



Přírodovědecká
fakulta
Faculty
of Science

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

STATEMENT OF THE BACHELOR THESIS REVIEWER

Name of the student: Lisa Hain

Thesis title: Understanding the role of bbo454 during infection by *Borrelia afzelii*.

Supervisor: Ryan O.M. Rego, PhD

Reviewer: Alejandro Cabezas-Cruz, DVM, MSc, PhD

Reviewer's affiliation: Center for Infection and Immunity of Lille (CIIL), INSERM U1019 – CNRS UMR 8204, Université Lille Nord de France, Institut Pasteur de Lille, Lille, France.

	Point scale ¹	Points
(1) FORMAL REQUIREMENTS		
Extent of the thesis (for bachelor theses min. 18 pages, for masters theses min. 25 pages), balanced length of the thesis parts (recommended length of the theoretical part is max. 1/3 of the total length), logical structure of the thesis	0-3	3
quality of the theoretical part (review) (number and relevancy of the references, recency of the references)	0-3	2
Accuracy in citing of the references (presence of uncited sources, uniform style of the references, use of correct journal titles and abbreviations)	0-3	3
Graphic layout of the text and of the figures/tables	0-3	2
Quality of the annotation	0-3	3
Language and stylistics, complying with the valid terminology	0-3	2
Accuracy and completeness of figures/tables legends (clarity without reading the rest of the text, explanation of the symbols and labeling, indication of the units)	0-3	2
Formal requirements – points in total		17
(2) PRACTICAL REQUIREMENTS		
Clarity and fulfillment of the aims	0-3	2
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 (absence of discussion with the literature is not acceptable)	0-3	3
Logic in the course of the experimental work	0-3	3
Completeness of the description of the used techniques	0-3	3
Experimental difficulty of the thesis, independence in experimental work	0-3	3

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

Quality of experimental data presentation	0-3	2
The use of up-to-date techniques	0-3	3
Contribution of the thesis to the knowledge in the field and possibility to publish the results (after eventual supplementary experiments)	0-3	3
Formal requirements – points in total		25
POINTS IN TOTAL (MAX/AWARDED)		48 (0-48) ²

Suggestions and questions, to which the student has to answer during the defense:

- 1- What is the contribution of different tick stages to the natural life cycle of *Borrelia* spp.?
- 2- In what part of the life cycle of *Borrelia* spp. different glycosylation patterns would be more important for the survival of the bacteria? And why?
- 3- Page 19, it is not clear from the text whether the triplet "TTC" constitutes a codon or not. Why is this important in the present thesis? If TTC (UUC) is referred here as a codon, then it codes for a phenylalanine (F). Following the logic of the thesis, this "F" was found in the group including *B. burgdorferi* s.s., *B. americana*, *B. carolinensis*, and *B. finlandensis* (which I will call 1), but not in the other group including *B. afzelii*, *B. garinii*, and *B. bavariensis* (which I will call 2). In addition, this "F" was found as the only difference in the amount of amino acids of this protein between bacteria of the groups 1 and 2. However, figure 5 shows that the only amino acid difference between groups 1 and 2 is a serine (S) at position 171 and not a F. My comment/questions are: (i) please, check whether the difference between groups 1 and 2 is a F or a S, (ii) if the difference between groups 1 and 2 is a S, what would be the biological significance of such difference? And, from an evolutionary point of view, (iii) based on the tree in figure 6, do you think the last common ancestor of *Borrelia* spp. had this S in this gene or not?

Eventual mistakes, which the students should avoid in the future:

Some formal mistakes and misspellings were found:

- 1-The thesis would have benefited from a "Summary".
- 2- Not all references are in the same format. Without intention of being exhaustive in the revision, several examples can illustrate this point:
While for some references the "volume" is provided (e.g. Ref6), for other references this information is missing (e.g. Ref4). In Ref4, the page number seems also to be wrong (66-76 instead of 3-5).
Ref5 has ".....," after the title.
Ref22 appears to be a manuscript published in PNAS, however, the name of this journal is incomplete as "Proc. Natl. Acad. Sci".
It is not clear whether Ref12 is a book or a journal article. In addition, is "Boltzmann-institut L", referring to a name of an author? Or to the "Ludwig Boltzmann Institut"?
- 3- Most figures lack a caption, and most of the names of the figures are not very clear, therefore figures are difficult to understand.
- 4- Page 4, "... as in pili or flagella or they secrete into the environment..." should read "... as in pili or flagella or they are secreted into the environment..."

² Enter the number of points awarded.

- 5- Page 10, Table 1, letters should appear in black and no gray.
- 6- Page 11, Table 2 is not only one table, but two. The same for Tables 3 and 8.
- 7- Throughout the thesis, "sections" and "subsections" (e.g. 3.9, 3.10 etc) are called "chapters". This is not correct as "section/subsection" and "chapter" mean different things.
- 8- Page 19, I wonder whether "Table 11 and 12" should read "Table 10 and 11".

Eventual additional comments of the reviewer on the student and the thesis:

- 1- The thesis would have benefited from a figure showing the natural life cycle of *Borrelia* spp..
- 2- A formal taxonomic classification of the genus *Borrelia* should have been included.
- 3- A thesis is an academic exercise in which certain standards should be respected. Therefore in the future, please, try to avoid anecdotal passages such as "Due to lack of time..." (Page 23).
- 4- Page 24, "highly homologous" is not a correct expression, use "highly conserved" instead. In addition, you mentioned that this gene/protein is expected "to be highly homologous over all *Borrelia* genospecies, (however) this does not seem to be true". But, in fact, the results in tables 10 and 11 suggest that this gene/protein is highly conserved among *Borrelia* species/strains. Nucleotide and amino acid identities higher than 90% (such as those in tables 10 and 11) are usually considered as high.
- 5- Page 25, from this sentence "...multilocus sequence typing (MLST), the analysis of eight housekeeping genes on the chromosome...", it seems that "MLST" is the "analysis of eight housekeeping genes...." which is not the case. You can refer to MLST whenever you are typing multiple loci at the same time. In the particular case of Ref36, they used "eight housekeeping genes".

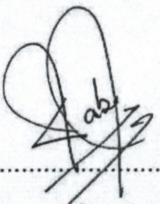
Conclusion:

The Bachelor thesis has a good quality both scientific and formal. The author uses different up to date molecular approaches to characterize the gene *bbo454* which encodes a glycosyltransferase in *Borrelia* spp. The experiments are combined with bioinformatics tools that complement the characterization of this protein. In general, glycosyltransferases and their biological relevance are poorly characterized in ticks and tick-borne pathogens. However, glycosylation plays very important roles in many biological processes, including infection and immune escape. Therefore, I consider this thesis as an important step towards a more complete understanding of the molecular basis of glycosylation in *Borrelia* spp., an important group of tick-borne pathogens.

In conclusion, I r e c o m m e n d the thesis for the defense and I suggest the grade 2.

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In Lille date 30.05.2016



signature

³ You can suggest a grade, which can be modified during the defense based on the presentation. However, if the reviewer is not present at the defense, the grade will not be counted.