

Review of the project  
«The molecular genetics of radiation-induced changes  
at the gene, genome and transcriptome level  
in *Drosophila melanogaster*»  
(2017-2022, LNP)

The project under consideration involves an in-depth and comprehensive study of the effects of exposure to ionizing radiation on the animal genome. The study of the structure of induced damage to genetic material at the molecular level remains an important task, despite the fact that the analysis of the various effects of radiation was started many years ago. The reason lies in the fact that the classical achievements of radiobiology and radiation genetics concern mainly the effects at the organismal, cellular and chromosomal levels, while the information on the molecular nature of mutations caused by ionizing radiation remains rather scarce. Meanwhile, it is obvious that without characterization of induced mutagenesis at the molecular level, radiobiology cannot correspond to the modern development of science as a whole. The project under review largely fills the existing gaps in knowledge and represents a purposeful attempt to systematically study radiation damage at the level of the whole genome, its expression and individual genes, taking into account the differences in their size, structure and localization.

The high demand for the proposed research is currently due to the need to adequately assess the biological effects of various damaging factors, including radiation, in new, changing environmental conditions; the need to create a scientifically sound strategy for protection from their effects; as well as in connection with plans for the development of outer space.

I would especially like to note that the work is based on the study of a unique collection of *Drosophila* lines and radiation mutants obtained earlier by I. D. Alexandrov and M. V. Alexandrova and collaborators. This largely determines the originality of the considered project, its novelty and - potentially - a particularly valuable contribution to radiobiology and genetics. Based on the analysis of a unique set of mutations using state-of-the-art research methods, the study can shed new light on the molecular nature of radiation-induced genome damage and its molecular mechanisms. The work intends to investigate not only the two types of irradiation, but also their effects on five different genes. This is an undoubted merit of the work.

The project leader and key executors (I. D. Alexandrov, I. A. Zakharov-Gezekhus, M. V. Alexandrova, V. A. Chistyakov) are well known specialists in radiation biology and animal genetics; their high qualification is beyond doubt. I am familiar with the works of the young participants of the project, K. P. Afanasieva and S. V. Korabinova, whose qualifications also seem quite adequate to the level needed to carry out the project. Importantly, the qualifications of the team correspond to the experimental tasks set in the project. Overall, the staffing seems to be very good.

After reviewing the brief application provided to me, I do not have the opportunity to discuss specific details concerning the adequacy and optimality of the proposed approaches and methods, but it is obvious that, with sufficient funding, the goals and objectives of the project are technically feasible. Considering that the work will use a unique collection of lines with radiation-induced mutations; the JINR has unique equipment necessary to replenish the

collection if necessary; the team is highly qualified in this field of research, the competitiveness of the project seems very high.

Having evaluated the interim formal results of the project, I would like to wish the team more intensive publications in highly ranked international journals. I think that this will be quite possible as the results of different directions of their work are accumulated.

Summing up, based on the expertise carried out, I recommend classifying the project as Category A.

Elena G. Pasyukova

Ph. D., Dr. Sci., Professor of Genetics  
Head of the Laboratory of Genome Variation  
Institute of Molecular Genetics of NRC "Kurchatov Institute"  
Moscow, Russia  
tel.: +7-499-1961909  
e-mail: [egpas@rambler.ru](mailto:egpas@rambler.ru)

