PhD Research Proposal Form
China Scholarship Council (CSC) - ENS Group

FIELD: ---Biology

Thesis subject title: **Exploring the role of Hox proteins in regulating aging in *Drosophila***

Name of the French doctoral school: BMIC

Name of the Research team: Ontogenesis and Molecular Interactions
Website: http://igfl.ens-lyon.fr/equipes/s.-merabet-ontogenesis-and-molecular-interactions

Name of the Supervisor: Christelle Forcet-Vauchel
Email: christelle.forcet@ens-lyon.fr

Lab Language: French, English

Research Proposal Abstract:

Aging is characterized by a progressive decline in cell and tissue function and increased vulnerability to disease and mortality. Many studies have uncovered the molecular changes and signaling pathways that influence aging. Notably, autophagy, a critical cellular process, declines with age in various organisms, contributing to the onset of age-related diseases [1]. Hox proteins are evolutionary conserved transcription factors that play a pivotal role in regulating autophagy in the *Drosophila* larval fat body during development [2,3]. Interestingly, these proteins also repress autophagy in the adult fly. Therefore, unravelling how Hox proteins regulate autophagy over time, and how this regulation impacts homeostasis and normal aging represents an intriguing and achievable goal.
This PhD project aims to (i) investigate whether modulating the expression of Hox proteins in the adult fat body affects lifespan; (ii) determine potential age-related variations in the ability of these proteins to repress autophagy in the adult fat body and (ii) elucidate the molecular mechanisms underlying the Hox-mediated regulation of autophagy and longevity.

Overall, this PhD project will require skills in Drosophila genetics and confocal imaging. Results obtained during the PhD should provide new perspectives in our understanding Hox-dependent mechanisms that may influence both autophagy and longevity, contributing to the development of age-related phenotypes in *Drosophila.*

References:

1 Aman Y, Schmauck-Medina T, Hansen M, Morimoto RI, Simon AK, Bjedov I *et al.* Autophagy in healthy aging and disease. *Nat Aging* 2021; **1**: 634–650.

2 Banreti A, Hudry B, Sass M, Saurin AJ, Graba Y. Hox Proteins Mediate Developmental and Environmental Control of Autophagy. *Developmental Cell* 2014; **28**: 56–69.

3 Duffraisse M, Paul R, Carnesecchi J, Hudry B, Banreti A, Reboulet J *et al.* Role of a versatile peptide motif controlling Hox nuclear export and autophagy in the *Drosophila* fat body. *Journal of Cell Science* 2020; : jcs.241943.

Type of PhD:

1.Full PhD

- Joint PhD/cotutelle (leading to a double diploma) : NO
- Regular PhD (leading to a single French diploma) : YES

2. Visiting PhD (for students enrolled at a Chinese institution who will be invited to a French institution to carry out a mobility period) : NO