On the mechanism of amylase synthesis

The increase of amylase activity in a soluble system from acetone-dried pigeon pancreas was reported previously[1]. The detailed account of this work[2] and further results[3,4] are in press. Owing to external difficulties in the publication of these papers, we wish to summarize our recent findings.

In the soluble system referred to above, amylase activity increases if ATP, the salts of a Krebs saline solution and a mixture of amino acids are added. The amino acid mixture can be replaced by 0.5 mg/ml L-arginine + 0.5 mg/ml DL-threonine. Addition of other amino acids did not further influence the increase of amylase activity (Table I, Expt. 1). It is remarkable that the increase in amylase activity is inhibited by the addition of minimal amounts of D(−)-*threo*-chloramphenicol, *p*-fluorophenylalanine, or ribonuclease (Table I, Expt. 2–4). In our opinion, amylase is synthesized in this system from a precursor protein. The two amino acids are used for this synthetic reaction and it will proceed only in presence of a ribonucleic acid. The precursor seems to be adsorbed on this surface, as is indicated by the *p*-fluorophenylalanine inhibition.

TABLE I

Reaction mixture: 0.4 ml water extract of acetone-dried pigeon pancreas + 0.6 ml incubation mixture. The latter contained 1 ml 10% neutral ATP solution, 3.2 ml of doubly-concentrated Krebs-saline solution and 0.3 ml amino acid mixture. The mixture was incubated at 37° C. Amylase activity is expressed in Smith and Roe units.

Expt. No.	*Inhibitor*	*Amylase units/ml mixture*	
		At zero time	*Change in 45 min*
1 a. Casein hydrolysate	—	4950	+ 560
b. Threonine + arginine	—	3930	+ 600
2 a. Threonine + arginine	—	4150	+ 950
b. Threonine + arginine	Chloramphenicol (1 μg/ml)	4360	− 290
3 a. Threonine + arginine	—	3590	+ 590
b. Threonine + arginine	*p*-Fluorophenylalanine (100 μg/ml)	3810	− 120
4 a. Threonine + arginine	—	4540	+ 1060
b Threonine + arginine	Ribonuclease (16 μg/ml)	4700	− 80

We found that the observed synthesis of amylase in a granular fraction ("mitochondria") of pigeon pancreas[5] requires the same constituents: ATP, salts, threonine and arginine. HOKIN[6] has already found the synthesis of amylase in pancreas slices to suffer more by the absence of threonine and arginine, than by the absence of the other amino acids.

It seems likely that this secretory enzyme is formed *in vivo* in at least two steps, the second step being a partial synthesis from precursor protein and arginine + threonine.

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Molecular interaction between purines and steroids

A discussion of the results of WEIL-MALHERBE[1], and of WEBER[2] concerning the ability of purines to form molecular complexes with polycyclic aromatic hydrocarbons and riboflavin led to the suggestion that purines might also form complexes with steroid hormones. During the past few years exploratory experiments have been conducted, and we wish to describe here the results of these experiments. A more detailed study of one of the observed interactions has been recently completed in collaboration with Dr. ALLAN U. MUNCK and will be reported separately.

The method of investigation has been to measure the solubility of steroids in buffered aqueous solutions of purine compounds. Finely divided solid steroid was added to purine solutions and