Skoltech
Skolkovo Institute of Science and Technology

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Viktor Mamontov

PhD Program: Life Sciences

Title of Thesis: Escape mechanisms of mobile genetic elements against CRISPR-Cas system and diversity in microbial communities

Supervisor: Professor Konstantin Severinov

Name of the Reviewer: Dmitry Chudakov

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	**Date: 30-12-2023**

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.

Overall structure – ok. Abstract could be formulated more logical, to better link or at least to describe the distinct parts of the work more clearly.

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

Relevant.

- The relevance of the methods used in the dissertation

Relevant.

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

First part of the thesis (Chapter 2) describes investigation of kinetic equilibrium between CRISPR-Cas nuclease activity against the plasmid and plasmid replication, allowing for a subpopulation of plasmid-bearing cells survive and proliferate.

Experimental part is clear, and interpretations seem reliable. Nice experiments in microfluidic growth chambers)) I should say that very similar sector-like and fading plasmid loss behavior we often observed in growing colonies when developing different fluorescent proteins. We usually associated this with the negative influence of fluorescent protein itself (some of them can be toxic for E coli when expressed at high level), making it beneficial for the colony to lose expression.

Altogether, this part of the work, published in PNAS, with the PhD student first authorship, looks like a valuable contribution to the understanding of possible ways of bacterial evolutionary adaptions. Here, from the point of ability to support some low proportion of seemingly foreign and dangerous plasmid inside, that allows to diversify bacterial phenotypes allowing for some compromise-looking progeny to survive.

Second part of the thesis (Chapter 3), recently published in Scientific Reports, with Victor Mamontov middle authorship, is a very technical yet useful piece of work, comparing DNA isolation methods for investigation of marine genomics and metagenomics.

Third part of the work (Chapter 4), published in Int J Mol Sci, with Victor Mamontov middle authorship, evaluates the basic features, activity against enteropathogens and safety of two E. coli strains isolated from farm animals, as a potential probiotic drug for farm use.

Altogether, I believe that the thesis Victor Mamontov are good enough to obtain PhD degree, with a major scientific contribution published in PNAS with the first co-authorship, and two more technical, yet useful manuscripts published.

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

Two technical works are both relevant to future practical applications, in marine biology studies and drug discovery, and agribusiness, respectively.

- The quality of publications

Sufficient for PhD.

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

No major issues.
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*