Abstract – popular

Our main aim is to test if (1) genetically distinct populations of an invasive species from isolated native areas vary in invasive potential; (2) contact between them leads to creating a superhybrid of increased invasive potential. Our research model will be 2 genetically distinct populations of the Ponto-Caspian amphipod *Dikerogammarus villosus* from the Danube and Dnieper rivers, which colonised the Oder and Vistula rivers in Poland, respectively, entering the country from opposite directions (western vs. eastern front). They are likely to meet each other in future. The following working hypotheses will be verified within the project:
Hypothesis 1: Populations from both invasion fronts are genetically distinct with no contact zone. We will confirm this situation with molecular data (microsatellites). This is crucial to select 'pure' eastern and western front populations for further studies.
Hypothesis 2: Invasive potential differs between the eastern and western front. Genetic distinction between the fronts may affect their biological traits and physiological tolerance to environmental conditions, and, in result, their invasive potential. This may be further modified by thermal conditions, which is important in the light of the ongoing climate change.
Hypothesis 3: Individuals from both fronts reproduce equally irrespective of the mate origin (the same or the other front) and hybrids between the fronts exhibit higher invasive potential than their parental populations from both fronts. Though the 2 fronts are genetically distinct for neutral markers, the reproduction barrier is unlikely. However, we will test if the breeding between and within the fronts is equal. Irrespective of that, if the two fronts meet, hybridization will occur, potentially resulting in a super-hybrid: more effective invader due to increased genetic variation and novel adaptations.

During the first summer, we will survey the Vistula and Oder rivers as well as Warta, Noteć and Bydgoski canal to test if the 2 fronts are still separated. To have undeniable confirmation of the purity of the populations from eastern and western fronts, we will use less conservative and biparentaly inherited markers i.e. microsatellites. Microsatellites already developed for *Dikerogammarus villosus* proved to be highly powerful in identifying genetic differentiation between fronts. In addition, we plan to design a simple probe, based e.g. on front specific microsatellite alleles, or other potentially promising molecular marker (i.e. ITS, H3), to readily differentiate populations from eastern and western front and their hybrid.
To test H2 and H3 we will compare traits responsible for the invasion success among 3 experimental groups: individuals from one of the 2 fronts and hybrids. They will be obtained as F1 generation in an outdoor mesocosm culture to unify their environmental conditions before the tests. We will test life-history (size, fecundity, maturation), behavioral (feeding preferences, predation, predator avoidance, spreading) and physiological (tolerance to environmental factors: temperature, starvation, overcrowding, oxygen deficits, non-consumptive predator effects) traits.

The proposed project is highly important at global scale. The present stage of *D. villosus* invasion in Poland is an unique chance to supervise the contact zone and intraspecific hybridization between the 2 fronts. Selecting *D. villosus* as a model organism is crucial, as the eastern and western front populations were genetically distinct and likely to have different temperature optima. Hybridization in *D. villosus* may emerge a super-hybrid with even higher invasive potential and result in a future "re-invasion" by these more invasive hybrids. The Polish scenario is a great opportunity to test experimentally this hypothesis.