Project 7 (P7): Identification and functional characterization of genes that enable an eukaryotic host to control and manipulate

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The evolution of eukaryotic organelles from endosymbiotic bacteria had transformative impact on life. Our group is interested in the question how a eukaryotic cell gains control over a bacterial intruder and transforms it into a beneficial endosymbiont and finally into a cell organelle. For this purpose we use the trypanosomatid *Angomonas deanei* as a model system. While for *in vitro* cultivation of most trypanosomatids complex culture media are required that contain a source of heme as well as several other cofactors and amino acids, *A. deanei* can be propagated in very simple media that lack many of these cofactors. The ability to grow in simple media goes along with the presence of a single endosymbiotic bacterium in the cytoplasm of *A. deanei* that divides synchronously with the host and is vertically transmitted to daughter cells. Although the endosymbiont genome is strongly reduced it retained genes for the biosynthesis of heme and other amino acids and cofactors that are required by the host. Interestingly, the endosymbiont is closely related to intracellular pathogens of the genera *Bordetella* and *Taylorella*. Therefore, our working hypothesis is that the endosymbiont entered the host as a pathogen and components of the host's immune system were involved in gaining control over the intruder.

This project aims at identifying "symbiosis genes" in the nuclear genome of *A. deanei* that mediate host symbiont/interaction and determining their evolutionary origin and cellular function. Ultimately, this work will contribute to provide insights into the repertoire of molecular mechanisms by which a eukaryotic host cell can control and manipulate a bacterial endosymbiont.