Abstract

Marking methods represent often an essential part of many studies which target on insect biology. These marking techniques sometimes represent the only possible way to obtain new and important informations.

In the first part of the thesis I deal with individual insect labeling, which was used for marking of solitary bees and their nests as a tool of obtaining informations about nesting bee dynamics in aggregation. Our study show that nest owner replacements are very common in all four species. However, a large percentage of the nests were abandoned by the female owners before owner change. Only a part of all the nests were trully usurped on the nesting site. The true usurpations thus represent rather minor part of observed nest owner replacement situations. The bees surprisingly often abandon their nests and found the new ones. The frequent contacts of the females on a nesting site occur as a result of common nest owner replacements. High tolerance of bees to each other together with tolerance of usurpations and low level of aggression may thus represent one of the possible ways towards communality and other types of social behaviour.

In the second part of the thesis I focus on the possibilities of food marking in bees. Effectivity of sugar and pollen utilization are not yet fully understood in social bees. Complexity of the nutritional flow in a bee colony indicates a need for a suitable experimental approach of food distribution monitoring throughout a colony and up to the larvae. We developed a new method of food tracking that utilises an inert lanthanide complex. The method allows to label and quantify the various food components within the colony. The delayed defecation of bee larvae enable the collection of all faeces from a cocoon. The amount of digested food corresponds to the amount of the lanthanide in the faeces, which is quantified using inductively coupled plasma spectrometric techniques. First, we tracked sugar distribution with a labelled sugar solution in the artificial bumblebee colonies and quantified the amount of sugar consumed by the bumblebee larvae during their entire development. Then, we labeled sugar solutions (monosaccharides x disaccharides) as well as pollen and we monitored defferencies in the consumption of these food sources in well-fed and food-stessed colonies. We confirm that monosaccharides (glucose and fructose) and disaccharides (sucrose) are a fully equivalent food source for bumblebees. We found out the existence of different patterns in ingestion of protein and sugar between well-fed and food-stressed bumblebee colonies.