

The capacity of carbohydrate utilization by *Trogoderma* can be compared with that of other insects. Larvae of *Tenebrio*³, unlike *Trogoderma*, grew well on mannitol or trehalose but not on mannose and galactose. *Stegobium*⁴ failed to utilize mannose, galactose, xylose, arabinose, cellobiose or -methyl glucoside, and similarly for *Oryzaephilus*⁴ xylose, dulcitol, inulin or sorbose were of no food value. However, insects like adult blowfly, *Calliphora erythrocephala*⁵, thrived very well on xylose, ribose or trehalose.

A full report of these observations will appear elsewhere.

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Zusammenfassung

Trogoderma-Larven reagieren auf verschiedenartige Kohlehydrate verschieden. Disaccharide erweisen sich als die besten, Trisaccharide, Stärke und Hexosen als ziemlich gute, Pentosen und Zuckeralkohole als sehr schlechte Kohlehydratquellen.

³ G. FRAENKEL, J. cell. comp. Physiol. 45, 393 (1955).

⁴ A. LEMONDE and R. BERNARD, Nat. canad. 80, 125 (1953).

⁵ G. FRAENKEL, J. exp. Biol. 17, 18 (1940).

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An *in vitro* Action of Deoxycorticosterone (DOC) on Red Cell Electrolytes

A direct action of adrenal steroids on red cell electrolytes has been demonstrated by CONWAY and O'BRIEN¹, STREETEN and SOLOMON², SCHATZMANN³, and by SHERWOOD JONES⁴. The physiological significance of the response has however not been elucidated.

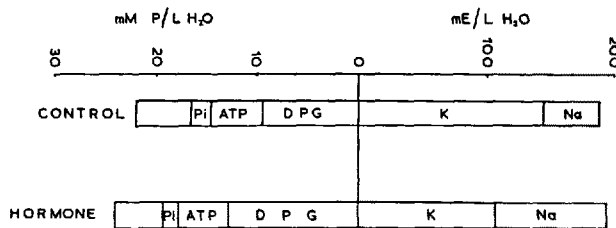


Diagram illustrating a metabolic response of the human red cell to DOC glucoside *in vitro*. Glucose 0.01 M, pH 7.40, temperature 38°C.

Further experiments have been conducted on suspensions of fresh human red cells in a bicarbonate buffer (KREBS and HENSELEIT⁵) having the following composi-

¹ E. J. CONWAY and L. T. F. O'BRIEN (1954). Quoted by CONWAY, Mem. Soc. Endocrinol. 5, 18 (1956).

² D. H. P. STREETEN and A. K. SOLOMON, J. gen. Physiol. 37, 643 (1954).

³ H. J. SCHATZMANN, Exper. 10, 189 (1954).

⁴ E. SHERWOOD JONES, Nature 176, 269 (1955).

⁵ H. A. KREBS and K. HENSELEIT, Hoppe-Seylers Z. 210, 33 (1932).

tion: Na 144.5, K 4.25, Cl 123.0, HCO₃ 25.0 meq/l, and P 1.5 mM/l. The buffer was in equilibrium with 5% CO₂ in O₂ and the suspensions were incubated at 38°. The ratio gas phase: buffer volume: red cell volume was approximately 200:20:1. Under these conditions the extracellular fluid remained of constant composition despite large changes in the red cell fluids. The substrates used were glucose (0.01 M) or adenosine (0.005 M). Deoxycorticosterone glucoside was added to the suspensions to give concentrations of 0.1 to 1.0 mg/ml. Over periods of 16 to 19 h there were demonstrable effects on the red cell electrolytes, but large net changes were observed only at the highest concentration. Employing a concentration of 1.0 mg/ml the following changes were noted in the treated erythrocytes: (1) the red cells had an increased mechanical fragility. (2) There was a fall in cell K of 38.0 meq/l H₂O and the erythrocyte gained 42.4 meq/l H₂O of Na (Figure). The erythrocyte water content increased by 10.5 g/l but no statistically significant change in chloride occurred. These results were similar with either glucose or adenosine as substrate. (3) DOC induced in the erythrocyte a mean increase of 3.8 mM P/l H₂O in the total acid-soluble phosphate and this was largely due to a net change of 3.4 mM P/l H₂O in 2:3-diphosphoglycerate (Figure). The effects of DOC on adenosine triphosphate and inorganic phosphate were not statistically significant. (4) The hormone treated cells, when centrifuged, did not deoxygenate as did the controls. Since oxygen uptake of non-nucleated red cells is probably due to the hexosemonophosphate shunt rather than to pyruvate oxidation, the methylene blue (MB) oxygen uptake of the abnormal cells was studied. (5) It was found that, in the presence of glucose (0.01 M), the oxygen uptake induced by MB (0.0033 g/100 ml) was inhibited 50% when the DOC was still present in the suspending medium, and the inhibition was approximately 30% when the DOC treated cells were washed and resuspended in fresh buffer.

It is concluded from the above evidence that high concentrations of DOC glucoside can act directly on red cell electrolytes and metabolism but it cannot be deduced that this action is a specific hormonal response and there is evidence that this is unlikely. Thus, the *in vitro* response is at variance with the erythrocytic changes induced *in vivo* by the administration of large doses of DOC acetate to rats fed on a low K diet. In these experiments the red cell gained K, Na and phosphate in response to a hypochloreaemic alkalosis in the plasma whereas skeletal muscle showed the anticipated loss of K and gain in Na⁶.

The DOC glucoside was kindly donated by CIBA Laboratories.

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Résumé

Dans les suspensions d'érythrocytes humains incubées avec du glucose et du déoxycorticostérone glucoside, K diminue, tandis que Na, H₂O et P augmentent. Ces globules rouges, traités avec des hormones, absorbent notablement moins d'oxygène de bleu de méthyle que les érythrocytes de contrôle.

⁶ E. SHERWOOD JONES and I. CHESTER JONES, Unpublished (1957).