



To
Prof. RNDr. David Storch, PhD, v.r.
Chairman of the Committee
Univerzita Karlova V Praze

Innsbruck, 20th August, 2016

Written Evaluation Doctoral Thesis of Mrs. Agata Mrugala

Dear Prof. Storch, dear Colleagues,

In response of your kind request from July 14th, 2016, I have prepared this written evaluation report on the Doctoral Thesis of Mrs. Agata Mrugala and the quality and scientific relevance of the implemented research covered in the thesis.

Non-native crayfish species and their associated pathogen *Aphanomyces astaci* are known to cause rapid declines in native crayfish populations with strong consequences in aquatic systems as these change trophic relationships even within a brief period of time. Several North American crayfish species have been introduced into European freshwaters, including the signal crayfish *Pacifastacus leniusculus* which has rapidly colonized river networks due to introductions and active migrations and is now the most widespread alien crayfish species in Europe. Particularly in larger rivers, this species spreads very fast and besides competing for space and food potentially transmits the crayfish plague pathogen, the oomycete *Aphanomyces astaci*. That crayfish plague is lethal to all European crayfish species is already known for many decades, however several biological characteristics, its spreading history and mechanisms and insights into their genetic variability are not known to a significant extent.

The doctoral thesis “The crayfish plague pathogen *A. astaci* in its introduced ranges: vectors, introduction pathways, genetic variation and host-pathogen interactions” is therefore an important contribution to freshwater crayfish science. It covers quite a variety of topics in crayfish-plague research all of them are new for science and mostly carried out following innovative ideas and modern methods.

The thesis is presented in eight chapters focusing on four interconnected themes: 1) distribution and prevalence of *A. astaci* infection in populations of its natural hosts introduced to new regions, 2) novel introduction pathways as well as vectors of *A. astaci*, 3) genetic variation of the crayfish plague pathogen, 4) *A. astaci* pathogenicity and crayfish immune defense dynamics. These chapters are presented as three first-author papers, two where the candidate shares the first author with another colleague, and three second-author papers. In addition the candidate included three papers, where she is a coauthor and contributed in the discussion and the writing of the manuscripts.

Besides the top quality of each of these contributions, these multi-author papers indicate that the candidate collaborated with several outstanding scientists in the field and for the purpose of

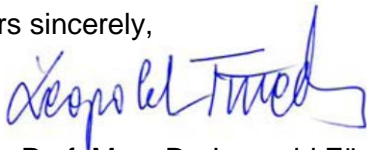
answering her research questions she undertook several long-term stays in their laboratories to learn and apply new and state-of-the-art methods. All of these contributions are published in highly acknowledged international scientific journals.

Overall, the thesis is prepared well and organized appealingly. The chapters are presented with an introducing outline of the publications, an embracing introduction covering the necessary background and state-of-the-art knowledge in the field, and a conclusion. This is followed by a list of relevant and important references, providing evidence that the candidate is aware of the published work in her field.

The candidate already presented her results at several international conferences - at one instance I witnessed her excellent performance at a scientific meeting.

Based on the high quality of research presented, the preparation and successful submission of publications as well as the cooperative nature of her work I do not hesitate to consider the thesis suitable for the defense. Its quality fulfills the criteria necessary for obtaining the PhD degree. These contributions are very important for the advancement of crayfish research and management.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Leopold Füreder', with a stylized flourish at the end.

Univ.-Prof. Mag. Dr. Leopold Füreder