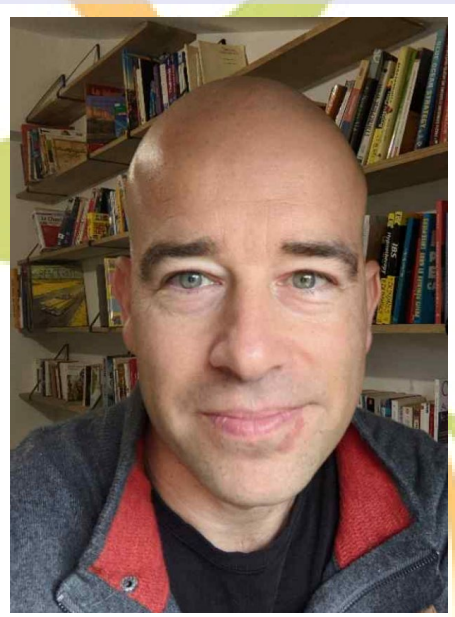
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Dengue virus infection modifies mosquito blood-feeding behavior to increase transmission to the host

Dr Julien Pompon
Institute of Research for Development, France



Dr Pompon studies the molecular determinants of arbovirus transmission by mosquitoes. By using molecular entomology, cell biology, omics and animal model, he improved the understanding of the mosquito antiviral response, the roles of lipids in virus propagation and characterized the multiple functions of non-coding viral RNA in transmission. His goal is to identify targets to develop new interventions.

Mosquito blood-feeding behavior is a key determinant of the epidemiology of dengue viruses (DENV). Here, we developed a high-resolution video-based assay to observe the blood-feeding behavior of Aedes aegypti mosquitoes. We showed that DENV infection increases mosquito attraction to the host and hinders its biting efficiency, the latter resulting in the infected mosquitoes biting more to reach similar blood repletion as uninfected mosquitoes. Using a new in vivo transmission model with immuno-competent mice, we demonstrated that successive short probes result in multiple transmissions. Finally, we integrated the behavioral data within a mathematical model and calculated that the number of infected hosts per infected mosquito, as determined by the reproduction rate, tripled when mosquito behavior was influenced by DENV infection. Taken together, this multidisciplinary study details how DENV infection modulates mosquito blood-feeding behavior to increase vector capacity, elucidating the contribution of mosquito behavioral alterations on dengue epidemiology.

Recent Publications:

1. Vial T., Tan W-L., Deharo E., Missé D., Marti G. and **Pompon J**. (2020). Mosquito metabolomics reveal that dengue virus replication requires phospholipid changes via the remodeling cycle. PNAS, 117(44), 27627-27636.
2. Chowdhury A., Modahl C.M., Tan S.T., Wong B., Misse D., Vial T., Kini R.M. and **Pompon J.** (2020). JNK pathway restricts DENV2, ZIKV and CHIKV infection by activating complement and apoptosis in mosquito salivary glands. PLoS Pathogens, e1008754.
3. **Pompon J.**, Manuel M., Ng G.K., Wong B., Shan C., Manokaran G., Soto-Acosta R., Bradrick S.S., Ooi E.E., Missé D., Shi P.-Y., and Garcia-Blanco M.A. (2017). Dengue subgenomic flaviviral RNA disrupts immunity in mosquito salivary glands to increase virus transmission. PLoS Pathogens, 13(7):e1006535.