These figures suggest that the effects of chlorpromazine and 2,4-dinitroorthocresol are additive.

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Antibody Formation by Protein Components of Bee Venom

It is not yet known for certain whether the physiological responses to bee venom include the formation of antibodies. Earlier investigators have obtained divergent results when investigating immunization against different effects of the venom. This is probably in part due to the fact that a series of pharmacological and enzymatic reactions are caused by quite different constituents of the venom¹. In recent years, several proteins with various biological properties have been isolated: first, the pharmacologically highly active toxin-fraction (so-called 'fraction I')²; then the enzymes phospholipase A³ and hyaluronidase⁴, which on electrophoresis migrate in the so-called 'fraction II'. From these findings arises the question whether antigenic properties may be found with these substances.

Solutions of cautiously dried bee venom were injected intravenously into rabbits at intervals of one to two weeks. Before every injection samples of serum were obtained and stored at -6° to -8° C. Repeated doses of 0.2 or 1.0 mgm./kgm. caused increasing formation of antiphospholipase and antihyaluronidase in the sera (cf. Fig. 1). On the other hand, the effects of bee venom on the isolated guinea pig auricle or frog heart, the frog sartorius, guinea pig gut or uterus, and also its systemic toxicity in white mice and the (direct) haemolysis of human erythrocytes by fraction I, were not diminished by the sera of the immunized rabbits to a greater degree than they were by normal rabbit serum.

Fig. 1. Increase of antiphospholipase and antihyaluronidase potency of rabbit serum after repeated intravenous injections of bee venom. At arrows: 1 mgm./kgm. bee venom. Activity is given as a percentage of the activity of a control (venom + stored normal serum). —, hyaluronidase (ref. 5); venom, 1:20,000, serum, 1:40. ---, phospholipase A (ref. 5); venom, 1:336,000, serum, 1:42.

The experiments show that two enzymes—phospholipase A and hyaluronidase—of bee venom give rise to immunization, whereas the non-enzymatic but pharmacologically highly active toxin-fraction I seems to be non-antigenic.

The investigations will be extended, and a detailed description of methods and results will be published in the dissertation of one of us (El K.).

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Formation of Erythulose from Hydroxypyruvate in the Presence of Yeast Carboxylase

HYDROXYPYRUVATE is a metabolite which can arise from the biological oxidation of glycerate¹, transamination of serine², or decarboxylative condensation of glyoxylate³. In the presence of cocarboxylase, magnesium ions and transketolase, it yields 'active' (cocarboxylase-bound) glycolaldehyde, capable of forming a ketopentose 5-phosphate with D-glycer-aldehyde 3-phosphate^{4,5} or sedoheptulose 7-phosphate with D-ribose 5-phosphate^{5,6}. Transketolase decarboxylates hydroxypyruvate only when a suitable acceptor aldehyde is present⁵ (acetaldehyde will not serve⁷) and does not decarboxylate pyruvate^{5,7}. Crude yeast pyruvate carboxylase, on the other hand, has been stated not to decarboxylate hydroxypyruvate⁸.

The conclusions of Akabori *et al.*⁹ that muscle minces cause a decarboxylative acetoin type of condensation of dihydroxyfumaric acid, leading by way of a hydroxypyruvate intermediate to the formation of tetrose and hexose sugars, led us to re-investigate the action of partially purified yeast carboxylase, prepared from several varieties of yeast, on pure lithium hydroxypyruvate¹. Contrary to the experience of Meister⁸, we observed a slow steady decarboxylation at pH 5, and this became vigorous at pH 6.5. Colorimetric estimation¹ confirmed the disappearance of hydroxypyruvate, with little or no formation of free glycolaldehyde. A neutral reducing substance accumulated in good yield, having *R_F* on paper chromatographic analysis in phenol/water of 0.695, identical with that of pure L-erythulose and distinct from that of erythrose (*R_F* = 0.65). This enzymically synthesized tetrose gave a crystalline *o*-nitrophenylhydrazone (found *N* = 16.5 per cent, calc. 16.5 per cent), melting point 150°, unchanged on admixture with authentic erythulose *o*-nitrophenylhydrazone. Determination of the optical rotation in ethanol of this derivative gave $[\alpha]_D = +48^\circ \pm 3^\circ$, thus characterizing the sugar as L-erythulose. The output of carbon dioxide in relation to the loss of hydroxypyruvate indicates the reaction to be: