

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Aleksandra Strotskaya

PhD Program: Life Sciences

Title of Thesis: Effects of Targeting by the *Esherichia coli* I-E CRISPR-Cas System on Infection by Various Phages.


Supervisor: Professor Konstantin Severinov

Chair of PhD defense Jury: Professor Yuri Kotelevtsev

Email: y.kotelevtsev@skoltech.ru

Date of Thesis Defense: October 24, 2017

Name of Reviewer: Konstantin Miroshnikov

<p><u>I confirm the absence of any conflict of interest</u></p> <p>(Alternatively, Reviewer can formulate a possible conflict)</p>	<p>Signature:</p>  <p>Date: 18-09-2017</p>
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The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to forward a completed copy of this report to the Chair of the Jury at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.

If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.

Reviewer's Report

Reviewers report should contain the following items:

- Brief evaluation of the thesis quality and overall structure of the dissertation.
- The relevancy of the topic of dissertation work to its actual content
- The relevancy of the methods used in the dissertation
- The scientific significance of the results obtained and their compliance with the international level and current state of the art
- The relevance of the obtained results to applications (if applicable)
- The quality of publications

- The summary of issues to be addressed before/during the thesis defense

The reviewed PhD thesis presented by Aleksandra Strotskaya is devoted to the complex investigation of molecular aspects of interactions between bacterial I-E CRISPR-Cas defence system and bacterial viruses at the early stage of viral infection. Within the last decade the studies of bacterial CRISPR-Cas system comprising the molecular “immune system” of bacteria preventing the viral metabolic takeover and, thus viral infection effectivity is a noticeable part of modern molecular biology, microbiology, and virology. Despite the prospects to use this system in gene tailoring, and very high biotechnological expectations, many peculiarities of CRISPR-Cas system remain unclear. Therefore the project performed by A. Strotskaya clarifies how the system functions in its “natural environment” – *E.coli* infected by various tailed and filamentous phages.

The dissertational manuscript is traditionally composed. The “Literature review” section provides a detailed overview of bacteriophage viral cycle and bacterial defense strategies. The section is perfectly structured, and the reviewed material is complete and critically estimated. This part of the dissertation gives a reasonable background to estimate the project in general, and may be useful for students and researchers specializing in molecular virology.

The description of used research methods is complete and detailed enough for independent laboratory reproduction. All described molecular-biologic, microbiologic, and physical methods are relevant for the goals of the work.

Obtained results are convincing and well illustrated. The conclusions correspond to the results. The content of the dissertation is published in leading international journals. It’s hard to predict the applied potential of the work, the results mostly lay in the field of fundamental science. However, the knowledge of how the CRISPR-Cas system functions in case of Lambda, M13, T5, T7 and T4 phage infection is certainly useful for planning the application of this gene tailoring strategy.

Minor notes concerning the interpretation of obtained results do not affect the overall positive opinion about the presented thesis. As a result of the review, Aleksandra Strotskaya’s thesis “Effects of Targeting by the *Esherichia coli* I-E CRISPR-Cas System on Infection by Various Phages” is recommended for formal defense, and is worth a Doctor of Philosophy degree.

Provisional Recommendation

I recommend that the candidate should defend the thesis by means of a formal thesis defense

I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate’s thesis according to the recommendations of the present report

The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense