating that mutant PCT–57 is unable to form glyoxylate from C_1 units. These results provide further evidence that enzymes catalysing the synthesis of glyoxylate and glycollate from acetate (or a derivative) are present in *Pseudomonas* AM 1. Mutant PCT–57 has possibly lost an enzyme responsible for the condensation of C_1 units to one of these C_2 compounds, and hence the failure of C_1 compounds to support growth although good growth occurs with ethanol. Alternatively, if the cyclic scheme for glycine regeneration operates (Large, Peel & Quayle, 1962), mutant PCT–57 may have lost the enzyme that cleaves a C_4 compound to give two C_2 compounds.

We thank the Science Research Council for a grant to P. M. D.

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Poly(Adenosine Diphosphate Ribose) Polymerase in *Physarum polycephalum* Nuclei

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Poly(ADP-ribose) polymerase has been found in the nucleus of several cell types (Nishizuka *et al.* 1969), although rat liver nuclei have been used almost exclusively to characterize this enzyme (Fujimura, Haregawa, Shimizu & Sugimura, 1967; Nishizuka, Ueda, Nakazawa & Hayaishi, 1967). The substrate is NAD; the product is a polymer of ADP-ribose that may be covalently linked to protein. Nicotinamide inhibits polymer formation.

Poly(ADP-ribose) polymerase may participate in the regulation of DNA synthesis. Preincubation of liver nuclei with NAD inhibits subsequent incorporation of dTTP into DNA. This inhibition may be related to the synthesis of poly(ADP-ribose). Maximal inhibition, about 80%, occurs with 4mM-NAD (Burzio & Koide, 1970).

We have examined this enzyme in the nuclei of the slime mould *Physarum polycephalum*, which was grown on 1% Marmite–1% glucose, pH 4.6. Nuclei were isolated, purified (Mohberg & Rusch, 1964) and then broken in an Eaton press.

This preparation possesses a poly(ADP-ribose) polymerase activity. The assay method measures incorporation of [*adenosine*-^{3}H]NAD into acid-insoluble products. The optimum temperature is 14°C; the organism is grown at 26°C. The optimum pH is 8.2, and Mg^{2+} is required. Incorporation of NAD continues for up to 2h. With optimum conditions the rate of incorporation is 23 pmol of ADP-ribose/min per mg of protein with 4mM-NAD. The reaction is almost completely inhibited by 10mM-nicotinamide.

We have confirmed that preincubation of rat liver nuclei with NAD inhibits subsequent incorporation of dTTP into DNA, and that this inhibition is greater at 25°C than at 37°C (Burzio & Koide, 1970). Isolated *Physarum* nuclei show increasing degrees of inhibition of subsequent dTTP incorporation into DNA after incubation in 0–4mM-NAD for 30min. We have also examined the variation of poly(ADP-ribose) polymerase activity during the cell generation.

The specific activity of NAD pyrophosphorylase in *Physarum* nuclei varies during each cell generation (Solao & Shall, 1971); it is high during DNA synthesis and low at other times. These two NAD-metabolizing enzymes may be closely involved in the regulation of DNA replication. This association would directly integrate NAD and energy metabolism with DNA biosynthesis both in progression through a single cell generation and in modulation of growth rate.

We thank the Cancer Research Campaign for their support of this work.

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