



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: Natálie Pokorná

Thesis title: Carotenoid pool of extremophilic bacterium *Deinococcus radiodurans*

Supervisor: RNDr. David Bína, Ph.D.

Referee: RNDr. Miroslava Herbstová, Ph.D.

Referee's affiliation: Institute of Plant Molecular Biology, Biology Centre CAS

	Point scale <sup>1</sup>	Points
<b>(1) FORMAL REQUIREMENTS</b>		
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
<b>(2) PRACTICAL REQUIREMENTS</b>		
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	2
Logic in the course of the experimental work	0-3	3
Completeness of the description of the used techniques	0-3	1

\* Choose one

<sup>1</sup> Mark as: 0-unsatisfactory, 1-satisfactory, 2-average, 3-excellent.



Experimental difficulty of the thesis, independence in experimental work	0-3	3
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	2
Practical requirements – points in total		22

<b>POINTS IN TOTAL (MAX/AWARDED)</b>	<b>40</b>	<b>(0-48)<sup>2</sup></b>
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**Comments of the reviewer on the student and the thesis:**

BSc thesis of student Natálie Pokorná on the topic of „Carotenoid pool of extremophilic bacterium *Deinococcus radiodurans*“, with its 44 pages and 69 citations correspond to an extent of master's thesis.

The aim of the thesis was to characterize carotenoid pigment content of *D. radiodurans* depending on different cultivation approaches (liquid versus solid media), and further to assess an effect of the stress factors (e. i. UV irradiation) on the carotenoid composition. In order to achieve the goals of her BSc thesis, the student used a combination of chromatographic and spectroscopic methods.

On the whole, the work is clearly divided into the sections and well written in understandable English. Introduction section with its 50 references is carefully processed and brings a comprehensive overview of the selected topic. Results section is extensive and shows that the author has learned and practically managed several biophysical and biochemical techniques to achieve the main goals of her study. The author also showed the ability to process and evaluate data and compare them with the known knowledge.

In conclusion, the submitted BSc thesis of Natálie Pokorná fulfills the requirements for the bachelor thesis at the University of South Bohemia and I recommend it to be accepted.

*Comments and mistakes*

**Introduction** section, subchapter „Other mechanisms of protection“.

From the above data, the thickness of the cell envelope of *D. radiodurans* is only 5 (not 50) times thicker than the envelope of *E. coli*. In one part of the Introduction text the numbers of references do not follow each other. Citation [35] is followed by [39], references [36-38] are omitted and used

<sup>2</sup> Enter the number of points awarded.



at the end of the Introduction section. The reference [38] is not used in the text at all.

### **Methods**

A description of the growth rate measurement procedure is missing. Instead, a copy of the previous paragraph is inserted. In addition, description of the preparation of samples for mass spectroscopy is missing in Methods section.

### **Results**

In Fig. 9, the labelling of several peaks that are discussed later in the text is missing.

In Fig. 8, there are 14 different colors and up to 5 shades of one color used. Therefore, it is difficult to find out which line corresponds to which letter or number. For the better clarity and efficient orientation, I recommend to hide the legend and directly label the line of each absorption spectrum with respective letter or number.

Furthermore, the units of the measured quantity are not given on the vertical axis in Fig. 8, 9, 10, 11 and in addition to, in Fig. 11 and 13, a physical quantity is not indicated at all.

I recommend displaying the results in Tab. 1 and 2 in the bar graphs to highlight the trend of the measured data.

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

#### **Mistakes, which the students should avoid in the future:**

##### **Questions**

Please describe, how did you perform growth rate measurements? This procedure is missing in Methods section.

Similarly, the procedure of the sample preparation for Mass spectroscopy and used instrumentation is omitted. How the samples were prepared for this technique? Which institution the mass spectroscopy was performed at?

Could you please explain how did you treat the data, e.g. in Fig. 8 and other absorption spectra graphs? Actually, the values of absorption cannot reach 2, 3, 4 or 5. What do the vertical axis actually shows?

Table 1 shows results of the quantitative analysis of the chromatographic data in differently matured cultures. Decreasing/increasing trends in the certain part of the data are discussed accordingly. How could you verify that the differences in data set are statistically significant?

How did you experimentally proceed in performing the resistance tests against the antibacterial agents? What amounts or concentrations of the disinfectants were used for these experiments? Did you try different amounts of those agents?

In the text, the partially unsuccessful MS analysis is explained by degradation or chemical



changes of the samples (the absorption in the UV region of the spectra). Do you have any suggestion to prevent these unfavorable effects? In your opinion, what are the critical points of the sample handling?

The Introduction section states that *D. radiodurans* was first isolated from gamma treated cans of meat. However, is the natural environment of the organism known?

**Suggestion**

To enhance further writing of scientific texts, I recommend the student to avoid use of long sentences and to pay more attention to appropriate listing of references.

The author should be more focused on details in the figures (e.i. axis scales, indication of the quantities and its units) as they are an integral part of scientific paper and serve as a main source of data for readers. In that context, figure legends should be more comprehensive for clarity.

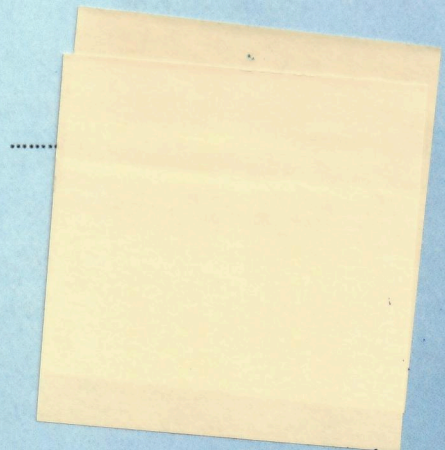
**Conclusion:**

In conclusion, I

**r e c o m m e n d**

**the thesis for the defense and I suggest the grade very good <sup>3</sup>**

In České Budějovice      date      11. 6. 2021



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<sup>3</sup> 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).