Skoltech
Skolkovo Institute of Science and Technology

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Daria Artamonova

PhD Program: Life Sciences

Title of Thesis: Comparative Analysis of the Action of Eubacterial Class 1 CRISPR-Cas Systems.

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: Asst. Prof. Dmitriy Papatsenko, CDIBB

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	**Signature:** Papatsenko **Date: 18-06-2017**

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

Thesis work by Artamonova D.N. "Comparative analysis of the action of eubacterial class 1 Crispr-cas systems" is devoted to investigation of primed and naïve adaptation by the I-F subtype CRISPR-Cas system of Escherichia coli and the Pseudomonas aeruginosa and study of III-A and III-B subtypes CRISPR-Cas systems of the bacterium Thermus thermophilus.

Currently, CRISPR-Cas systems are in the focus of intensive investigation, great hopes are associated with CRISPR-Cas genome targeting and genome editing tools. Many research techniques aimed at genome screening or lineage tracing may also utilize CRISPR-Cas systems. Since there are many such systems are already present in bacteria, it is essential to explore this great natural diversity of molecular mechanisms and their responses to different phages. Clearly, some of the identified mechanisms can provide new insights on how the bacteria can fight the phage infections and help to improve the existing or introduce new CRISPR-Cas based tools and applications.

For the described reasons, the proposed direction of this thesis work and the major goals appear to be on the bleeding edge of current research and technology in biological sciences.

Major findings of this thesis work include discovery of high diversity of molecular mechanisms of functioning of CRISPR-Cas systems, in particular, it has been found that differences in the molecular mechanisms of action are observed not only among different types and subtypes of CRISPR-Cas systems, but even among systems belonging to the same CRISPR-Cas subtype, but encoded in different bacteria.

The dissertation manuscript is very well written and contains substantial backgrounds and clear well-though diagrams and images illustrating major scientific findings. Very deep analysis of the existing literature has been performed and relevant conclusions have been derived from the results. The amount of the work, quality of the preformed research and quality of publications, along with significance of the selected research direction fully justify this work as a completed PhD thesis project.

Few minor wishes (which may be addressed at the time of defense) from the side of the reviewer: (a) Clearly it is hard to predict future practical application involving molecular mechanisms described in this dissertation, but maybe it is possible to discuss these applications in future publications or at the time of dissertation defense. (b) The conclusions are clear, but it may be better to expand this section a bit and add few sentences describing contexts (e.g "this was not known before", or "this is a qualitatively new mechanism" or else), so the impact of the findings would be more clear to a non-specialist in this particular field. One more column in table 6 with such comments may really help with this respect as well. All these issues may be addressed during defense.

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*