Abstract 36:

Keeping the peace at the mucosal surface. How does host immunity control bad bugs?

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The digestive tract of all animals is colonized with a complex community of microbes. In response to these colonizing bacteria, the host immune system develops (it learns to discriminate between friend and foe) and in turn the immune system can shape the microbial community by removing pathogenic species. Although most microbes are harmless, some species can be deleterious when given the opportunity. These so-called pathobionts are important members of the normal microbiome that can cause the loss of homeostasis and disease under specific conditions. Unlike pathogens that will be expelled by the host immune system, these pathobionts appear to be kept under control, but can cause disease under conditions where gut homeostasis is disturbed. In our project, we will investigate how the host immune system can suppress pathobionts, while leaving commensals in the gut alone. We will make use of the zebrafish model that has attractive advantages, including the sequential development of innate and adaptive immunity, optical transparency during early development combined with genetic engineering possibilities with fluorescently labelling cell types (eg. T cells, neutrophils). With the use of the zebrafish model, we aim to unravel the role of specific cell lineages of the innate (e.g., neutrophils) and adaptive (e.g., T-cells) arms of the immune system as well as the intestinal epithelial cells, which collectively appear to orchestrate the intestinal microbiota. In addition, since cellular proximity or direct contact between immune cells and microbes are not considered to occur, we hypothesize that mediators of the immune system might impact these distant microbes via extracellular processes.