Skoltech
Skolkovo Institute of Science and Technology

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Alexander Martynov

PhD Program: Life Sciences

Title of Thesis: Using mathematical modeling to understand prokaryotic adaptive immunity

Supervisor: Prof. Konstantin Severinov

Co-Supervisor: Prof. Jaroslav Ispolatov

Chair of PhD defense Jury: Prof. Mikhail Gelfand   *Email: m.gelfand@skoltech.ru*

Date of Thesis Defense: 25 October 2018

Name of the Reviewer:

I confirm the absence of any conflict of interest	Signature:
No conflict of interest	
	Date: 29/11/2018

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 submit signed copy of the report 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

- Brief evaluation of the thesis quality and overall structure of the dissertation.

The dissertation is well written and is quite readable. The quality of English is very good (minor mistakes and typos which I spotted are pointed out in the attached PDF-file). Perhaps the number of figures in the section 3 is a bit overwhelming. It is difficult to find the important ones. Also, some potentially confusing mathematical notation used in Eqs. (3.7) and (3.9) is indicated. Finally, I fid it a bit confusing at first that the dissertation quantifies probability of survival of a given cell after an arbitrary time instead of the death rate. If I was preparing the figures I would use the death rate. I do not recommend redoing the figures though as it is a lot of work and there is no principal difference between these two measures of CRISPR effectiveness.

- The relevance of the topic of dissertation work to its actual content

Content is relevant to the topic.

- The relevance of the methods used in the dissertation

Computational methods (my area of expertise) are relevant. The candidate demonstrated familiarity with current analytical and numerical techniques.

- The scientific significance of the results obtained and their compliance with the international level and current state of the art

Results are scientifically significant as they provide a new explanation to one of the long-standing mysteries of CRISPR systems: what determined the number of spacers in a genome? I also found the results in the plasmid section of the proposal are neat and interesting. Are they being prepared for publication?

- The relevance of the obtained results to applications (if applicable)

Applications are not my area of expertise.

- The quality of publications

PLoS Comp Bio is a respectable journal. One publication is a bit on the low end of the spectrum but I assume that the plasmid results are also being prepared for publication. Is it true?

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

Address minor points in the attached PDF file and correct a few typos.

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*