



Přírodovědecká
fakulta
Faculty
of Science

Jihočeská univerzita
v Českých Budějovicích
University of South Bohemia
in České Budějovice

SUPERVISOR'S STATEMENT ON BACHELOR THESIS

Name of the student: Marco Halbeisen
Study program: Biological Chemistry
Department/Institute: Institute of Chemistry
Thesis title:

Supervisor: Roman Tuma
Supervisor's affiliation: Institute of Chemistry

Point scale¹ Points

(1) FORMAL REQUIREMENTS

Formal and graphical quality of the thesis	0-3	2
Ability to work with literature	0-3	3
Language and stylistics	0-3	3
Formal requirements – points in total		8

(2) PRACTICAL REQUIREMENTS

Fulfillment of the aims	0-3	3
Ability to understand the results, their interpretation, and clarity of the results, discussion, and conclusions	0-3	3
Discussion quality – interpretation of results and their discussion with the literature	0-3	2
Experimental difficulty of the thesis, independence in experimental work	0-3	3
Contribution of the thesis to the knowledge in the field and the possibility to publish the results (after eventual supplementary experiments)	0-3	3
Practical requirements – points in total		14

POINTS IN TOTAL (MAX/AWARDED)

24

22

¹ Mark as: 0-unsatisfactory, 1-satisfactory, 2-average, 3-excellent.

Comments of the supervisor on the student and the thesis:

Marco started this project during the difficult time of full-blown SARS-Cov-2 pandemics with all the consequences of restricted travel and access to the labs. Undeterred, he used his excellence in exact science and took full advantage of “telecommuting” to do a computation-based project. This part, molecular modelling of the TBEV polymerase and its complex with the helicase domain, forms the first part of the thesis. Marco then followed closely what was going in the wet lab and started to ask mechanistic questions about the helicase. He took advantage of the new crystal structures of the helicase and modelled RNA into it and then by a computational “tour-de-force” took the system through the ATPase cycle. That led to an important mechanistic insight about the interplay between RNA interactions and phosphate release, which constitutes the second part of the thesis. Knowing the limitations of modelling Marco was eager to test the mechanistic hypotheses, e.g. roles of key amino acid side chains, experimentally. As soon as the pandemics allowed, he came to the lab, generated several mutants, and tested their ATPase activity and interpreted the results.

Concerning the thesis, I have only few critical remarks. Some improvement could be made to figure presentation, labelling and text proofreading. I also found the discussion rather shallow, lacking side-by-side comparison with existing, structure-based, models for helicase action.

While the polymerase complex modelling proved to be rather educational exercise in limitations of these approaches, the helicase models and mechanistic insights are already included in one manuscript which is under revision in J. Biol. Chem., and another publication, concerning the phosphate release, is being prepared. Overall, Marco’s conduct in the lab and his approach was highly professional and productive, his engagement and independence were on the level of graduate student, and his work has significantly contributed to the mechanistic understanding of viral helicases.

Conclusion:

In conclusion, I

r e c o m m e n d *

the thesis for the defense.

In **České Budějovice** date **7.6. 2022**

signature