

**- Habilitation Thesis Summary -**

# **Spatial Ecology as Revealed by Crayfish Species**

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This thesis is addressed to the scientific community, but I also rely on the readership of further candidates from doctoral schools and of the general public. Considering the scientific community can easily access, understand, and evaluate specialised scientific papers, the latter must be able to easily navigate the information in an accessible format that still communicates *science*. This is the only reason why this thesis is written in Romanian.

My career is owed to crayfish: aquatic invertebrates that showed me the way to imagine and demonstrate various hypotheses. The first challenge focused my attention on **species distribution**, focusing on the ‘blind spot’ on a country level for the international audience. Throughout the 4 years between 2007 and 2011, I managed to scrutinise the coverage of indigenous species on a relevant resolution level. Furthermore, during this time, the presence of two invasive crayfish species was discovered: the spiny-cheek crayfish and the marbled crayfish.

The effort of various field trips earned me with, not only expertise, but an important volume of environmental data. Their analyses allowed me to approach the knowledge of crayfish from an ecological perspective, opening the way to interdisciplinarity through advanced statistical approaches, which are designed to identify the optimal conditions in which crayfish are naturally reliant upon. These efforts are relevant for protection of the natural heritage of crayfish populations in Romania, and worldwide. Currently, this expertise has been consolidated in my academic profile in the instruction of **spatial ecology**: the investigation of ecology on a geographical scale. We approached the presence - or absence - of crayfish not only in a specific location, but also towards the routes that they may - or may not - be able to communicate and exchange genes in (a.k.a. gene flow). Working with large areas of landscape often raised the problem of field coverage considering the classical approaches. However, spatial ecology is designed to operate digital data, extracted with the aid of satellite images which accurately describe the geography of the environment.

This habilitation thesis contains an introductory part in the candidate's curriculum vitae, briefly presenting the main aspects from the perspective of education and professional skills, together with representative public profiles. A selection of the ten most influential papers is listed at the end of this thesis. The scientific profile, in terms of expertise and scientometric indicators, is discussed in the context of career development. Important attention was paid to the efficient usage of public funds, as revealed in the section of scientific achievements.

The next chapter was dedicated to the most important publications, namely "the most spectacular", "the most cited" and "the most complex" work output. Here it discusses, besides scientific achievements, the way in which the ideas behind each study were born; it is an inspirational message for further applicants of doctoral schools.

Special attention was paid to the chapter dedicated to general career achievements and future projects. Collecting information regarding the distribution of crayfish species in Romania was my first goal, strongly motivated by the lack of coverage of sites where crayfish were observed in this area of Europe. The strong dynamic context of current invasions is reflected also by the rapid expansion across the continent of several crayfish species. Moving forward, ecology became the main direction of my scientific profile. The multiple challenges in order to decipher evolutionary pathways required a combination of ecology and population genetics, resulting in so-called spatial ecology. The added value of molecular data proved to complete not only the missing piece of the puzzle, but also challenged the reconsideration of the evolutionary context in the Pannonian basin. Moreover, these results provided a reliable anchor for molecular clock recalibration- an asset for other assessments of European species' evolution. Finally, this phylogeographic context enabled me to describe a new species of crayfish. The behaviour of crayfish is the current direction of research in my portfolio, opening new perspectives for attractive field and laboratory applications. In this regard, we gained interesting results which revealed the dominance of a highly successful crayfish invader against a native species caused by the superior claw features - that being raw bite force.

A career projection for the future is also briefly touched upon in the next chapter of the thesis, pointing to ideas for the basis of next project proposals. Last, but not least, teaching career was discussed. My career expectations as a doctoral coordinator were addressed and emphasised the vision of the most relevant criteria to be met for selecting future candidates.

The thesis ends with a biosketch.