Summary

My thesis is focused on nesting behaviour and population genetics of solitary bees. These two topics, although seemingly unrelated, bring much new information and thus contribute to the better understanding of solitary bee biology that is still insufficiently known.

Although the solitary behaviour represents the necessary original state for the evolution of higher sociality or obligate cleptoparasitism, its role is largely unappreciated. Furthermore, intraspecific cleptoparasitism, which is an alternative and facultative nesting strategy in bees, is a probable antecedent state of obligate cleptoparasitism. Although the obligate cleptoparasitism is a very common strategy in solitary bees, the information about the frequency and the occurrence of intraspecific cleptoparasitism in solitary bees is rare.
We studied the nesting behaviour of solitary bees to detect different behavioural patterns that could serve as preadaptations to sociality or cleptoparasitic behaviour and we also focused on the detection and description of intraspecific cleptoparasitism in solitary bees. We chose four model solitary species for these studies – *Andrena vaga* (Andrenidae), *Anthophora plumipes* (Apidae), *Colletes cunnicularius* (Colletidae) and *Osmia rufa* (Megachilidae). We described the behaviour of *Andrena vaga* at the nesting site and showed that although the behaviour is individually variable, it is possible to detect several species specific foraging and daily behavioural patterns and interspecific comparison thus should be possible. Further we detected the presence of intraspecific cleptoparasitism in the form of nest usurpations in all the studies species, which implies that intraspecific cleptoparasitism is widely spread in solitary bee species. We further showed that regular nest abandonments and switches are surprisingly frequent in solitary bees and that they may play a crucial role in the evolution of sociality, because they decrease the intraspecific aggressiveness. Behavioural and seasonal data collected during our field observations were further used to describe different factors influencing foraging activity and lifespan in natural populations of solitary bees. We shoved that the lifespan is driven both directly by climate and indirectly through climate-dependent changes in activity patterns.

The population genetic studies brought information about the state of populations of solitary bees. Specialisation is a very common strategy in bees, but endangers them by decreasing population size and local gene diversity and by enhancing genetic structure. We studied the population structure of specialised bee *Andrena vaga* in the heterogeneous environment of the Czech Republic and we expected to detect a significant population structure. However, our results confirmed good dispersal ability of this species resulting in generally admixed pattern. Interestingly, two differentiated subpopulations, separated by a wide clinal zone of admixture, were detected within the study area that could reflect a quarterly history of this species. Further, we developed a set of microsatellites for *Anthophora plumipes* and used them to describe the phylogeography of this species in the whole species area and to evaluate the result of its recent introduction in the USA. We detected seven major clades, six in Europe and one in Asia (and in the USA). Genetic distances implied that several of these clades should be considered separated subspecies or even species. We confirmed the Japanese origin of the USA population and stated that the introduction was successful despite the dramatic decrease in genetic variability and Ne in both the source Japanese and the introduced USA population.