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INFLUENCE OF ZINC IONS ON COTTON PYROPHOSPHATASE

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Continuing a study of the physicochemical properties of cotton pyrophosphatase, we have investigated the influence of zinc ions on the hydrolytic activity of the enzyme, which exhibits its maximum action at pH 8.6 [1, 2].

The necessity for the presence of zinc ions in the hydrolysis of pyrophosphate has been reported in a number of papers by S. M. Avaeva et al. [3, 4].

The pyrophosphatase activity was measured by a method described previously [5].

The results of our investigations have shown that with a rise in the concentration of zinc ions in the incubation medium the activity of cotton inorganic pyrophosphatase also increases (Fig. 1, curve 1). Higher concentrations of these ions led to an inhibition of the hydrolytic activity of the enzyme. Thus, the maximum activity of the pyrophosphatase is reached at 1 mM $ZnCl_2$ in the medium (at a concentration of PP_i of 3 mM). A further rise in the concentration of zinc ions in the incubation mixture is accompanied by an inhibition of hydrolytic activity of the enzyme, and at a concentration of zinc ions of 4 mM their inhibition already amounts to 70%.

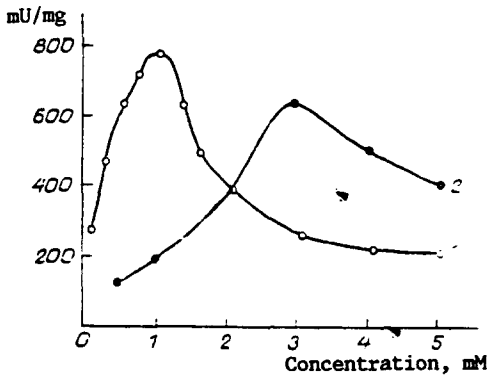

Fig. 1. Inhibition of the Zn^{2+}-activated hydrolysis of pyrophosphate: 1) with an excess of metal at a substrate concentration of 3 mM; 2) with an excess of substrate at a constant concentration of $ZnCl_2$ of 0.5 mM.

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In this connection it is interesting to mention the inhibition of the reaction by an excess of PP_i at a constant concentration of $ZnCl_2$ of 0.5 mM (Fig. 1, curve 2). It is not excluded that the inhibiting effect is connected with the accumulation of complexes of the metal–pyrophosphate type ($ZnPP_i^{2-}$ and Zn_2PP_i), as has been established previously for yeast pyrophosphatase [3].

Thus, summarizing the results on the activity of cotton alkaline pyrophosphatase in the presence of magnesium ions [2] and zinc ions, it can be stated that the affinity of metal ions for cotton pyrophosphatase, and also its complex with pyrophosphate, is higher for zinc ions than for magnesium ions.

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AMINO ACID COMPOSITION AND BIOLOGICAL VALUE OF PROTEINS OF THE WOODY VERDURE OF SEA BUCKTHORN

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In our preceding publication [1] it was reported that the woody verdure of the sea buckthorn is rich in protein substances (up to 27% on the absolutely dry substance), the overwhelming bulk of which (about 97%) consists of soluble proteins, the majority of which, in their turn, are represented by water-soluble and alkali-soluble proteins. The same paper gave information on the amino acid composition of the water-soluble protein fraction, on the basis of which indices of the biological value of the water-soluble proteins were based. The biological values of this protein fraction is comparable and even superior to the analogous indices of traditional fodder crops.

TABLE 1. Amino Acid Composition of the Alkali-Soluble Proteins of the Woody Verdure of the Sea Buckthorn

Amino acid	Amount, % on the total amino acids				
	June	July	August	September	October
Lysine	3,30	4,66	6.08	4,84	4,87
Histidine	3,85	3,79	4 67	3.61	4,31
Arginine	4,04	4,49	5.89	4,67	4.81
Cystine	1,89	2,02	2.43	1,15	2,04
Aspartic acid	15.91	11.43	11,37	13,93	6,43
Threonine	7,13	6,01	5,45	5,18	10,04
Serine	9,71	7,29	10,64	7,21	11.12
Glutamic acid	16,48	13.94	11.76	16,39	14,23
Proline	3 29	1.34	2.05	5,66	2,20
Glycine	7,11	6,73	7,39	8,03	8.67
Alanine	5,24	5,97	6,06	6,72	6,50
Valine	2,99	6,70	4,92	4,10	3,86
Methionine	0 50	0,15	0,25	0,25	0,21
Isoleucine	4,21	2.98	2,03	2.38	2,23
Leucine	7,12	14,65	12,09	8,44	9,60
Tyrosine	4,30	3.08	2.62	3,28	3,16
Phenylalanine	4,45	4,72	4.90	4.26	5,61
Sum of the essential amino acids	34,59	44,97	40,77	33,77	41,62

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