



**Confidential**

### ***Supervisor's Review of USB RIFCH PhD Thesis***

|                                                                                   |                                    |
|-----------------------------------------------------------------------------------|------------------------------------|
| Surname of the PhD student: Yu Cheng                                              | Name of supervisor: Otomar Linhart |
| Title of PhD thesis: Sperm quality affects the fertilization in freshwater fishes |                                    |

#### **OVERALL COMMENTARY ON THE PhD THESIS**

During four years of her PhD study (2018-2022) in our laboratory, she was enthusiastic student with excellent activity. I remember when she came to us, an inconspicuous and scared girl who we basically didn't understand what she was telling us. At the beginning, her older PhD colleague, Miaomio Xin, helped her through the difficulties of the first half of the year, who basically taught her routine work in the laboratory. She tried to write a review, but I understood that given the language skills of the time, it would be difficult. Therefore, we left this stage of scientific work and determined that as soon as the reproductive season allows, we will focus on experimental work with the aim of:

1. To optimize the egg incubation in Petri dishes.
2. To identify conditions for egg activation and fertilization in sterlet.
3. To examine the changes of sperm phenotype and function during sperm aging.
4. To improve the sperm quality with artificial seminal plasma or good natural seminal plasma and fertilization in zebrafish, European catfish and sterlet during *in vitro* short-term storage.
5. To explore the DNA methylation among the whole genome of sperm aging in common carp based on WGBS.

Already in the first experiments, I noticed that Yu Cheng tries to be accurate, efficient, fast and does not confuse in performing experiments, in short, that she is smart and has handy hands, which was a good positive signal. Then came a period of nice findings. All the results we created in the 2019 season in collaboration with Miaomio Xin have already been statistically evaluated by Yu Cheng. She developed her bioinformatics to the point that she started using the R Development Core Team system, which is one of the most suitable tools for biostatistics. Thanks to Yu Cheng, all the work could be done, from incubating eggs in Petri dishes to using extenders and activating solutions for short-term sperm storage. Unfortunately, the fruitful work of the 2019 season was interrupted in the first half of 2020 by a covid pandemic. Unfortunately, at the time from January to June, Yu Cheng was stranded in China. We remotely evaluated and published the results of 2019, so visually it seems today that no delay occurred, but the opposite was true. After her return in July 2020, we threw ourselves into experiments with the short-term preservation of zebrafish and common carp sperm. The experiments did not always succeed, but thanks to its convincing stubbornness, she managed to find suitable extenders to dilute sperm and start preparing samples for molecular studies of fish sperm quality in collaboration with Azin Samarin, her sisters Azadeh and Pavlína Vechtová from the Faculty of Science, USB. It was Yu Cheng's scientific dream to learn molecular techniques and publish his results in this field. I remember that she came to see me once in the beginning, she was incredibly mentally down. After a while, she told me that someone had told her that she knew nothing about molecular biology and therefore that she would not be able to research molecular biology. And after two years of hard study and experimentation together with a short-term internship at INRAE, Rennes, France has become so familiar with the local bioinformist and Cathrine Labbe that she is able to go through all that sequencing data after total DNA sequencing and be able to evaluate it. I have supervised a total of 13 PhD students, but Yu Cheng is the first to be a capable



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biostatistic analyst. In the end, even that review learned to write about what, as evidenced by the perfect discussion part of her PhD theses work as well as the latest publication. I had many very smart and capable students, but I dare say that no one was as exceptional as Yu Cheng. She will certainly be a valid part of all scientific teams, and it is clear to me that we will hear more about her in scientific circles. I understood that she is able to discover outstanding results in near future.

She published more than 12 peer-reviewed papers, 5 as the first author. One paper has been published in International Journal of Molecular Sciences (IF 2020 = 5.9) and three additional papers are under review. Her papers have citation level 30 and h-index 3.

### **FINAL RECOMMENDATION**

- ☒ can be recommended for defence of PhD Thesis  
☐ can be recommended with reservations for defence of PhD Thesis  
☐ can not be recommended for defence of PhD Thesis

..2<sup>nd</sup> May, 2022, Vodňany....  
Date and place

... Otomar Linhart.....  
surname and signature