SPRING, SUMMER, AUTUMN, WINTER

SEASONAL CHANGES IN HEMOCYTE-NUMBER AND TYPES IN THE HONEY BEE

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Introduction: Honeybee (*Apis mellifera*) is an ecologically and economically important domesticated social insect that goes through complete metamorphosis. A bee colony can be divided in three casts: the queen, the drones and the workers. In temperate zones, the life time of the summer workers is about 3 weeks, while winter workers may live even for 6 months. Like other insects, honeybees have an immune system which has cellular- and humoral elements, furthermore, they also apply alternative communal defense strategies, such as hygienic behavior or social fever therefore, their immune response can contain unique elements. The effector cells responsible for the cell mediated immune response are the blood cells. In previous studies, hemocytes were recognized and characterized on the basis of their morphological properties. Although different cell types were determined, their functions and lineage relationships is still neither unknown, as molecular markers for them were not exist nor was a hematopoietic tissue found. The aim of our research is to study the cellular components of the immune system of the honey bee by identification of molecular markers for hemocyte subsets and relate their expression to morphological features and function in different developmental and seasonal stages.

Methods: immunofluorescence-, immunohistochemical methods, phagocytosis assays.

Results: We defined and clustered several markers for hemocytes and used them in combination with phagocytosis assays. We recorded seasonal changes in the expression pattern of the markers and in the phagocytic function. Using the markers we showed that the phagocytic hemocyte pool was reduced, and accordingly, the cell population, having the markers, expanded during the winter.

Conclusion: Our results show that there is a dramatic seasonal change in the function and the phenotype of the hemocyte populations in the honey bee, which may be related to the lifespan, or reflects the seasonal variation of the microflora which the honeybee is exposed to throughout the year. The use of the blood cell specific markers will help to follow the seasonal changes in the composition of hemocyte populations and to understand the principles of blood cell homeostasis, and may help to identify hematopoietic compartments in this species.

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