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) : Institut de la Vision
Research Unit Director : José-Alain Sahel
Research Team Director : Alain Chédotal
Team name : Role des Molécules de Guidage Axonal

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Supervisor of the Research Intern for this project: Kim Nguyen-Ba-Charvet
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## 2. Internship project title:

Does ARID3C control cone photoreceptor cell patterning?

## 3. Internship Description:

Vision starts at the photoreceptors cells (PR), which are unique sensory neurons that are specialized to capture light. Death or dysfunction of PR represents the primary cause of visual impairment. Transcriptional controls are critical for the development and long-term survival of PR; impairment of these controls leads to retinal dysfunction or degenerative disease. Cones discriminate wavelengths. In mice, cones only expressed two opsins (M and S-opsin). M-opsin expression begins at the end of the first postnatal week distributed in a dorsal to ventral gradient, whereas S-opsin expression starts earlier with a higher level the ventral retina. The correct patterning of opsin expression is crucial for normal color vision.

Many questions about the gene regulatory mechanisms governing retinal development remain unanswered. Not much is known about the factors triggering the opsin subtype choice (M or S). We found that ARID3C, a transcription factor is expressed in the postnatal mouse retina. ARID3C function is still unknown. We observed that ARID3C is expressed in a dorsal to ventral gradient between Po and P8 just before M-opsin starts to be expressed. This coincidence led us to hypothesize that ARID3C could be involved in the M-opsin/S-opsin cone distribution pattern.

This project aims to study the role of ARID3C in cone cell patterning in mice but also chick.

We have developed a protocol for whole-tissue clearing of pigmented eyes, "EyeDISCO" applicable after immuno-staining which allows us to observe the entire retina using Light Sheet Microscopy. We would then be able to study the ARID3C 3D expression pattern using an antibody we are currently generating.

We want to investigate ARID3C function in the chick retina, as 80% of its PR are cones. To this end, we will design shRNA that we will clone into a genome-integrative plasmid that allows a permanent expression. First, we will select the most effective shRNA by electroporating the construct in cultures of chick cone cells. The selected shRNA will be then electroporated *in ovo* and retinas will be harvested when M-opsin starts to be expressed and study opsin expression.

This study should give insights into the function of ARID3C in cone subtypes development.

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