



Universität Hamburg

UHH • ZOOLOGISCHES INSTITUT UND ZOOLOGISCHES MUSEUM
MARTIN-LUTHER-KING-PLATZ 3 • 20146 HAMBURG

Prof. Dr. Bohuslav Gaš
Dean of Faculty of Science
Charles University in Prague
Albertov 6
128 43 Prague
Czech Republic

Department Biologie

Biozentrum Grindel
Zoologisches Institut
und Zoologisches Museum



Dr. D. Keyser

Tel. + 49.(0)40-42838-2289
Fax + 49.(0)40-42838-3937
Keyser@zoologie.uni-hamburg.de

Ihr Zeichen/Schreiben vom

Unser Zeichen

22.10.09

Betr.: Evaluation of the PhD-Thesis of Radka Symonova

Dear Sir,

I received the PhD-thesis of Miss Radka Symonova for evaluation.

The thesis comprises 161 pages. Of these are 107 pages the actual thesis, additionally three publications and one unpublished manuscript is attached. Two posters and four abstracts of publications in preparation are attached as well

The paper published in *Hydrobiologia* in 2007 with the title "Ultrastructure of hepatopancreas and its possible role as a hematopoietic organ in non-marine cypridoidean ostracods (Crustacea)" is written solely by Radka Symonova. In the second publication Radka Symonova is first author together with Jaroslav Smrž in the paper "First record of hemocytes and oenocytes in freshwater ostracods" published in the *Journal of Crustacean Biology* in 2009. Together with Matzke-Karasz, Smith, Miller and Tafforeau she is co-author in the Science paper 2009 on "Sexual Intercourse Involving Giant Sperm in Cretaceous Ostracode". The attached manuscript on "Karyotype polymorphism vs. instability and inter-population genomic differences in non-marine ostracods (Crustacea) showing geographical parthenogenesis" lists six co-authors where Radka Symonova is the first author.

Miss Symonova has worked in the beginning of her PhD study in Prague on the histology and ultrastructure of freshwater ostracods. These studies centred on the difficult research of invertebrate hemocytes and other cells in the body liquid of ostracods. Both published papers show her ability to ask the right questions and to find and use the appropriate methods and techniques to solve the question arising in this important research. She has substantially contributed to the scientific knowledge in this widely neglected very complicated field of research.

Due to her extremely good knowledge in histological research and her knowledge of the special methods and techniques she had the advantage to take part in the EU-project SexAsex, which tackled the unsolved question what is the reason of parthenogenesis and why is it so often manifested in non-marine ostracods.

During this time she learned a wide range of new methods, especially molecular techniques. This enabled her within the project to start on several extremely difficult research fields. There was first the histology of the female reproduction organ, which has even in the old literature received only minor interest, for it is so complicated to work on it. Together with Dr. Matzke-Karasz she managed at least to get an understanding about the function of this organ and could also use the very interesting technique of nanotomography.

The second field was the karyotyping of different clones and species in non-marine ostracodes. Also here was she able to get interesting results in connection mainly with sexual and asexual populations. She could verify the findings of Tetart (1978) that *Eucypris virens* has a high variation in chromosome numbers. Also her findings in other species are in accordance with the literature.

A very promising technique is the hybridization of the DNA of different animals. She shows examples of intra-specific, inter-specific hybridization. This is a real powerful tool to show change and correspondence in the genomic arrangements in animals. It is especially very well suited to answer some of the questions related to the origin of parthenogenesis and other evolutionary trends. She could prove the occurrence of insect telomeres in ostracods.

The observation of meiosis in parthenogenetic populations seems to present a problem, which still has to be solved.

The discussion on parasites possibly inducing parthenogenesis is inevitable in this field of research. While she clearly demonstrated the presence of *Wolbachia pipientis* and Microsporidia in the tissue of *Eucypris virens*, *Cypris pubera* and *Heterocypris incongruens* with histo-chemistry techniques, she failed to show this with molecular techniques on *Wolbachia*.

Her paragraph on giant sperms in non-marine ostracods is giving some background information on the paper in Science.

In the discussion she deals with

1. the giant sperms and the investigated female reproduction organ,
2. the variability of the chromosome numbers,
3. the presence of insect telomeres,
4. the complex of cryptic species in *Eucypris virens*,
5. parasite influence on reproduction,
6. hybridization possibilities
7. sex chromosomes and determination
8. coexistence of sexual and asexual populations
9. sexual dimorphism in fossils

I find it rather difficult to evaluate this thesis. There is no doubt on the high standard of her both publications of histology. It is not quite clear for me how much she contributed to the paper on giant sperms. The unpublished manuscript is an outcome of the work described in her thesis.

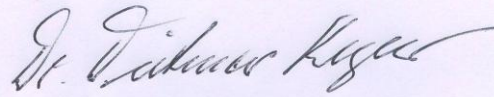
Looking at the fields which she summarized in her discussion, it occurs to me that all of the mentioned topics in themselves give rise to a PhD thesis itself. But covering all these items in her thesis she could only scratch at each topic. She showed that she knows thoroughly the theory, the methods and techniques of each field of research. But I have the feeling that her investigations have not been as deep and comprehensive as her work on histology. This is also admitted by her, when she mentioned several times, that further experiments have to be carried out, or that the results are preliminary.

On the other hand it is amazing how many different techniques and methods she used. Also there are so many interesting for the science new findings facilitated by her application of these new techniques that this thesis may act as a starting point of investigations in all of these fields. It acts like opening a window for further and more extensive research in several fields. She already started this part in her unpublished manuscript and her abstracts show this also. One could regard this thesis as an overlook what possibilities new experiments with new methods can offer nowadays in ostracod research.

If a PhD thesis should show whether the candidate has the capability to work by herself in scientific research I think this thesis proves this without reservations. Her publications on

histology are without any doubt well done. Her thesis shows that she is able to tackle new boundaries in science. This is to my understanding what a thesis should show.
If I am asked to give a mark to this work altogether I think it is good (2.0)

Hamburg, 22. October 2009

A handwritten signature in black ink, appearing to read 'Dr. Dietmar Keyser', written in a cursive style.

(Dr: Dietmar Keyser)