- ABSTRACT (IN ENGLISH) -

Biological invasions by crustaceans represent a serious threat for native species in Europe. In my thesis I focus on non-indigenous freshwater crayfish introduced to Europe and their parasite *Aphanomyces astaci*, the pathogen of the crayfish plague. The thesis consists of four already published first-author papers (**chapters I**, **II**, **IV** and **V**), two first-author manuscripts (**chapters III** and **VI**), and one paper which I co-authored (**chapter VII**).

The first part (**chapters I-V**) focuses on genetic variation in North American crayfish introduced to Europe. We showed that in two crayfish species, both successful invaders in Europe, genetic variation differs significantly, reflecting their different colonization histories on the continent. The spiny-cheek crayfish *Orconectes limosus* was likely introduced to Europe just once, in small numbers (90 individuals). Variation at the mitochondrial DNA (mtDNA) level in the spiny-cheek crayfish in Europe is much lower compared to North America (**chapter I**), although some variation was revealed by nuclear markers in its Central European populations (**chapter II**). In contrast, the signal crayfish *Pacifastacus leniusculus* was introduced to Europe several times, in large numbers. Its European populations are highly diverse genetically and belong to a single subspecies, *P. l. leniusculus*, one of the three subspecies recognised in North America (**chapter III**). Nevertheless, the discovery of new mtDNA lineages in North America showed that the division into subspecies should be revised and more studies from its American range are needed.

Chapter V showed the utility of DNA barcoding, in combination with morphological examinations, for accurate identification of newly established non-indigenous crayfish in Europe. We verified morphological identification of some of these invaders (*Orconectes juvenilis*, *O. virilis* complex, *Procambarus fallax*, *P. acutus*/*zonangulus* complex). Moreover, in studied individuals from the *Orconectes virilis* cryptic species complex (**chapter IV**), *O. immunis*, and the *Procambarus acutus*/*zonangulus* complex surprisingly high variation was found (**chapter V**). Comparing the patterns of variation in non-indigenous crayfish in Europe with data from their American range may therefore reveal important information on overall variation within these taxa.

Chapters VI and **VII** are dedicated to the detection of the crayfish plague pathogen in non-indigenous crayfish in Europe. *Aphanomyces astaci* (oomycetes) first appeared in Europe in 1859 and has substantially reduced native crayfish populations. North American crayfish established in Europe may carry the pathogen and transmit it to indigenous European crayfish, causing mortalities of these susceptible populations that continue today. Information on *A. astaci* prevalence in invasive crayfish populations is therefore necessary for evaluation of the threat they represent to native species. **Chapter VI** provides information on the crayfish plague prevalence in French populations of the signal crayfish *P. leniusculus* obtained by a quantitative TaqMan MGB real-time PCR. We confirm that the species serves as a reservoir of the pathogen in France and we hope our data will contribute to the efficient protection of the native white-clawed crayfish *Austropotamobius pallipes* in the country. In **chapter VII**, the same method of *A. astaci* detection was used to test samples of invasive crayfish from Central Europe which were previously analysed by another molecular method. The high sensitivity of the real-time PCR allowed discovery of infected individuals in populations where the presence of *A. astaci* was not reported before. We therefore confirm that the method is suitable for routine detection of the crayfish plague pathogen, although a combination of molecular methods is recommended.