Project proposal for the attribution of a PhD grant within the *ParaFrap* PhD Programme

Title of the project: How do parasites manipulate the behaviour of their vectors? A comparative spatial transcriptomic study in *Anopheles* and *Glossina* sensory organs.

Main PI for the project:
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KEYWORDS : parasitic manipulation, vectorial transmission, spatial transcriptomics, sensorial ecology

ABSTRACT
Many parasites are known to alter behavioural traits of their hosts in a way that increases the probability of onwards transmission. Because of their medical/veterinary importance and because phylogenetically very distant parasites harness hematophagous behaviours to be transmitted, vector-borne parasites represent sensible models to study parasite manipulation of host behaviour.
The present project aims to decipher the proximate mechanisms of behavioural manipulation in the two major vectorial systems *Plasmodium falciparum* - *Anopheles gambiae* and *Trypansoma brucei* - *Glossina morsitans*. We postulate that similar manipulation of the host sensory system may occur in both systems. We will use a comparative approach and investigate evolutive convergence in transcriptomic profiles in these insects' sensory and integration organs depending on the infection status.
The PhD student, will perform experimental infections of *A. gambiae* females by *P. falciparum* and infections of *G. morsitans morsitans* by *T. brucei brucei*. Insects at different stages of infection and their uninfected controls will be analysed by cutting edge transcriptomics of their sensory and integration organs. The spatial distribution of specific gene transcripts, especially those coding for olfactory receptors, will be characterised, and patterns of responses to infection will be mapped and contrasted in both vector systems. Finally, genes whose expression is strongly affected by infection will be further studied and their role in odour detection will be measured by electrophysiology in mosquitoes to identify, localise and functionally characterise the sensory pathways affected by infection. We expect this spatial map will help understanding natural odour recognition in insects and its modulation by infection.

SOME PUBLICATIONS OF THE MAIN PI'S research group related to the project

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