(4) Further oxidation of the residues from the boron-doped diamonds was achieved only after they had been washed with alkali.

(5) A marked increase in the oxidative stability of the RVG diamonds was observed when they were mixed with some powdered boron before combustion.

In addition to their potential technological importance, these results have an important scientific implication. The thermal oxidative etching of diamond is an investigatory technique used in the study of the origin of natural diamond, and inferences have been drawn from the results concerning the microstructural characteristics and thermal history of the diamonds. However, as the work reported here shows, small amounts of impurity can markedly change the oxidative behaviour of diamonds.

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[1] Huggins, C. M., and Cannon, P., *Nature*, **194**, 829 (1962).
[2] Cannon, P., *J. Amer. Chem. Soc.*, **84**, 4253 (1962).
[3] Wentorf, R. H., and Bovenkerk, H. P., *J. Chem. Phys.*, **36**, 1987 (1962).

BIOCHEMISTRY

Glyoxylate Reductase Activity of Lactate Dehydrogenase

LACTATE dehydrogenase (L-lactate: NAD oxidoreductase, *EC* 1.1.1.27) occurs in most animal tissues in five different forms[1,2], which can easily be separated by electrophoresis, and these dehydrogenases are enzymes of substrate specificity. Meister[3], however, has found that a series of α,γ-diketo acids are reduced at an essentially uniform rate which is about one-tenth that for pyruvate. Markert and Møller[1] observed that a series of α-hydroxy acids are oxidized at different rates by the isozymes of bovine heart extract, and Kun[4] has shown that β-mercaptopyruvate is reduced by crystalline heart lactate dehydrogenase. It has been shown (unpublished) that β-hydroxybutyrate is a slowly reacting substrate. The present report presents evidence for the glyoxylate reductase activity (*EC* 1.1.1.26) of lactate dehydrogenase based on quantitative and qualitative studies of purified enzyme (Boehringer rabbit muscle lactate dehydrogenase) or rat liver extract. Quantitative determination of dehydrogenase activities was carried out by measurement of the diminution or production of reduced nicotinamide dinucleotide ($NADH_2$) (at 23° C and at a wave-length of 340 mμ).

A qualitative study of cellulose acetate electrophoresis[5] was performed at 4° C, and the enzyme activity was observed by staining the $NADH_2$ produced by the enzyme reaction with phenazine methosulphate and nitro-blue tetrazolium. The results are shown in Table 1 and Fig. 1.

Table 1. ACTIVITY OF THE PURIFIED LACTATE DEHYDROGENASE WITH TWO SUBSTRATES

(Specific activities are expressed as μmoles of $NADH_2$ reduced or produced/100 μg of protein/h)

Substrate		Specific activity
Pyruvate	0·0125 M	111·6
Glyoxylate	0·0125 M	105·6
Lactate	0·0125 M	1·2
Glycolate	0·0125 M	0·96

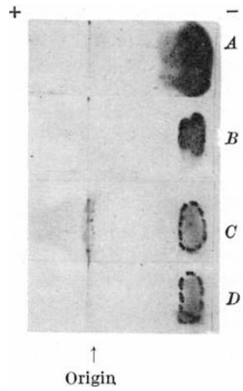

Fig. 1. Results of cellulose acetate, electrophoresis. *A*, Purified Boehringer rabbit muscle lactate dehydrogenase; *B*, rat liver extract; *C*, purified Boehringer rabbit muscle lactate dehydrogenase; *D*, rat liver extract. *A* and *B* developed with lactate; *C* and *D* developed with glycolate

Our results show that the lactate dehydrogenase catalyses glyoxylate reductase.

Except for the intensity of the bands, the patterns obtained on the cellulose acetate preparations, from the two different substrates, were identical. When glycolate was used instead, the pattern was much fainter. In view of the similarity in structure between the molecules of pyruvate and glyoxylate, and lactate and glycolate, the finding that these substrates are metabolized by the same system is not surprising.

Kun[6] has indicated that glycolate is oxidized to glyoxylate by a soluble liver enzyme, but its exact properties have not yet been established. It is well known that some single enzymatic proteins are capable of catalysing reactions with more than one substrate. These results would seem to provide further evidence for this concept, but more extensive investigations will be required to rule out the possibility of enzymatic contamination.

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[1] Markert, C. L., and Møller, F., *Proc. U.S. Nat. Acad. Sci.*, **45**, 753 (1959).
[2] Wieland, T., and Pfleiderer, G., *Biochem. Z.*, **329**, 112 (1957).
[3] Meister, A., *J. Biol. Chem.*, **184**, 117 (1950).
[4] Kun, E., *Biochim. Biophys. Acta*, **25**, 135 (1957).
[5] Sawaki, S., and Morikawa, N., *J. Vitaminol.*, **10**, 179 (1964).
[6] Kun, E., *J. Biol. Chem.*, **194**, 601 (1952).

Peroxidation of Lipid from Normal and Paroxysmal Nocturnal Haemoglobinuria Erythrocytes

PREVIOUS investigations in this laboratory demonstrated that *in vivo* red cell damage in animals and humans during exposure to oxygen under high pressure was associated with peroxidation of erythrocyte unsaturated fatty acids[1,2].

In paroxysmal nocturnal haemoglobinuria (PNH), a rare disease characterized by intravascular haemolysis accentuated during sleep, the primary defect is in the stroma of the erythrocyte. The underlying mechanism of red cell destruction has not been clarified in spite of intensive investigation. Since some investigators reported that PNH erythrocytes contained increased quantities of unsaturated fatty acid, we examined the possibility that the lipid of PNH erythrocytes would form more lipid peroxides than that of normal erythrocytes under conditions known to cause lipid peroxidation.