



**Prof. Dr. Leopold Füreder**  
**Universität Innsbruck**  
**Institute of Ecology**  
Technikerstr. 25  
A-6020 Innsbruck  
Austria

## **Thermal adaptation in ectotherms: Linking life history, physiology, behaviour and genetics**

### **Thermal adaptations of native crayfish species in Slovenia**

#### **Scientific Report for Short Visit Grant**

Climate changes are an important threat which are supposed to be reflected in increased water temperature and thus will affect native crayfish species to become less competitive in comparison of invading species. New aspects of the biology of the invasive species suggest an ecological superiority of non-indigenous crayfish and could explain the long-term influence on native crayfish. Due to that reason the purpose of my visit was to improve knowledge about thermal adaptation of crayfish in linking to climate changes.

In Slovenia four native crayfish species are present and since 2003 also one invasive. Two species are under strict protection and are on the list of Habitats Directive of EU. In my PhD thesis I want to study physiological differences between native crayfish. Thermal adaptations to different water temperatures affect their survival, reproduction and behaviour. Studies of reproductive biology in the laboratory could show the rate of reproduction, maturation and juvenile growth.

As a PhD student, at the very beginning of my career, I need to get experienced in maintaining crayfish population in the laboratory. Research group I work in, have worked mainly on Cladocera, Isopoda and Amphipoda so far, which are relatively easy to keep in the laboratory cultures. Crayfish are more demanding and need different approach. The laboratory I visited has a long experience in crayfish research. During my visit at the Institute of Ecology in Innsbruck I established cooperation with people working on native and invasive crayfish in Austria. I improved knowledge about techniques to keep a laboratory population of crayfish in good condition and on the different temperatures. I acquired additional knowledge about reproduction of crayfish in simulating conditions.

Beside this, I gained information about growth and reproduction of crayfish under different conditions. Water temperature influences on growth and survival of crayfish from eggs to adult state. With new knowledge and techniques, I will easily continue studies on thermal adaptation of crayfish under different water temperatures as simulating season. In the future, I could improve studies on how fast one species is growing under simulated water temperatures. I could also discover how water temperature influences on breeding and eggs development. Physiological researches are part of thermal adaptation of crayfish.

In the future we would like to collaborate with the Institute of Ecology in Innsbruck and Prof. Dr. Leopold Füreder on the project about invasive crayfish. Since 2003 the signal crayfish *Pacifastacus leniusculus*, has been found in Mura River in Slovenia. In Austria, signal crayfish was discovered even sooner and its fast spreading was confirmed. For these reasons we need future studies about thermal adaptation and distribution of invasive crayfish.

**Martina Jaklič, PhD student**