Joint Institute for Nuclear Research

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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

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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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FROM THE MUTATION THEORY TO THE THEORY OF MUTATION PROCESS

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Contemporary concept of mutagenesis originates from Korzhinsky - de Vries (1899-1901) mutation theory of evolution, based upon study of discrete inherent phenotypic variations. Since that time development of the theory of the gene (Johanssen, 1909, Morgan 1926) and discovery of radiation mutagenesis (Muller, 1927) led to the deeper understanding of mechanisms of mutational process.

Three men's paper (Timofeeff-Ressovsky, Zimmer, Delbruck, 1935) launched the modern paradigm in genetics and presented the first radiobiological study of the gene as a macromolecule. The theory developed, though a bit formalistic, nevertheless served as a stimulus for the further study of the physiology of the gene and of its' mutational transitions, the same as the molecular biology in general. More specific description of mutagenesis started with the physiological hypothesis of mutational process, initiated by Lobashev (1946), who put together "mutation" and "repair". He did it more than 20 years before von Borstel, who connected mutations and mistakes of 3R (replication, recombination and repair) late 60-ies of the XX c. The forthcoming general theory of mutational process now is connected with the dynamics of genetic material underlying its evolutionary conservation. Contemporary view of variability connects mutations with the template principle in biology founded by Koltsov and Timofeeff-Ressovsky (convariant reduplication principle) in the late 30-ies of the XX c.

The theory of mutational process today is still contradictory putting together a set of events heterogeneous by their mechanisms: true gene mutations in one hand and so-called chromosome and genome mutations in the other hand. It is evident that chromosome rearrangements and transpositions are connected rather with recombinations than with real mutations. Genome mutations are also cannot be considered the same way as mutations being connected with cytosceleton abnormalities. This is only a part of wider problems encountered now by the general theory of variability destined to embrace inherent and non-inherent variations such as modifications, ontogenetic variability and epigenetic variations (and inheritance). The widely accepted classification of variability deserves a revision, basing rather upon mechanisms than on phenomenology of the processes under investigation.