INTERNSHIP

QUANTIFICATION OF AXONAL REGENERATION IN DROSOPHILA

The motivation of this project is the restoration of damaged neuronal circuits, for instance for patients suffering from neurodegenerative diseases. The Drosophila is an excellent model for studying axonal regeneration, because during metamorphosis (transition to the adult stage), a significant and stereotyped restructuring of its nervous system is observed. In this living organism, particularly well-suited to genetic manipulation, F. Besse team (C. Medioni) has recently characterized a population of neurons (ie Bursicon) whose axons regenerate reproducibly during metamorphosis. Any alteration in the axonal regeneration of these neurons, thus in adult neurons, results in wing unfolding defects in adult Drosophila.

The aim of this project is to build and assess a protocol to characterize regulators involved in axonal regeneration. For each targeted gene, the strength in alteration is assessed at the population level by evaluating the unfolding defects at the population level. Then, Bursicon neurons will be imaged in adults in two populations, one control and one with the inactive gene. Last, the localization of the regulator induced by the gene will be analyzed in a wild type population, also by imaging. Two challenges arise. First, (at least) 15 individuals are to be imaged in each population (gene-suppressed, control, wild-type), yielding a significant number of 3D images are to be analyzed. Second, an objective comparison of groups (control vs gene-suppressed for one gene, or across genes) is necessary, which cannot be reached by visual assessment.

The goal of this internship is to defined automated image processing methods to quantify the regulator localization as for the axonal arborization.

Requirements:

1. Last year of master in computer sciences or applied mathematics (with interest in biology) or bioinformatics (with interest in image processing)
2. Knowledge in image processing, preferably 3D
3. Computer skills: programming (python), image processing/graphics libraries
4. Written and spoken English

Practical information:

1. This work takes place in a collaboration between IBV (C. Medioni) and Morpheme, a joint research team between INRIA, CNRS and the University of Nice Côte d'Azur.
2. This internship is located in Sophia Antipolis (French Riviera).
3. This internship is remunerated
4. Duration: 6 months, expected start: early 2025
5. To candidate, please send a curriculum vitae, referees coordinates and a motivation letter to
    - Grégoire Malandain (Gregoire.Malandain@inria.fr)

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