**Master 2 internship project**

**Year 2023-2024**

**Laboratory/Institute:** IAB **Director:** Pr Pierre Hainaut

**Team:** GETI: Genetic, Epigenetic and Therapy of

Infertility **Head of the team:** Dr Arnoult Christophe, Pr Pierre Ray

**Name and status of the scientist in charge of the project:** Dr Arnoult Christophe **HDR: yes X no ☐**

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**Program of the Master’s degree in Biology:**

**☐** Microbiology, Infectious Diseases and Immunology **☐** Structural Biology of Pathogens

**x** Physiology, Epigenetics, Differentiation, Cancer **☐** Neurosciences and Neurobiology

**Title of the project: Involvement of microtubules inner proteins in mice fertility**

Objectives (up to 3 lines):

The objectives of the stage will be to analyze the expression and localization of Microtubules Inner Proteins (MIP) proteins in several mouse tissues (testis, epidydimis, oviduct, trachea) and to investigate their involvement in mouse flagella and cilia beating using high-speed videomicroscopy.

Abstract (up to 10 lines):

During fecundation, sperm must migrate along the female genital tract to fertilize the ovulated oocyte. This migration is possible thanks to (i) the sperm movement by itself thanks to their flagella beating and (ii) the oviductal flow created by the multiciliated cells present in the oviduct. Cilia and flagella have in common a highly specialized microtubular structure: the axoneme. This axoneme will suffer important physical torsion and curvature which allow the specific movement specific of the flagella and cilia beatings. Several proteins are required to maintain the axonemal integrity during the flagella movements. Our lab is working on a little protein family, highly conserved during the evolution, whose members can be either preferentially expressed in male cells as spermatozoa or in multiciliated epithelium as the oviduct. To decipher the role of these proteins in fertility and in ciliogenesis, mice animal models have been established and are currently phenotyped.

Methods (up to 3 lines):

The expression will be analyzed by pRT-PCR and western blot. The protein localization will be assessed by immunohistochemistry and immunofluorescence. The beatings will be recorded and determined on fresh tissues thanks to a high-speed video camera.

Up to 3 relevant publications of the team:

Bi-allelic Mutations in ARMC2 Lead to Severe Astheno-Teratozoospermia Due to Sperm Flagellum Malformations in Humans and Mice. Coutton C et al., Am J Hum Genet 2019 Feb 7;104(2):331-340.

[Mutations in CFAP43 and CFAP44 cause male infertility and flagellum defects in Trypanosoma and human.](https://pubmed-ncbi-nlm-nih-gov.insb.bib.cnrs.fr/29449551/)

Coutton C et al., Nat Commun. 2018 Feb 15;9(1):686.

Requested domains of expertise (up to 5 keywords):

Physiology, cellular biology, biochemistry.