



## **FELLOWSHIP SUMMARY REPORT**

Fellowship recipient: Christine Ewers

Subject title: **Has the invasive Chinese mitten crab evolved into a novel threat? Understanding the contribution of multiple introductions to invasive success (theme 2)**

Host institution: University of Antwerp

Host: Prof. Dr. Jonas Schoelynck

Duration: September 04, 2023 to March 03, 2024

I consent that this report will be posted on the Co-operative Research Programme's website



**1. What were the objectives of the research project? Why is the research project important?**

Invasive species are one of the major threats to global biodiversity. Their negative ecological and economic impacts are exemplified by the Chinese mitten crab. The Chinese mitten crab is currently occurring in high densities in Belgium, where it was previously rare. Given extensive shipping traffic and first genetic evidence for cryptic invasions, we hypothesise that cryptic invasions played a role in this increasing invasiveness by changing the genomic composition and overall fitness of the Belgian crabs. We aimed to understand the effect of multiple introductions on invasiveness by combining experimental ecology with genomics and natural history collection analyses, and comparing the Belgian “hybrid” population with the German population, which showed no signs of hybridisation. This allowed us to predict future impacts.

**2. Were the objectives of the fellowship achieved?**

We conducted a large ecological experiment and generated historical and contemporary genome-scale data for the two European populations (Belgium vs Germany) with contrasting invasion histories. We still need to analyse some of the genomic data, which took us a while to get sequenced. In addition, as a follow-up of the ecological experiment, we will measure glucose and lactate levels of blood samples we took during the experiment. In general though, the objectives of the fellowship have already been achieved.

**3. What were the major achievements of the fellowship? (up to three)**

- (1) The overall result was quite unexpected: despite the mitochondrial genomes of mitten crabs from Belgium belonging to a large proportion to a different species, the Japanese mitten crab, the nuclear genomes of Belgian and German mitten crabs were not differentiated.
- (2) The comparative experiment revealed that the fitness of German and Belgian mitten crabs was not different. In light of the fact that these two populations are genomically the same, this result is not so surprising anymore, but did not fit our initial hypothesis.
- (3) Including genomic data from native mitten crabs indicates that the German and Belgian mitten crabs, and possibly all European mitten crabs, are distinct from any native population. This means they could also differ in the ecology and fitness.

**4. Will there be any follow-up work?**

We will publish our findings in a scientific journal within the next 12 months upon completion of the last tasks. This research marks the beginning of a fruitful collaboration. Since applying to the OECD collaborative grant, we have already worked on a number of publications together and applied for a few other grants. At the moment, I do not envisage that our research will likely result in protected intellectual property, novel products or processes.



**5. How might the results of your research project be important for helping develop regional, national or international agro-food, fisheries or forestry policies and, or practices, or be beneficial for society?**

The results of our research are important for the management of invasive species. On the one hand, German and Belgian mitten crabs, and probably also other European populations, can be considered as a single ecological entity. This means they can be managed within the same framework. Initially, we hypothesised that the Belgian mitten crabs would be quite different and require a separate management plan. On the other hand, the European mitten crabs cannot be compared to native mitten crabs from China. Thus ecological data from native populations that is relevant for management cannot be used to infer ecology of the European mitten crabs. Separate experiments need to be conducted to assess the ecology of the European mitten crabs.

**6. How was this research relevant to:**

Invasive species are detrimental to ecology and economy. The Chinese mitten crab disrupts freshwater and marine ecosystems, and impedes the quality and quantity of benefits we humans gain from these ecosystems, including fisheries and aquaculture production, water quality and flood protection. The management of this species has high priority. But we first need to understand what we are managing. Our research gave first insights into the unexpected properties of Chinese mitten crabs in Europe, which will hopefully ultimately help improve food security.

**7. Satisfaction**

The fellowship conformed fully to my expectations. I was very happy with the host organisation and the host itself, which supported my ideas and collaborated with me in all aspects of the project.

The OECD Co-operative Research Programme fellowship will likely increase my career opportunities by extending my scientific network, exposing my research to the greater community and making it relevant to managers and policy makers alike.

I did not encounter any practical problems, and cannot give any improvements. I encourage the CRP to retain its straightforward approach to funding, which gave me great flexibility in achieving the goals of this research project.

**8. Advertising the Co-operative Research Programme**

My host and colleague Prof. Jonas Schoelynck made me aware of the CRP. I had not heard about it. If anything, it may be good to somehow advertise it more in academic circles, e.g. in relevant conferences. I do not have any issues to report.