

Population genetic structure of the rare pine wood-living longhorn beetle *Tragosoma depsarium* in Sweden – relations to forest composition and management history?

Would you like to contribute to our understanding of the effects of human activities on species genetic diversity? Why not join our team to study the impact of forest management on an endangered saproxylic beetle?

Forestry is a source of renewable raw materials and bioenergy but also has a key role in the conservation of insects and other organisms attached to dead wood. However, the Swedish Forestry Agency's forecasts showed that many biologically valuable forest types, including older pine forests, risk being displaced by more homogeneous forest landscapes dominated by younger, dense stands of spruce. Wood-living insects represent excellent indicators of biodiversity in forestry and nature conservation. In pine forests, the rare pine wood-living longhorn beetle *Tragosoma depsarium* has great potential as a signal species for valuable habitats and is a Swedish conservation priority species. It has specific habitat requirements, especially in sunlit older pine forests, developing on coarse, dead pine logs, and has an important role in the ecosystem by breaking down deadwood. However, little information is known on its true distribution and population abundance in relation to available deadwood substrates. The species likely has a highly fragmented population distribution in major parts of Sweden, due to fragmentation of its habitat through modern forestry. *T. depsarium* could thus represent an ideal model species to study the effects of habitat fragmentation on genetic diversity and gene flow, as we now have excellent tools for systematic monitoring and collection:

We seek motivated Masters students to join our project which intends to (i) describe the genetic diversity and population structure of *T. depsarium* in Sweden and (ii) determine if populations have suffered loss of genetic diversity due to forest management and isolation. During the summer 2021, the geographic distribution of the beetle in Sweden was assessed at a large scale through extensive pheromone trapping, and several populations were sampled along its distribution range. DNA was extracted for each individual and sent for RAD sequencing. The student will have the opportunity to analyse RADseq data from raw data to more advanced analyses, including population genetics. The study could be performed as a standalone bioinformatics study based on existing RADseq data, but also include hands-on experience with field sampling and DNA extraction techniques based on additional studies that will be performed in 2024. The results will be useful for implementing more efficient conservation management strategies for this beetle in Sweden.

*This project is a collaboration between researchers at SLU and the University of Helsinki. The project also includes continued pheromone-based surveys and landscape studies of *T. depsarium*, which will be pursued in parallel conservation projects in 2024.*

Duration and credits

Bioinformatics studies on sequenced materials could start immediately, as early as possible from April. If you would be interested in getting involved in active sampling and DNA extractions, the best sampling time is generally during July with preparations starting in late May or early June.

Laboratory work with samples could start in the autumn semester in September. Credits: Masters corresponding to 30-45 credits.

Required qualifications and learning goals

You have a keen interest in evolutionary ecology, genetics and conservation biology. Through this project you have the opportunity to develop your skills and experience in practical entomology and field sampling, hands-on genetic techniques, bioinformatics, biological conservation, population genetics and other statistical analyses. You don't need prior experience from bioinformatics. The work environment will be in English. The project has already started but you will have the opportunity to suggest studies and approaches of your own interest!

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