



## Master internship offer

#### Host team : Epigenetics and Zygote Formation

http://www.ens-lyon.fr/LBMC/equipes/epigenetique-et-formation-du-zygote

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**Key words** : Genetics, epigenetics, *Drosophila melanogaster*, spermiogenesis, zygote, chromatin, histoneprotamine transition, histone marks.

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#### Lab interests and potential projects

The research team investigates the molecular mechanisms of histone-protamine replacement during sperm differentiation and its role in the transmission of paternal chromosomes to the zygote. This topic is investigated using functional genetic approaches in *Drosophila melanogaster*. Our recent projects focus on the mechanisms of nucleosome disassembly in spermatids (Dubruille et al., Science, 2023).

We are also investigating the impact of the endosymbiotic bacterium *Wolbachia* on spermiogenesis and zygote formation, as well as the role of the toxin-antidote system CifA-CifB (Horard et al., Curr. Biol., 2022).

Additionally, we are studying the evolution and function of histone variants that have been lost in holometabolous insects (*Drosophila*) but are still present in hemimetabolous insects, such as the cricket (*Gryllus bimaculatus*), a model we are actively developing in the lab (Gonzalez-Sqalli et al., in press).

Several internship opportunities are available, depending on the progress of our projects, the candidates' specific interests and the timing of the internship. We encourage interested applicants to send a CV and a cover letter by email.

#### Technics used in the lab :

*Drosophila* and cricket genetics (crosses, phenotypic analyses, CRISPR/Cas9, ...), cytology/microscopy (dissections, embryo collections, immunofluorescence, confocal microscopy ...), molecular biology (DNA, western blot)

### **Publications :**

Gonzalez-Sqalli E, Caron M, Loppin B. **2024** The *white* gene as a transgenesis marker for the cricket *Gryllus bimaculatus*. *G3*, *in press*.

Dubruille R, Herbette M, Revel M, Horard B, Chang CH, Loppin B. **2023** Histone removal in sperm protects paternal chromosomes from premature division at fertilization. *Science* 382(6671):725-731. doi: 10.1126/science.adh0037. PMID: 37943933

Orsi G, Tortora MMC, Horard B, Baas D, Kleman JP, Bucevičius J, Lukinavičius G, Jost D, Loppin B. **2023** "Biophysical ordering transitions underlie genome 3D re-organization during cricket spermiogenesis." *Nature Comm.* 14(1):4187. doi: 10.1038/s41467-023-39908-1. PMID: 37443316

Horard B, Terretaz K, Gosselin-Grenet AS, Sobry H, Sicard M, Landmann F, Loppin B. **2022** Paternal transmission of the Wolbachia CidB toxin underlies cytoplasmic incompatibility. *Curr Biol.* 32(6):1319-1331.e5. doi: 10.1016/j.cub.2022.01.052. PMID: 35134330

Tirmarche S, Kimura S, Dubruille R, Horard B, Loppin B. **2016** Unlocking sperm chromatin at fertilization requires a dedicated egg thioredoxin in Drosophila. *Nature Comm.* 7:13539. doi: 10.1038/ncomms13539. PMID: 27876811

Loppin B, Dubruille R, Horard B. **2015** The intimate genetics of Drosophila fertilization. *Open Biol.* 5(8). pii: 150076. doi: 10.1098/rsob.150076. PMID: 26246493



The histone-protamine transition in *Drosophila*. The upper image shows a wide view of a testis expressing Protamine B fused to GFP stained with DAPI (DNA) and an anti-pan histone antibody. Lower panels show close-ups of the nuclei of 64 spermatids (differentiating spermatozoa) in a testis from transgenic flies expressing the histone H3.3-mRFP1 and Protamine B-GFP fusion proteins.