Master de Sciences et Technologies
Mention Biologie Intégrative et Physiologie
Parcours : Neurosciences
Responsable : Professeur Régis Lambert

Internship Proposal
Academic Year 2019-2020

1. Host team:

Research Unit (e.g. Department or Institute): Brain Plasticity Unit, CNRS, PSL Research University, ESPCI Paris
Research Unit Director: Thomas Preat
Research Team Director: Serge Birman
Team name: Genes Circuits Rhythms and Neuropathology

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2. Internship project title:

Circadian system and stress resistance in *Drosophila melanogaster*

3. Internship Description:

Endogenous circadian clocks control many self-sustained rhythms in physiology and behaviour with approximately 24-hour periodicity. Aging, prolonged stress and pathological conditions such as Parkinson's disease are known to have a negative impact on the circadian system, resulting in enhanced physiological and behavioural defects. Conversely, the loss or weakening of the clock decreases resistance to oxidative stress and can contribute to disease progression and reduce lifespan. However, the signalling mechanisms by which endogenous clocks improve stress resistance and life expectancy are not yet well understood. The fruit fly *Drosophila* is widely used to study the circadian system and as a model of aging and neurodegenerative diseases. In previous work, we have studied the effects of genetic clock disturbances on locomotor decline and longevity. We have identified interactions between specific circadian genes and neuropeptides that control aging-related processes and oxidative stress resistance in the *Drosophila* central nervous system [1, 2 and unpublished results]. In particular, the neuropeptide pigment-dispersing factor (PDF), expressed in a small number of neurons, appears to play a central role in these regulations. The goal of this internship will be to further explore the mechanisms by which circadian genes and their interactions can have such a deep influence on *Drosophila* healthspan in normal or neuropathological conditions. The methodology used will mainly combine classical genetics, behavioural tests and brain imaging.

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[1] Vaccaro *et al*. (2017) PLoS Genet*. 13*, e1006507 (doi: 10.1371/journal.pgen.1006507)
[2] Hajji *et al*. (2019) Hum. Mol. Genet. *In press* (doi: 10.1093/hmg/ddz031)