The crayfish plague pathogen, the oomycete *Aphanomyces astaci*, has been decimating populations of European crayfish species for more than 150 years, and is therefore considered one of the 100 worst world's invasive species. *A. astaci* is highly specialised for a parasitic life, but it can be isolated from moribund crayfish and grown on synthetic media, as it is the case also for several other oomycetes (**chapter 7**). The life of *A. astaci* includes three basic forms: mycelium in host's tissues, and the infective units occurring in water, zoospores and cysts.

All North American crayfish species tested so far have shown some resistance to *A. astaci*, i.e., they could carry the infection for long, serving as vectors of the pathogen. Massive sporulation from infected North American crayfish starts when the host is moulting, stressed, or dying (**chapter 4**). However, I could show in my experiments that some sporulation occurs even from apparently healthy and non-moulting American crayfish hosting *A. astaci*, so infected North American crayfish must be considered a permanent source of the infection (**chapter 4**). Five genotype groups of *A. astaci* have already been distinguished. Strains from a particular genotype group probably share the same original host crayfish species of North American origin. Nevertheless, they can be transmitted horizontally to other hosts (e.g., **chapters 2, 4 and 6**).

In contrast to North American crayfish, all crayfish species of Eurasian and Australian origin so far exposed to *A. astaci* spores were more susceptible. Nevertheless, some populations of European crayfish with latent infection of *A. astaci* have recently been reported from several countries (including Turkey, **chapter 1**). Although some chronic infections caused by an *A. astaci* strain originating from the North American signal crayfish have been reported (e.g., **chapter 2**), latent infections are usually assumed to be a result of infection with a strain from the first genotype group that had been introduced to Europe.

Apart from crayfish, only the catadromous Chinese mitten crab *Eriocheir sinensis* was reported to host the crayfish plague pathogen, which we have recently confirmed by molecular and microscopic methods (**chapter 2**). In addition, we have shown that the semi-terrestrial crab, *Potamon potamios*, can also be infected with the pathogen, so all freshwater-inhabiting crabs should be considered as potential hosts (**chapter 2**). The experiments with freshwater shrimps, crustaceans related to crabs and crayfish, suggested minor growth of the pathogen in some individuals and exuviae. However, none of the shrimps exposed to *A. astaci* spores died (**chapter 3**). Other animals seem to be resistant to the pathogen. Even the data from our pilot research did not suggest any *A. astaci* growth in non-decapod crustaceans coexisting with infected crayfish (**chapter 2**). Nevertheless, the possibility that some other crustaceans may become accidental hosts of *A. astaci*, e.g., when stressed, has still not been entirely rejected.

Human activities had a key role in the introduction and dispersal of *A. astaci* in Europe. While the first North American crayfish have been introduced for aquaculture purposes, more recent introductions of new American crayfish species, some of which are proven *A. astaci* carriers, have probably been caused by hobbyists (e.g., **chapter 6**). Close attention must also be paid to the disease status of the crayfish during stocking, even when apparently healthy European crayfish are used (**chapter 1**). In addition, human-mediated dispersal of the crab *E. sinensis* should also be prevented (**chapter 2**).

With respect to the recent data on the latent infections of European crayfish, and particularly to the transmission of *A. astaci* by *E. sinensis*, the long-distance dispersal by the locomotion of the infected hosts might be more important than it was anticipated (**chapter 2**). Crayfish plague may be spread also by dead hosts and their body parts, the transmission has been proven even through the digestive tract of fish. In contrast, such a transmission through mammals and birds is highly unlikely (**chapter 5**).

Future research of *A. astaci* will probably gain from molecular methods. Their specificity, however, should always be tested against other oomycetes that may be present on moribund crayfish (**chapter 7**). In this thesis, I have also brought several hypotheses that might be tested in future.