



Review of USB FFPW PhD thesis

First name(s), surname, titles of the PhD student: Martin Hubálek, Dipl.- Ing.	First name(s), surname, titles of supervisor: Prof. Dipl.-Ing. Martin Flajšhans, Dr. rer, agr.
Title of PhD thesis: Polyploidization capacity of sturgeons and its influence on fitness	

REVIEWER:

Surname: Gessner	Institution: Leibniz Institut für Gewässerökologie und Binnenfischerei (IGB) Berlin, Germany
Name: Jörn	
Titles: Dr. rer. agr.	E-mail: sturgeon@igb-berlin.de
Please describe your professional relationship to the PhD student: none	Please describe your field of expertise: Restoration ecology and management, fish behaviour and aquaculture

QUESTIONNAIRE

Originality, scientific importance, perspectives and impacts of results presented in the PhD thesis for basic and/or applied research

Evaluate competitiveness of the PhD thesis in the international context and compare its level with the current state of the art in the field (**extent ¼ – ½ page**):

The publications listed in the thesis are showing very clear structure, sound experimental design and a wealth of data. Three out of the four publications are published in moderate to benchmark journals in the field.

The originality of the selected approaches to solve the objectives of the work seems adequate, utilizing and adapting the methods that were largely established and developed further at the USB Faculty of Fisheries and Protection of Waters. In his work the candidate has verified the suitability and applicability of new and improved methodology and has done so in a convincing and well planned and arranged experiments. The methods developed for polyploidization will be valuable additions to the toolbox in polyploidy research as well as in practical application.

While utilizing the methods and approaches developed at the faculty (Flajšhans et al. 2013, Lebeda & Flajšhans 2015, Lebeda et al 2020), the candidate extended the scope of the work to new species and hybrids. Thus the results obtained allowed to verify and critically reflect the results obtained and the conclusions drawn by Leal et al. (2019,2020,2021) and others to establish alternative concepts on the effects of ploidy of different levels.



Elaboration of the PhD thesis, objectives of the work and deliverables

Evaluate the overall level of elaboration of the PhD thesis (structuring of the main text, comprehensibility, logic of the chapters and their ordering) and the originality of the selected approaches to solve the objectives; evaluate publications and whether the results described correspond to objectives of the PhD thesis (extent ¼ – ½ page):

The text and arrangement of the thesis of Maritin Hubálek closely follows the outline provided in the “Announcement of the Vice dean for study affairs No. 2/2016 Guideline for writing the Ph. D. thesis” at the FFPW USB. It is clearly structured and meets the required form throughout the document. The order of the chapters is logical and the different chapters build upon each other, starting with methodological development and finishing with the practical effects of polyploidization upon the performance of the fish investigated.

The candidate shows that he is familiar with the literature in the field and also reveals that this familiarity reaches over decades rather than years. He has considered the relevant literature to a large degree while also showing that he is familiar with the main concepts in the field. From these concepts he was making use in conceptualizing the framework of the thesis.

The text of the General Introduction and the final Discussion are clearly structured and comprehensive. Although the questions to be investigated are presented at the end of the General Introduction and the respective answers are provided in the end of the Discussion, which provides a great and direct link, the question remains, why the hypothesis that were tested, were not presented too.

It is not fully comprehensible why the order of the papers has been chosen in the present manner. storage paper is not listed first since it would potentially have affected all other sample collections. Furthermore, the different approaches taken in the induction of polyploidization of the target species differ between the different papers (Chapters 2 and 5). This seems inconclusive too since the method was published earlier than the remaining papers and would have been available for implementation, reducing the number of unsuccessful polyploidization attempts in the samples. The explanation offered by the candidate, that the utilization of the newly established method would have prevented the comparison between different experiments could be acceptable if the experiments were carried out in a nonlinear mode (which is not communicated) but if the experiments would have been carried out as listed in the thesis, the question remains why the new method was not tested in the experiments as a parallel approach to further prove its applicability and help establish a reliable reference for future studies.

Since it is not possible to determine the input of the PhD Supervisors, it is assumed that the candidate has developed the approaches and solutions by himself which is considered an impressive performance. In this context it is not very helpful that the contribution of the candidate given on the cover page to the respective chapter only expresses percentages and not the work that was carried out by him.

The results described both in the paper and in the Discussion correspond to the questions that were presented in the General introduction of the PhD thesis and the respective answers were summarized comprehensively in the Discussion.



OVERALL COMMENTARY ON THE PhD THESIS

Please write in the box specific comments concerning the PhD thesis in extent of 1-2 pages:

The PhD Thesis by Martin Hubálek, entitled „Polyploidization capacity of sturgeons and its influence on fitness“ utilizes experimental approaches that were developed and refined at the Faculty of Fisheries and Protection of Waters and with its scope, the contribution continues this development.

While the polyploidization capacity of sturgeons was known from experimental trails since the 1960s from the development of interspecific hybrids, the issue has become highly relevant in the development of sturgeon aquaculture and lately with the discovery of autopolyploidy in farmed sturgeons. In this respect the thesis has taken up on this renewed interest and has contributed to the methodological approaches to ease the research in polyploidy by contributing to the development of the pressure shock treatment for the retention of the second polar body based upon the methods described by Pifferer et al (2009); Havelka and Arai (2019) confirmed the conceptual considerations of efficacy of pressure shock as a suitable treatment.

In order to be able to commence such experiments in the field the development of a transportation and preservation technique was successfully established and tested although the scope seems somewhat far from the focus of the thesis.

The experiments conducted, especially with regard to the adaptability to suboptimal conditions in a range of temperatures and the fitness test, applying swimming speed as the criterion for fitness, were very nicely planned and executed, providing a wealth of data that allowed to significantly alter the current concept of oxidative stress due to cell size in poliploids or at least to restrict its applicability. As such the work was contributing substantially to the understanding of the effects of poliploidy in whole body experiments with live fish.

One issue that has been left out of the scope of attention in the work so far is the evaluation of the treatment effects upon the resulting development compared to the effects of the increase in genome size. Early life exposition to massive physical stress results in a series of adaptive responses, the can be hard to differentiate from the effects of the alterations that have been induced by the physical impacts. Even if this differentiation is hard to be carried out experimentally, the general impact upon the experiments by an increase of malformations and mortalities cannot be neglected and should be discussed thoroughly.

Furthermore, obvious effects as the variably effectiveness of the pressure shock treatments in Chapter 2 are not discussed in depth and explanantion trials are left open. Wwith a view on the effectiveness of the pressue treatment raises the question why in the experiments under Chapter 5, this method was abandoned in favor of the less effective and less productive heat shock. As such, especially in the experiments described in Chapter 5, a comparison between the two methods would have been valuable to also verify for cumulative effects in the second treatment.

Overall the thesis reveals the intensive theoretical and practical involvement with the conceptual and methodological background and prerequisites and contributes significantly to the overall understanding and interpretation of polyploidy in sturgeons.



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FINAL RECOMMENDATION

- ☒ PhD thesis can be recommended for defence
- ☐ PhD thesis can be recommended for defence with reservations
- ☐ PhD thesis cannot be recommended for defence

Berlin, 6. July 2022

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Date and place

Dr. rer. agr. Jörn Gessner

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Name and signature