Komplexbildung angenommen werden muss, während dem γ-Globulin ein solcher Effekt nicht zukommt. Die Inaktivierung kann möglicherweise auch durch Einwirkung von Fermentsystemen, die freigesetzt oder enthemmt werden, zustandekommen. Ähnliches ist für «pain-producing substances» und Bradykinin-artige Stoffe bekannt[6].

Die fehlende oder viel langsamere Inaktivierung in Plasma kann aus der Kombination von PPS mit bei der Gerinnung wichtigen Makromolekeln resultieren. Diese Deutung der Versuchsergebnisse wird unterstützt durch die Befunde von UNGAR, WESTPHAL und unsere eigenen, dass PPS die Fibrinolyse fördert[2] und durch diejenigen von PILLEMER, LANDY und SHEAR[7], welche nach Verabreichung von Polysacchariden das Auftreten von hochmolekularen Substanzen im Blut beschreiben. Die unterschiedliche Zerstörung in Serum und Plasma scheint für das biologische Verhalten der PPS von Bedeutung.

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Forschungslaboratorien der CIBA Aktiengesellschaft, Pharmazeutische Abteilung, Basel, 18. November 1957.

Summary

Although bacterial polysaccharides are broken down in the serum of various animals, polysaccharides in the plasma of the same animal are largely stable. The importance of this finding is discussed with respect to the biological behaviour of polysaccharides.

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On the Carbohydrate Utilization by the Larvae of *Trogoderma granarium* Everts. (Dermestidae: Coleoptera)

Trogoderma granarium is one of the major pests affecting stored plant products in India and elsewhere. Its larvae are known for their hardy nature and can withstand adverse conditions of insufficient food supply, long periods of starvation, high temperatures and low humidities. These are also resistant to normal insecticide concentrations which are fatal to almost all the insect species living in the similar environment. The larvae feed on the endosperm leaving the testa intact. Though polyphagous in habit, they prefer food rich in carbohydrates. Some observations[1] on its nutrition made earlier, suggested that it can make use of large varieties of food grains including those that are not nutritious to many of the stored-product beetles. In an attempt to study nutritive values of several carbohydrates – simple and complex – the larvae were reared on different artificial food media, each providing a separate source of carbohydrate. The results are briefly reported in the present communication.

The basic diet consisted of casein, cholesterol, vitamins of B complex, a salt mixture and one of the 22 compounds as a source of carbohydrate. The proportions in which various ingredients were mixed were the same as reported elsewhere[2]. The results are summarized in the Table where the degree of utilization is indicated by the corresponding numbers of + signs.

Of the monosaccharides tested, the pentoses – arabinose, xylose and rhamnose – were not utilized while the hexoses proved to be better nutritionally. Glucose was very suitable but fructose behaved with irregular efficiency; galactose and mannose were poor, while sorbose remained entirely unutilized. The disaccharides were still better.

Maltose and sucrose gave the best growth. An adverse effect on larval development was observed when diets contained melibiose, cellobiose or lactose. Inclusion of trehalose rendered the diet completely deficient. Raffinose and melezitose were of medium nutritive value. Polysaccharides, like maize, potato and soluble starches, served as fairly good sources of carbohydrate. Sugar alcohols – mannitol, sorbitol and dulcitol – proved to be of no dietary value.

[1] K. R. P. SINGH and N. C. PANT, J. zool. Soc. India *7*, 155 (1955).
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Growth of *Trogoderma* larvae on various carbohydrates. ++++ indicates a growth comparable to optimum growth in control diet. Decrease in plus signs indicates corresponding slower growth. Absence of growth indicated by –.

Source of carbohydrate	Utilization	Source of carbohydrate	Utilization
Pentoses		Melibiose	+++
Arabinose	–	Cellobiose	+++
Xylose	±	*Trisaccharides*	
Rhamnose	±	Raffinose	+++
		Melezitose	+++
Hexoses			
Glucose	+++	*Polysaccharides*	
Fructose	++ ?	Soluble starch	+++
Galactose	++	Maize starch	+++
Mannose	++	Potato starch	++
Sorbose	±		
		Sugar Alcohols	
Disaccharides		Mannitol	!
Sucrose	++++	Sorbitol	–
Maltose	++++	Dulcitol	–
Lactose	++±		
Trehalose	±	*Control*	
		Wheat flour + 5% yeast	++++

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.

Thanks are due to Prof. M. L. BHATIA, Head of the Department of Zoology, University of Delhi, for his interest in work and for providing research facilities. The investigations were partly supported by a Government of India grant made by the Ministry of Education to one of us (N.C.P.).

N. C. PANT* and N. K. UBEROI

Department of Zoology, University of Delhi (India), October 28, 1957.

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.

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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'BRIEN[1], STREETEN and SOLOMON[2], SCHATZMANN[3], and by SHERWOOD JONES[4]. The physiological significance of the response has however not been elucidated.

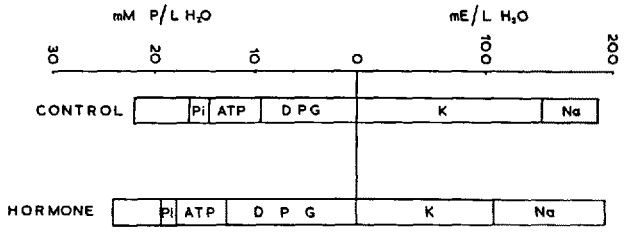

Diagram illustrating a metabolic response of the human red cell to DOC glucoside *in vitro*. Glucose 0·01 *M*, pH 7·40, temperature 38°C.

Further experiments have been conducted on suspensions of fresh human red cells in a bicarbonate buffer (KREBS and HENSELEIT[5]) having the following composition: Na 144·5, K 4·25, Cl 123·0, HCO_3 25·0 meq/l, and P 1·5 *mM*/l. The buffer was in equilibrium with 5% CO_2 in O_2 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 H_2O and the erythrocyte gained 42·4 meq/l H_2O 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 H_2O in the total acid-soluble phosphate and this was largely due to a net change of 3·4 *mM* P/l H_2O 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 hexose-monophosphate 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 hypochloraemic alkalosis in the plasma whereas skeletal muscle showed the anticipated loss of K and gain in Na[6].

The DOC glucoside was kindly donated by CIBA Laboratories.

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Department of Medicine, University of Liverpool, September 20, 1957.

Résumé

Dans les suspensions d'érythrocytes humains incubées avec du glucose et du déoxycorticostérone glucoside, K diminue, tandis que Na, H_2O et P augmentent. Ces globules rouges, traîtés avec des hormones, absorbent notablement moins d'oxygène de bleu de méthyle que les érythrocytes de contrôle.

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