

THE ROLE OF MULTINUCLEATED GIANT HEMOCYTES IN THE CELL-MEDIATED IMMUNE RESPONSE

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Insects developed a powerful immune system - the prototype of the innate immune system of vertebrates - to invading microorganisms and parasites by the help of humoral and cellular elements. In *Drosophila melanogaster*, the commonly used model organism to study innate immunity, the cellular elements, the phagocytic plasmatocytes, the melanizing crystal cells and the encapsulating lamellocytes are organized in three hematopoietic compartments, the lymph gland, the circulation and the sessile hematopoietic tissue. While the immunity of *D. melanogaster* is extensively studied, our knowledge on the immune response of other *Drosophila* species is still fragmentary. The aim of our research is to understand the adaptation of the cell-mediated immunity to different parasites within Drosophilidae. In the study, we analyzed the cell mediated immunity of *Drosophila ananassae*, a representative of the *ananassae* subgroup.

To define the hemocyte subsets, functions and origin in this species, we developed a toolkit based on immunological markers and a transgenic reporter system, which allows the *in vitro* analysis and *in vivo* observation as well as manipulation of hemocytes and hematopoietic compartments.

In *D. ananassae*, plasmatocyte and crystal cell morphology and functions are similar to those in *D. melanogaster*. However, instead of lamellocytes – the encapsulating cell type of *D. melanogaster* –, we observed special giant cells with filopodia, which we named as Multinuclear Giant Hemocytes (MGHs). These MGHs take part in the capsule formation, and they eliminate the parasitic wasp eggs effectively without melanization, a reaction characteristic for the encapsulation in *D. melanogaster*. The MGHs are derived from the circulation and the sessile tissue, without the involvement of the lymph gland; the latter compartment being a source of the encapsulating lamellocytes in *D. melanogaster*. This, and the *in vivo* observation that the lymph gland primarily consists of differentiated plasmatocytes suggest that the major role of the lymph gland in this species is to provide plasmatocytes for the metamorphosis and for the adult stage.

The analysis of the immune response in *D. ananassae* reveals diversity in the development of the innate immune system in insects suggesting a selecting pressure of the host-parasite interactions. In addition, as MGHs are similar to vertebrate multinuclear giant cells in granulomas, therefore we believe that the *D. ananassae* immune system is a powerful model to understand basic mechanisms of granuloma formation in vertebrates.