

Physiological mechanisms and specificity of silkmoth *Bombyx mori* L. response on exogenous nucleic acids effects

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The grains, caterpillars, pupas and silkmoth larvae are widely used as an experimental stuff in biochemical, genetic and other researches. This fact can be explained by the whole range of particularities of the silkmoth's experiments that profitably differ this specimen from other laboratory animals – rapid digenesis, frequent recurrence of the histolysis and histogenesis processes in the development cycle, growing conditions are simple enough, possibility of working with large quantity of the specimens, practical value.

Using the silkmoth as an experimental specimen, such important biophysical problems, as the ways of nitrogen assimilation, mechanism of the protein biosynthesis, regularity of amino acids, carbohydrates and fats exchange, chemistry and biochemistry of hormones, biochemistry of ontogenesis, correlation of proteins and carbohydrates exchange, biochemical aspects of the organism and its environment interconnection and others, are worked out.

The silkmoth is particularly useful for researches directed on studies of the silkmoth organism response on directive effect of the highly specific compounds – morphogens, especially exogenous nucleic acids. As a result – it is an important practical solving of the problem how to increase the total vitality and producing capacity level of the specimen. The peptide bonds synthesis scale and intensity of their formation in the silkmoth organism are exceptionally larger than in other biological specimens. In the silk gland cells, only two studied and different proteins (fibrin and sericin) are synthesized, that allows to study different novel approaches concerning mechanism of the nucleic acids effect on protein bodies biosynthesis. Moreover, silk protein synthesis characterizes by the unique amino acid compound, and is accompanied by intensive trophic, tissular proteins and

amino acids rearrangement in the first periods of the silkmoth growing. Similar effects are observed in the moult and metamorphosis processes.

As the productivity stimulants, native and modified by thiophosphamide and cyclophosphamide DNA and RNA, and 1-ethoxysilolan, as the best of known analogues of the silkmoth productivity, were used.

The nucleic acids and migugene introduction to the silkmoth organism were done by treating mulberry leaves with working solutions of preparation. The counts and removal of specimens, that died according standard methods, were systematically conducted.

The investigations determined, that the age dynamic of the caterpillars' mass, grown using exogenous nucleic acids, brings to the effect of stimulation of the growth metabolism and silkmoth germination. The maximum effect obtained in the variant with DNA modified by thiophosphamide and native yeasty RNA using. The maximum of caterpillars' mass increasing comparing to control was 20,7.

The protein and hemocytes content in hemolymph of the 5th age caterpillar listed in the table. It was determined considerable increasing of the protein and hemocytes in the caterpillars of those variants, where the preparation on DNA source were used, that correlates with high protein in hemolymph specimens of these variants, and as a result, reflects metabolism intensity and high level of the protein reserves in organism.

The growth of the silk gland, determined by matching of the silk gland mass and the caterpillar body mass showed that along with proportional growth of the both indexes, specimens of the experimental variants comparing to control have increase of the silk gland weight. This particularity, together with total increase of the silk gland mass, determines possibility of larger quantity of the silk secreting.

As a result of exogenous nucleic acids effect, the dynamics of the cell composition of the silkmoth caterpillar hemolymph undergoes the changes, that characterizes increasing of the mature, phagocytized hemocytes (granulocytes) with simultaneous decreasing the number of the young forms (plasmocytes) during the total amount of cell elements oscillation. In the beginning, the largest

decreasing of the hemocytes number (57,7% concerning the control) changes into short-term increasing (to 136,6%) with following decreasing of their content and with gradual norm approximation. The disintegrated, died cells number, that considerably increases (maximum to four times), testifies the progress of the pathologic process in organism. The morphologic structural failures of hemocytes are universal too and reveal in the pathologic vacuolization of hemocytes cytoplasm, that accompanied by cytomembrane rupture and their death.

The quantitative and qualitative composition changes of the free amino acids of the silkmoth caterpillar hemolymph content, as a result of exogenous nucleic acids effect, lie in the gradual increasing of the amino acids total content, achieving its maximum on the 10th day, and then gradually stabilizes to norm. It is significant and very important for understanding the metabolism intensification mechanism of the experimental caterpillars – amino acids appear, that were not detected in control specimens, - first, praline and methionine, than tyrosine and valine. The aspartic acid was not detected, alanin disappears. Further, high level of amino acid content in caterpillar hemolymph is observed until the term of cocoon formation.

Thus, the exogenous nucleic acids stimulate the growth, germination and viability of the silkmoth. The hemolymph response on acids effect appears in increasing of the protein concentration and hemocytes number after the exchange process intensification.

The protein and hemocytes content in hemolymph of the silkmoth caterpillar, grown using nucleic acids

Variants	The protein number, %	td	The hemocytes number		td
			spec./ mm ³	%	
Deoxyribonucleic acid (DNA)	12,8±0,6	2,6	6609±417	160,7	2,2
DNA modified by thiophosphamide (DNT)	13,3±0,7	3,4	6512±621	158,3	2,1
DNA modified by cyclophamide (DNC)	12,1±0,5	2,2	6492±426	157,8	2,0
Native yeasty RNA	13,1±0,7	3,1	6721±510	163,4	2,4
Modified RNA (RN)	12,0±0,4	2,2	6395±380	155,5	0,5
RNA modified by thiophosphamide (RNT)	11,8±0,5	1,8	6257±324	152,1	- 0,3
RNA modified by cyclophamide (RNC)	11,6±0,4	1,7	6312±306	153,5	- 0,1
1-ethoxisilotran (best analogue)	10,8±0,5	-	6304±224	153,3	-
Control	10,4±0,3	-	4112±286	100,0	-

Note: The value of td counted for each preparation comparing to the best analogue.