

Joint Institute for Nuclear Research



**MODERN PROBLEMS OF GENETICS,  
RADIOBIOLOGY, RADIOECOLOGY  
AND EVOLUTION**

*The Second International Conference  
dedicated to the 105th anniversary of the birth  
of N. W. Timofeeff-Ressovsky and the 70th anniversary  
of the paper «On the Nature  
of Gene Mutations and Gene Structure»  
by N. W. Timofeeff-Ressovsky, K. G. Zimmer,  
and M. Delbrück*

Yerevan, September 8–11, 2005

**ABSTRACTS, PAPERS BY YOUNG SCIENTISTS**

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The collection contains theses of the reports and competition papers by young scientists presented at the conference. The theses and young scientists' papers are published in the authors' wording.

**Современные проблемы генетики, радиобиологии, радиоэкологии и эволюции:** Вторая междунар. конф., посвященная 105-й годовщине со дня рождения Н. В. Тимофеева-Ресовского и 70-летию публикации статьи Н. В. Тимофеева-Ресовского, К. Циммера и М. Дельбрюка «О природе генных мутаций и структуре гена» (Ереван, 8–11 сентября 2005 г.): Аннот. докл. и статьи молодых ученых. — Дубна: ОИЯИ, 2005. — 318 с.

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Сборник содержит аннотации докладов, представленных на конференцию, а также короткие исследовательские статьи, включенные в конкурс молодых ученых в рамках конференции.

Издание представляет интерес для специалистов в области генетики, радиобиологии, радиоэкологии и эволюции.

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# GENETICS AND EVOLUTION (WHAT WE DON'T KNOW)

*N.V. Glotov*

Mari State University, Russia

During the classic period of genetics, application of genetic methodology to the theory of evolution resulted in formulation of synthetic evolution theory. The essence of the latter was stated as an ultimate laconic scheme by N.V. Timofeev-Ressovsky, in the paper published in the *Botanical Journal* (1958, T.43, N 3, pp.317-336; in Russian). Skyrocketing of genetics during the following half-century provided new important information for genetic characteristics of the evolution process, revealing fundamental posers to indicate shortage of our knowledge. Some of these posers are as follows:

In regard to the species formation, what is the role of non-canonical autogenous variability (as migratory genetic elements, chimeric genes in cytoplasmic male sterility, etc.)?

The “silent” part of genome – what would be its role in evolution if revealed?

What is the role of major heritable ontogenetic transformations (“happy monsters”), if regarded to fast shifts of modifier gene frequency values showing significant influence upon trait manifestation and expressivity ?

Fitness of the moment – is it correlated to possibility of evolutionary transformations?

Epigenotype formation – is it important for a species maintenance or/ and for evolutionary transformations?

Are radical environment changes obligatory for evolutionary transformations?

Pattern of a species population structure – is it of any significance for possibility and direction of evolutionary changes?

The major problem probably concerns to understand cell-genome as an integral structure, and a population – as an ecological-and-genetic structure.