



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* THESIS

Name of the student: Tobias Lernhardt

Thesis title: The Effect of Ploidy on the Brain Cellular Composition of Sterlet Fish
Supervisor: Mgr. Pavel Němec, Ph.D.

Referee: MSc. Ievgeniia Gazo, Ph.D.

Referee's affiliation: University of South Bohemia in České Budějovice, Faculty of Fisheries and Protection of Waters

	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	1
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	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	3
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	2
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

* 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	1
Practical requirements – points in total		22
POINTS IN TOTAL (MAX/AWARDED)	48	39²

Comments of the reviewer on the student and the thesis:

The thesis describes effects of polyploidization on sturgeon neurodevelopment and brain cellular composition. Considering the endangered status of sturgeons, this topic of research is very important. In general, the experimental design and methods used in this study are appropriate and logical. The graphical presentation of the results is clear and well-elaborated. I would like to highlight that the amount of experimental work, data analyses, and quality of figures are at a high level for the Bachelor thesis.

However, I also would like to point out some weak points of this work, particularly organization of the thesis, writing, and use of citations. I had to take down several points for outdated information, such as IUCN categorization of sterlet (they are nowadays classified as endangered, not vulnerable). The candidate also used inappropriate citations, such as Du et al., 2021 instead of IUCN red list (page 1, paragraph 1) or “Fontana et al” with a reference to Du et al., 2021 (page 1, the last paragraph), etc. It is very important to always cite the original source. The statement that triploids in sterlet are “functional diploids” is not true (page 29, the second paragraph, citing Ludwig et al., 2001). Also, the format of the references should be uniform throughout the thesis.

I would recommend focusing the Introduction part on the fish model, brain function and/or organization, artificial triploidization, or justification of the techniques used. In my opinion, part 1.2 should describe brain biology instead of energy costs of replication. In this part the candidate presented 10 equations, where they show that when genome size becomes 1.5 times bigger, it requires 1.5 times more energy to replicate. It could be done in two formulas instead of 10. Furthermore, the results of the study did not support the initial hypothesis that the cell density should be lower in triploids due to the higher energy cost of replication. Therefore, there was no point in devoting one and a half pages of thesis to calculations of energy cost. Similarly, in Materials & Methods, equations 16 and 17 are meaningless. At first, the candidate defined Neuron% through Neuron Count and then used the same Neuron% to define Neuron Count, which was an original and independent parameter calculated during the experiment.

In my opinion, the weakest parts of the thesis are Discussion and Conclusions. The candidate did not come up with any clear hypothesis explaining the observed results instead of the initial failed hypothesis. It would be worth mentioning that triploid fish are sterile, grow faster and usually have higher body weight than diploids. Interspecific hybridization in sturgeons led to sterile triploids, and fertile tetraploids as was shown by Linhartová et al., 2018. Therefore, it would be

² Enter the number of points awarded.

logical to speculate that in triploid sterlets gonads are not developing, and they have more energy for body growth and neurodevelopment.

Further, according to the “Recommendations for BSc. and MSc. theses writing at the Institute of Chemistry, Faculty of Science, University of South Bohemia”, the Conclusion part should be a short, bullet-point summary of the findings. In the current thesis, the Conclusions part consists of several sub-chapters, some of them clearly belong to the Discussion. The difference between sub-chapters “Main Observations” and “Final Observations” is not clear.

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

Mistakes, which the students should avoid in the future:

1. How old were the fish used in the study? Considering differences in body weight, they must be of different ages. But different stages of life might be associated with different brain compositions. Why wasn't this considered?
2. How were the sexes of fish determined? Sturgeons do not have sexual dimorphism and sex identification in immature fish can be difficult.
3. How triploidization was performed?
4. Why wasn't considered sterility of triploids as a factor affecting brain development? Also, if triploids are sterile, that contradicts the statement of this thesis that triploidy is an advantageous trait. In this case, those fish do not participate in the gene pool as their genes cannot be passed on to the next generation.
5. Considering the function of cerebellum, is there any hypothesis regarding the reasons of such a prominent sexual dimorphism in triploids?
6. As a remark for the future, when writing an Introduction, it is better to consider the actual results and not only the original hypothesis, especially if the one is not supported by the study.

Conclusion:

In conclusion, I

r e c o m m e n d *

the thesis for the defense and I suggest the grade 2 .³

In

date

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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).