COEVOL MULTI-SCALE COEVOLUTION

EVOLUTIONARY GENETICS OF INTERACTIONS GROUP

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Research interests

Transposable elements (TEs) are repeated sequences of DNA that populate the genome of every single species and are able to replicate and insert new copies of themselves into the genome they inhabit. As they are devoid of any obvious function for their host organism and induce mutations that are most of the time deleterious, TEs are often seen as **genomic parasites**.

The goal of my research is to **understand the factors that determine the proliferation of these parasites and the ins and outs of the cohabitation between genes and TEs** within genomes.

Current projects

Invasive species: TEs dynamics and contribution to adaptation

Invasive species constitute an ideal model to study real-time evolution. With regard to TEs they provide a way to understand how demographic factors (range expansions accompanied by founder effects) can influence TEs dynamics. In addition while TEs are deleterious in general several spectacular examples of TE-based adaptations have been described. Invasive species can thus be used to study the contribution of TEs to the adaptation of populations to new environments. We have been able to show in *Drosophila suzukii*, an invasive species in Europe and the United States, that the invasive process was associated with an increase of the genomes' TE load, which seems to be linked to bottlenecks that accompany the invasion (Mérel et al. 2021). We also work with the Asian tiger mosquito *Aedes albopictus*, an invasive species from Asia, and described its repeatome (Goubert et al. 2015). We showed that in this species several insertions segregate at high frequencies in Europe which suggests that they might be involved in the adaptation of this mosquito to temperate environments (Goubert et al. 2017). We are currently extending this study through the comparison of numerous complete genomes from native and invasive populations of this species (ANR funded project MosquiTEs, PI M Boulesteix) to get a better understanding of the contribution of TEs in the adaptive process.

Interactions between viral infections and transposition rates

Natural selection has enabled the emergence of defense systems in genomes allowing them to protect themselves against the deleterious effects of TEs. In many organisms small RNAs (piRNAs and siRNAs) are central to these defense system. Defense against viruses is also ensured thanks to small RNAs (siRNAs in Drosophila, piRNAs and siRNAs in mosquitoes). It is thus tempting to ask whether viral infections could interfere with TEs control and conversely. This question is currently addressed by Chloé Garambois during her PhD (supervision: Marie Fablet and Matthieu Boulesteix).