



Přírodovědecká
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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: Sarah Gahbauer

Thesis title: Three-Dimensional Visualization of Tick-Borne Encephalitis Virus Infection in Mouse Brain Tissue

Supervisor: RNDr. Marie Vancová, Ph.D.

Referee: Martin Strnad, Ph.D.

Referee's affiliation: Parasitology Institute, Biology Centre CAS & Faculty of Science, USB

	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	3
Accuracy in citing of the references (presence of uncited sources, uniform style of the references, use of correct journal titles and abbreviations)	0-3	2
Graphic layout of the text and of the figures/tables	0-3	3
Quality of the annotation	0-3	3
Language and stylistics, complying with the valid terminology	0-3	3
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		18
(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	3
Discussion quality – interpretation of the 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

* Choose one

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

Completeness of the description of the used techniques	0-3	3
Experimental difficulty of the thesis, independence in experimental work	0-3	3
Quality of experimental data presentation	0-3	3
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
Practical requirements – points in total		27
POINTS IN TOTAL (MAX/AWARDED)	48	(45-48) ²

Comments of the reviewer on the student and the thesis:

The thesis demonstrates a very good understanding of the complex life cycle of TBEV and its interaction with host brain tissue, shedding light on the mechanisms underlying the viral infection process and significantly contributes to our knowledge of TBEV and its pathogenesis. The application of a high resolution, three-dimensional visualization technique has enabled a detailed exploration of the spatial distribution of TBEV and the effects of the virus on cellular ultrastructure of the host within mouse brain tissue. The clear and concise description of the employed methods, including tissue preparation, imaging techniques, and image analysis, ensured that the reader can grasp the technical aspects of the work easily. The clear organization of the thesis, with well-defined sections, allows for easy comprehension and facilitates the reader's navigation through the research findings. The incorporation of relevant literature supports key findings of the thesis and places the research within the broader context of TBEV pathogenesis. The weakest part of the thesis (but still good enough) was the description of the images/figures. Overall, the thesis on 'Three-Dimensional Visualization of Tick-Borne Encephalitis Virus Infection in Mouse Brain Tissue' represents a valuable contribution to our understanding of TBEV pathogenesis.

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

Mistakes, which the students should avoid in the future:

- 1) In the study, you follow the TBEV invasion process after intracerebral injection of the virus. In the Results section, however, you first describe the ultrastructure of the nerve cells and later you come back to describe the endothelial cells. I would describe it the other way around, following the infection process (from bloodstream, over BBB, to neural cells). (Suggestion)
- 2) Better description of images/figures is required, specifically the cell type was often missing in the description. A bit higher usage of navigation landmarks (asterisks, arrowheads) and description of the cellular ultrastructure would be also appreciated by the reader. (Suggestion/Mistake)
- 3) In the Abstract, you write "Furthermore, infection of astrocytes, their end feet, and pericytes is observed." I do not see any results about pericytes in the Results section. (Mistake)
- 4) Could you summarize the main ultrastructural differences upon TBEV infection between

² Enter the number of points awarded.

the variety of neural cells which you investigated? (Question)

- 5) In the Abstract, you write 'The observed whorls, which were probably created using the smooth ER as a membrane source'. Is it always smooth ER? From the images, is it possible to distinguish rough and smooth ER? If yes, can you estimate the ratio between rough and smooth ER?
- 6) During image acquisition, different microscope settings were used to image the various ROIs in the same sample block. Why? Why were the 3D models prepared from only ROI4 and ROI5, even though the value of 'Total Slices imaged' is significantly smaller? Can you explain the difference between optical and physical slice thickness? (Question)
- 7) In your opinion, what further studies need to be done in order to better understand and describe the entry routes of the virus into the brain. Where are the main knowledge gaps? With what experiments would you expand your studies? (Question)

Conclusion:

In conclusion, I

r e c o m m e n d

the thesis for the defense and I suggest the grade excellent .³

In **Ceske Budejovice** date **6.6.2023**

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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. Grades: excellent (1). Very good (2), Good (3), Unsatisfactory/failed (4).