It was also found by means of the ^{14}C -labelled yeast that glucose, like 3-FG, stimulated endogenous metabolism so that about one-third of the carbon dioxide evolved was of cellular origin.

The observed increase in oxygen uptake and carbon dioxide production after the addition of 3-FG to resting cells of *Saccharomyces cerevisiae* must be accounted for by an increase in endogenous metabolism.

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Photosynthetic-Carbon-Cycle Enzyme Activities in Leaves of a Chlorophyll-less *Phaseolus vulgaris* Plant

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Chlorophyll-less plants of *Phaseolus vulgaris* cultivar Alabaster seem to occur quite rarely. When such a plant was found in a batch of seedlings that had been allowed to green in natural daylight in July, the primary leaves were taken for electron microscopy and the assay of enzyme activities (Bradbeer, 1969) at the stage at which the leaves appeared to have reached their maximum size, fresh wt. 133 mg./leaf. No indication of the onset of senescence in these leaves was obtained from their protein content, 7.02 mg./leaf, or from electron microscopy. The electron micrographs revealed the presence of plastid-like organelles that did not show any internal lamellar structure.

The chlorophyll-less leaves have been compared with the etiolated leaves of plants grown for 14 days in the dark (fresh wt. 35 mg., protein content 1.93 mg.) and also with the fully greened leaves of plants grown for 14 days in darkness followed by 5 days of continuous illumination at $500 \mu\text{w}/\text{cm}^2$ (fresh wt. 133 mg., protein 4.72 mg.). The etiolated leaves contained all of the investigated enzymes of the photosynthetic carbon cycle but the activities were very much lower than those of fully greened leaves.

The three photosynthetic-carbon-cycle enzymes that are confined to the chloroplasts, namely ribulose diphosphate carboxylase, phosphoribulokinase and NADP-linked triose phosphate dehydrogenase, were present in the chlorophyll-less leaves at about the same activities as in etiolated leaves.

Four enzymes, ribose phosphate isomerase, phosphoglycerate kinase, fructose diphosphate aldolase and transketolase, showed activities almost

midway between those of etiolated and fully greened leaves. These enzymes are all implicated in the photosynthetic carbon cycle but they are not confined to the chloroplasts.

Triose phosphate isomerase, NAD-linked triose phosphate dehydrogenase and phosphopyruvate carboxylase occurred in chlorophyll-less leaves at about twice the activity found in fully greened leaves. Of these three enzymes only triose phosphate isomerase appears to be a component of the photosynthetic carbon cycle in beans, and this enzyme and NAD-linked triose phosphate dehydrogenase occur both inside and outside of the chloroplasts.

Chlorophyll-less plants of *Vicia faba* have been reported to lack chloroplast ribosomes (T. A. Dyer, R. Miller & A. D. Greenwood, unpublished work), but no information on this point is available for *Phaseolus*.

Bradbeer, J. W. (1969). *New Phytol.* **68**, 233.

The Purification and some Properties of a Monohaloacetate Dehalogenase from *Pseudomonas dehalogenans* N.C.I.B. 9061

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Several micro-organisms can eliminate halogen atoms from halogenated aliphatic or aromatic compounds; such reactions play an important part in the breakdown of halogenated herbicides in the soil. The enzymic release of the halogen atom of monohaloacetate as inorganic halide has been studied in cell-free extracts (Davies & Evans, 1962) and with partially purified enzymes (Goldman, 1965; Goldman & Milne, 1966; Goldman, Milne & Keister, 1968).

Pseudomonas dehalogenans N.C.I.B. 9061 was grown aerobically at 28–30° on a mineral salts medium containing monochloroacetate (0.37%) as sole carbon source. Cell-free extracts, prepared by ultrasonic disintegration of the harvested cells, contained an enzyme that catalysed the release of inorganic chloride from monochloroacetate. This enzyme was assayed by conductimetric titration with 1 mM-AgNO₃ of the chloride released after 10 min. reaction at pH 9.0 and 30°.

In agreement with the other haloacetate dehalogenases the enzyme had a pH optimum of 9.5; below pH 5.0 activity was irreversibly lost. Dialysis for 10 hr. at pH values between 7.0 and 10.0 produced no significant loss of activity. At pH 7.0 the enzyme was stable for at least 48 hr. at ambient temperatures, and indefinitely at 4°; the activity