

Katerina Bisova's group – Laboratory of Cell Cycles of Algae

Supervisor: Sien Audoor

Title of the project: Generation of mutant green micro-algae: optimisation and characterisation

For how many student/s: 1

Description of the project:

The cell cycle, the series of events by which a cell grows and divides, is a fundamental process in all living organisms; and understanding how it is regulated remains a central question in cell biology. Most current knowledge comes from the study of binary fission, in which one mother cell produces two daughter cells. Green micro-algae, however, divide through the alternative process of multiple fission, in which a mother cell undergoes several rounds of DNA replication and nuclear division before releasing multiple daughter cells simultaneously. The host laboratory has long-standing expertise in the use of synchronised algal cultures, which allow cell cycle events to be studied with high temporal resolution. The generation of algal mutants is a powerful complementary approach to dissecting the molecular mechanisms that underlie this process.

In this project, the student will gain hands-on experience with both the generation and characterisation of micro-algal mutants. They will carry out mutagenesis experiments in one of three models (*Chlamydomonas reinhardtii*, *Chlorella sorokiniana*, *Desmodesmus quadricauda*) to generate novel mutant strains. Furthermore, they will characterise mutants using a range of molecular biology methods (which may include DNA extraction, PCR-based genotyping, protein analysis by Western blot, and confirmation of genetic modifications by DNA sequencing) as well as cell biology methods (microscopy). Together, these activities will give the student a broad overview of the experimental workflow from strain generation through to molecular and phenotypic verification.

Requirements

- Proficiency in spoken and written English, including the ability to read and critically engage with scientific literature
- Previous laboratory experience is not required, but is an advantage, as the project is predominantly wet-lab based

Learning Outcomes

By the end of the project, the student will be able to:

- Understand the principles of mutagenesis in micro-algae
- Perform core molecular biology techniques including DNA extraction, PCR, and gel electrophoresis
- Interpret genotyping, sequencing, and microscopy data in the context of mutant characterisation
- Navigate scientific literature and extract relevant methodological information to inform experimental design