

Katerina Bišova's group

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Title of the project: Exploring genetic interactions in the green microalga *Chlamydomonas reinhardtii*

For how many student/s: 1

Description of the project:

All living cells rely on many genes working together to control essential processes such as growth, metabolism, and response to environmental changes. However, genes do not function independently. Instead, they interact with each other, and these interactions can strongly influence how cells behave. Understanding these relationships is important to explain how cells adapt and survive under different conditions.

In this project, we study genetic interactions in the green microalga *Chlamydomonas reinhardtii*, a widely used model organism for studying photosynthesis and cellular metabolism. We are particularly interested in how genes involved in nutrient sensing and metabolism work together to regulate cell growth.

To investigate this, we combine different genetic mutations and observe how cells grow under controlled laboratory conditions. By comparing single mutants and combinations of mutations, we can identify cases where genes interact, for example when two mutations together cause a stronger effect than expected.

The results of this project will contribute to a better understanding of how genetic interactions control cellular functions in photosynthetic organisms and how cells respond to changes in their environment.

In the proposed project the student will:

1. Grow and maintain cultures of *C. reinhardtii* mutants under laboratory conditions.
2. Assist in crossing mutant variants to obtain *C. reinhardtii* double mutants.
3. Perform growth experiments under different environmental conditions (e.g. nutrient stress) and record and compare phenotypes such as growth rate or colony size.
4. Analyse and interpret results to identify potential genetic interactions.
5. Gain experience in the use of artificial intelligence tools for scientific literature analysis, including strategies to reduce language barriers in scientific writing in English and to facilitate rapid acquisition of knowledge within a defined research topic.

Requirements:

1. The student is expected to be comfortable in speaking and writing in English.
2. Language requirements also include basic understanding of basic scientific literature.
3. Prior laboratory experience is advantageous but not mandatory.
4. Given that a substantial portion of the project involves experimental work, candidates should be comfortable working in a wet lab environment.
5. Study degree is not essential, although there is a slight preference for advanced bachelor student.
6. Given the inclusion of an AI-based learning component, having a personal laptop is considered an advantage, although it is not mandatory.