

## **Project Title: Immuno evasion of orthoflaviviruses**

**Supervisor:** PD Dr. Beate Kümmerer

**Institute/group:** Institute of Virology

**Webpage:** <https://www.immunosensation.de/members/pd-dr-beate-kummerer>  
<https://www.ukbonn.de/virologie/>

**Requirements:** Interest in virology, molecular biology and immunology, ability to work in a team, willingness to work in the BSL3 safety laboratory, willingness to be vaccinated against yellow fever, eventually work with mosquitoes.

**Skills to be learned:** Cell culture (vertebrates and insect cells), PCR, mutagenesis, cloning of plasmids, DNA purification, sequencing, in vitro transcription of RNA, electroporation, cultivation and titration of viruses, plaque assay, growth kinetics of viruses, real-time PCR, immunofluorescence, immunoprecipitation, Western blot, RNA purification (viral or cellular), luciferase reporter assays, breeding and infection of mosquitoes if required.

**Project Description (max. 150 words):** Many orthoflaviviruses are arboviruses, i.e. they are transmitted from mosquitoes to humans and replicate in both mosquitoes and vertebrates. One factor influencing the ability to replicate in the host is the ability of the virus to counteract the host's immune system. Orthoflaviviruses, like yellow fever virus, have developed various mechanisms of immuno evasion. E.g. orthoflaviviruses modify the 5'-end of their genome with a cap1 structure analogous to the cap structure of cellular mRNA using their own methyltransferase. In vertebrates it has been shown that, in contrast to the cap0 structure, the cap1 structure prevents the recognition by RIG-I, an intracellular receptor of the innate immune system. Our recent studies demonstrated that the cap0 structure is also recognized in mosquitoes. We now aim to further dissect the mechanism(s) of cap0 recognition in mosquitoes. Further, we are interested to analyze the role or mechanisms of orthoflaviviral proteins in evading the host immune response.

**Support concept (max. 75 words):** The student shall gain insight into a current research topic in the field of arboviruses. After familiarization with the S2 laboratory and learning the most important methods, the student will be introduced to the S3 laboratory. The student should learn to plan and carry out experiments independently. To provide support, regular meetings are held to discuss the planned procedure. Further, presentation of obtained data in the regular PhD seminar shall support presentation and language skills.