**CNRS 9022**
**and INSERM U1257**
**Institut de Biologie Moléculaire et Cellulaire,**
**Université de Strasbourg, France**

**1 Post-doctoral Position**

**Title:** A *Gene drive* carrying an antiviral gene as a tool to fight dengue and Zika viruses in *Aedes* mosquitoes

Dengue (DENV) and Zika (ZIKV) are mosquito borne viruses that infect millions of people worldwide. *Aedes aegypti* mosquitoes are the major vectors for these viruses and are an important target for transmission blocking strategies. We have previously described an endogenous antiviral gene named *Loqs2* that can make mosquitoes resistant to DENV and ZIKV when ectopically expressed in the gut. The objective of this project is to design CRISPR-based gene drive (GD) systems in *Aedes* mosquitoes that contain the *Loqs2* gene (and potentially other antiviral genes of interest). GDs are synthetic genetic elements possessing the property to spread and invade populations of a target species that would allow our transgene to modify mosquitoes in the wild. GDs have not yet been developed for mosquitoes of the *Aedes* genus. Here, we will generate mosquito strains carrying GDs that will be tested in the laboratory for their efficiency both in terms of gene drive and of pathogen resistance phenotype. We will also use them to address specific concerns regarding the safety of GDs. Our study will contribute to the generation of a strategy that could be applied in the field to effectively control the transmission of mosquito borne viruses.

**Key words:** Dengue and Zika viruses, *Aedes mosquitoes*, antiviral immunity, gene-drive

The selected applicant will join a multinational team at the Research Unit M3i 'Insect Models of Innate Immunity' in the Institut de Biologie Moléculaire et Cellulaire on the central campus of the University of Strasbourg. This project involves an international collaboration and will be co-advised by Dr. João Marques (Department of Biochemistry and Immunology at Universidade Federal de Minas Gerais, Brazil and group leader at CNRS UPR9022, Strasbourg, France) and Dr. Eric Marois (group leader at INSERM U1257, IBMC, Strasbourg France).

This is a multidisciplinary project and candidates should be skilled in molecular biology; prior experience in virology or immunology is a plus. Written and oral communication skills in English are required.

This is a 36-month position funded by ANR.

Enquiries/applications should be made by e-mail including a CV and contact for two references to: João Marques (joao.marques@unistra.fr) and Eric Marois (e.marois@unistra.fr)

Lab websites:
https://ibmc.cnrs.fr/en/laboratoire/m3i-en/equipes/antiviral-responses-in-the-aedes-mosquito/
https://ibmc.cnrs.fr/en/laboratoire/m3i-en/equipes/immune-responses-in-the-anopheles-gambiae-malaria-vector/

**Key lab publications:**


1. A single unidirectional piRNA cluster similar to the flamenco locus is the major source of EVE-derived transcription and small RNAs in Aedes aegypti mosquitoes.RNA. 2020 Jan 29.
2. Control of Dengue Virus in the Midgut of Aedes aegypti by Ectopic Expression of the dsRNA-Binding Protein Loqs2. 2018. Nature Microbiology 3 (12): 1385–93.
3. Transgenic Expression of the Anti-Parasitic Factor TEP1 in the Malaria Mosquito Anopheles Gambiae. 2017. PLoS Pathogens 13 (1): e1006113.
4. A CRISPR-Cas9 Gene Drive System Targeting Female Reproduction in the Malaria Mosquito Vector Anopheles Gambiae. 2016. Nature Biotechnology 34 (1): 78–83.
5. Tools for Anopheles gambiae Transgenesis. 2015. G3 (Bethesda, Md.) 5 (6): 1151–63.
6. Sequence-Independent Characterization of Viruses Based on the Pattern of Viral Small RNAs Produced by the Host. 2015. Nucleic Acids Research 43 (13): 6191–6206.