MASTER 2 Neurosciences Fondamentales et Cliniques

Internship proposal 2021-2022

(internship from January to end of May 2022)

Host laboratory: Institut Neuromyogene, Université Lyon 1 - CNRS UMR 5310 - INSERM U1217

Host team : Genetics and neurobiology of *C. elegans*, PI : Jean-Louis Bessereau, Faculté de Médecine et de Pharmacie, 3ème étage, aile D, 8 avenue Rockefeller, 69008 LYON
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Internship supervisors : Bérangère Pinan-Lucarré, Chargée de recherche INSERM, berangere.pinan-lucarre@univ-lyon1.fr

Project title : Characterization of a new synaptic regulator in *C. elegans*

Project summary :

Background: The synapse is an evolutionarily ancient structure. Using the worm *Caenorhabditis elegans*, we seek to elucidate new molecular mechanisms involved in synapse formation and function, potentially conserved in human. We recently identified novel neuron-to-neuron synapses using a fluorescent reporter of the ACR-16 acetylcholine receptor, the ortholog of the human alpha7 receptor.

Aim: This project aims to identify molecular mechanisms regulating the synaptic localization of the ACR-16 receptor. To this end, we performed a genetic screen upon random mutagenesis, based on the localization of ACR-16. This screen identified 26 mutants displaying synaptic defects. The mutated genes are being identified by WGS, a strategy applied routinely in the lab. The trainee will undertake the functional characterization of a synaptic regulator newly identified by this screen.

Technologies used: The trainee will implement skills in molecular biology (construction of plasmids by Gibson ligation, restriction, sequence analysis, PCR), formal genetics (multiloci crosses), molecular genetics (CRISPR, generation of transgenic lines of *C. elegans*), and imaging (conventional microscopy, spinning disk, image analysis by Fiji).

3-5 recent publications :

(1) Pinan-Lucarre, B., …, and Bessereau, J.L. (2014). *C. elegans* Punctin specifies cholinergic versus GABAergic identity of postsynaptic domains. ***Nature*** 511, 466-470.
(2) Tu, H.*, Pinan-Lucarre, B*….and Bessereau, J.L. (2015). *C. elegans* Punctin Clusters GABA(A) Receptors via Neuroligin Binding and UNC-40/DCC Recruitment. ***Neuron*** 86, 1407-1419.
(3) Zhou, X., …, Pinan-Lucarre, B.* and Bessereau, J.-L.* (2020) The netrin receptor UNC-40/DCC assembles a postsynaptic scaffold and sets the synaptic content of $GABA_A$ receptors. ***Nature Communications*****;** 11(1).

Please send your proposal to emiliano.macaluso@univ-lyon1.fr and marion.richard@univ-lyon1.fr for publication on the Master of Neuroscience website.