

Towards a *Plasmodium* 3D cell atlas

Across the variety of stages in the malaria life cycle, we focus our studies on the formation, egress, and motility of *Plasmodium* parasites within the mosquitoes. After mosquito uptake, *Plasmodium* undergoes rapid differentiation into male and female gametes. These egress from the red blood cells in complex ways to form a zygote. From the zygote a motile ookinete is developed to cross the midgut epithelium and differentiate into an oocyst, within which hundreds to thousands of sporozoites can form. These in turn exit from the protein-delimited cysts and enter salivary glands. To investigate these processes, we explored the use of 3D electron microscopy methods based on chemical fixation followed by serial sectioning and tomography. We have generated whole cell volumes of wild type and genetically modified parasites at different stages including microgametocytes, retorts, ookinetes, and sporozoites. These provide for striking visual representations and novel insights into gene function at a subcellular scale. Our ultimate goal is to provide a full 3D representation of the *Plasmodium* life cycle from multiple malaria parasites as a community resource.