

Ponto-Caspian gammarids *Dikerogammarus villosus* and *Pontogammarus robustoides* belong to a group of invasive invertebrates which have actively extended their ranges in almost entire Europe during the recent several dozen years. Due to their predation and competition, they became dominating benthic invertebrate species in many aquatic ecosystems. So far, studies on these organisms have focused mainly on their impact on local ecosystems and tolerance to various environmental factors. However, few studies dealt with anti-predator defence mechanisms of invasive species, particularly considering the aspect of stress. Previous research has shown that alien gammarids are less preferred prey compared to their native counterparts. Assuming that predators are one of the main factors controlling the population size of prey species, the ability to limit their negative impact may underlie the invasion success of these alien organisms.

The main purpose of our project is to determine whether, due to lower susceptibility to predatory pressure, invasive species bear lower costs of induced defence responses. Stress induced by the presence of danger increases the probability of survival, but is a costly reaction, resulting in a range of physiological changes defending the organism against negative consequences of exposure to a stressful situation. Moreover, many organisms exposed to stress not only bear costs associated with physiological responses, but also limit their food intake (so called “indirect predator effect”). A particularly disadvantageous phenomenon is a long-term predatory pressure, resulting in chronic stress. Consequences of this form of stress are still not fully understood, but generally are believed to decrease fitness of the organism and cause damages at the cellular level. We predict that, due to the more efficient anti-predator defences, resulting in better survival, invasive species are less susceptible to negative consequences of chronic stress, which allows them to allocate more energetic resources into growth and reproduction. This might give them competitive advantage in newly invaded communities.

We are going to check this hypothesis in a series of laboratory experiments, in which we will expose the above-mentioned invasive gammarids and their native relatives to various predators, modifying exposure time and accompanying environmental conditions (e.g. density, presence of shelters, food, predator diet, etc.). We will simultaneously measure behavioural responses of gammarids to presented dangers and physiological changes in their organisms, looking for the symptoms of stress and its negative consequences.