

when hydrogenase-deficient *E. coli* was applied as symbiotic bacterium. The results showed that the oxygen elimination process is the most crucial factor for algal hydrogen production, efficient bacterial respiration is essential for the activation of algal Fe-hydrogenase.

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## Identification of a novel effector cell type in the cell-mediated immunity of *Drosophila*, the multinucleated giant hemocyte

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Innate immunity is the first line immune defense against microbes, parasites and tumours which is composed of humoral and cell mediated events. In *Drosophila*, three main classes of blood cells, so called hemocytes, are the effector cells of cell mediated immunity. The plasmatocytes engulf microbes, produce extracellular matrix components, and provide systemic signals during microbial infections. Crystal cells contain crystallized prophenoloxidase enzyme, which is necessary for the melanization response. Lamellocytes arise upon immune induction, such as infestation by parasitoid wasps, and are required for the encapsulation reaction by forming a multilayered capsule around the parasitic wasp egg, which later melanizes. The effector hemocytes of the *Drosophila* larva originate from three hematopoietic compartments: the lymph gland which is a compact hematopoietic organ with multiple lobes, the sessile tissue where hemocytes are attached to the wall of the hemocoel, and the circulation. All three compartments contribute to differentiation of the effector hemocyte pool following immune induction.

The cell mediated immunity of *Drosophila melanogaster* is well studied; however, our knowledge on the immune response of other insects, in particular, other members of the *Drosophilidae* family is far from complete. The availability of various *Drosophila* species from different natural habitats allows to study the adaption of the cell mediated immune response to the different parasites. Recent studies show the diversity of the capsule forming cells of different Diptera species. According to these data the pseudopodocytes in *D. affinis* and *D. obscura* from the *obscura* group of *Drosophilidae* are capable of phagocytosis, similarly to plasmatocytes, however they are also involved in the capsule formation around foreign particles.

Our aim was to characterize the hemocyte subsets and the hematopoietic compartments in *Drosophila ananassae* from the *ananassae* subgroup. We identified a special giant hemocyte, which we named MGH (Multinuclear Giant Hemocyte) in *D. ananassae*, that appear after immune induction. To isolate different hemocyte subsets and to define their function, origin and formation, we produced monoclonal antibodies to subclasses of hemocytes and developed a transgenic reporter system which allows *in vivo* detection and manipulation of hemocytes and hematopoietic compartments in *D. ananassae*. As MGHs are similar to mammalian multinuclear giant cells, which play an important role in the formation of granulomas, we believe that *D. ananassae* could serve as a model for a better understanding of the development, structure and function of granulomas and of the multinucleated giant cells.

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## Methodology of ancient DNA, and results to date

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Our research group isolates and studies ancient DNA (aDNA) from excavated human remains in collaboration with the Department of Anthropology. Sequence data obtained from ancient bones can unravel genetic relatedness of individuals, and populations. From a representative data set one can surmise population movements, and population history. The aDNA research can complement anthropological and archaeological data. For kinship studies routinely matrilineally inherited mitochondrial DNA sequences, or patrilineally inherited Y-chromosomal sequences are used, but autosomal loci correlated with known phenotypes can also be examined, such as monogenic disease genes, hair and skin color genes, or FOX2P gene, associated with speech ability.

In addition, aDNA of ancient pathogens can also be obtained from their deceased carriers, which makes it possible to determine the distribution of prehistoric infectious diseases, such TB caused by *Mycobacterium tuberculosis*.

The preservation of aDNA, largely depends on the environment, and even under best conditions, it is largely degraded and fragmented. Usually trace amounts of 50-200 bp long DNA fragments are left, so classical methods apply PCR amplification, and cloning. The risk of contamination with modern DNA is very high, therefore special sterile laboratories are required for aDNA work. In the last few years the