



Přírodovědecká
fakulta
Faculty
of Science

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

OPPONENT'S REVIEW ON BACHELOR/DIPLOMA* THESIS

Name of the student: Robin Schürz

Thesis title: Comparison of metabolic pathways in insect symbiotic bacteria

Supervisor: Prof. RNDr. Václav Hypša, CSc.

Referee: RNDr. Ivan Fiala, PhD

Referee's affiliation: Institute of Parasitology, BC AS CR

Point scale¹ 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	1
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	1
Formal requirements – points in total		15

(2) PRACTICAL REQUIREMENTS

Clarity and fulfillment of the aims	0-3	3
Ability to understand the results, their interpretation, and clarity of the results, discussion, and conclusions	0-3	2
Discussion quality – interpretation of the results and their discussion with the literature (absence of discussion with the literature is not acceptable)	0-3	1
Logic in the course of the experimental work	0-3	3
Completeness of the description of the used techniques	0-3	2

* Choose one

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

Experimental difficulty of the thesis, independence in experimental work	0-3	1
Quality of experimental data presentation	0-3	1
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	2
Practical requirements – points in total		18

POINTS IN TOTAL (MAX/AWARDED)	48	33
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Comments of the reviewer on the student and the thesis:

The aim of the thesis is to compare the metabolic pathways of *Legionella polyplacis* from two lice species and to calculate and compare Ka/Ks parameters for molecular evolutionary analysis. I found the topic and results very interesting.

The introduction of the thesis is quite well written, but in my opinion very short and missing some important topics. In particular, I missed information about known biochemical pathways known from other symbiotic bacteria that can be discussed later. Problematic of Ka/Ks values should also be explained in the introduction, but it appears in the methodology.

Many abbreviations are used in the text, e.g. various computing servers or platforms, without their meaning being explained. I admit that they are well known and commonly used, but I would strongly recommend in the format of a Bachelor thesis to use e.g. a list of abbreviations in the appendix if one is not familiar with these abbreviations.

The methodology could be more detailed. For example, section 3.2 "Metabolic reconstruction" is very important for the thesis, but instead of a detailed description of the problem, it refers to Rihova et al. (2021), where the analysis was done in a "similar fashion". In the bachelor thesis the whole methodology should be described in detail, moreover Rihova et al. (2021) is not freely available, so it is not easily accessible for most readers.

The legend to the figures should be self-explanatory, e.g. with information on what the green colour means. I would welcome a better visualisation of the results of the KEGG Mapper. Also, it is not ideal to use different labels for enzymes in the text and in the figures with metabolic pathways, e.g. citrate cycle aconite hydratase is called K01681 in the text and in the figure, it is (probably) labelled 4.2.1.3. Another example can be seen in chapter 4.2.1: The text mentions two enzymes found in *L. polyplacis*_{ser} - transketolase and ribulose phosphat-3-empirase - with reference to Figure 12. I could not see these enzymes in this figure. Similarly, Figures 13 and 14 should show the differences in metabolic pathways between two bacteria, but the different enzymes are not highlighted - finding them is very problematic and inconvenient.

The English text could be more fluent, but overall the English is sufficiently good with some grammatical errors /e.g. page 36: "The pathway to produce acetyl-CoA is present but unfortunately is the enzyme to form citrate missing"/.

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

Mistakes, which the students should avoid in the future:

- 1) What was the criterion for the decision to classify the metabolic pathway as fully functional, semi-functional and non-functional?

2) You have noted some differences between the metabolic pathways of *L. polyplacis* from *P. serrata* and *L. polyplacis* from *P. spinulosa*. Can you comment on some phylogenetic/evolutionary aspects of this finding?

3) You have explained the functionality of incomplete metabolic pathways by arguing that the host supplies the pathway through its enzymes. How can this theory be proven?

4) In the last paragraph of the conclusion, you state that the number of synonymous substituents is higher, which means that bacteria have purifying selection in their genomes. Can you explain the term "purifying" selection? I would expect negative or positive selection in this context.

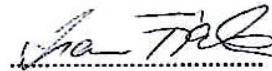
Conclusion:

In conclusion, I

r e c o m m e n d

the thesis for the defense and I suggest the grade **2** .

In **České Budějovice** date **19.1.2022**

A handwritten signature in black ink, appearing to read 'J. Tábek', written over a horizontal dotted line.

signature

