

Internship subject: Modelling oil droplets production in microalgae

Supervisors : Damien Pellier, Juliette Salvaing

Duration : 5 mois

Research laboratory : Laboratoire d'Informatique de Grenoble, 700 avenue Centrale, 38058 Grenoble cedex 9/ Laboratoire de Physiologie Cellulaire et Végétale CEA Grenoble 17 rue des martyrs, 38054 Grenoble cedex 9

Keywords : Modelling, biological processes, lipid droplets, biofuel production

1. Context:

Microalgae are unicellular organisms that play an important ecological role for the storage of Carbon and the production of Oxygen. They naturally store Carbon as oil, in particular in response to stress, such as nutrient deprivation. This production of oil is of interest for industrial applications such as the production of biofuels. However, the yield of oil and its extraction from the algae need to be improved. We have recently identified a strain that produces more oil even in the absence of stress. Moreover, part of the oil seems to be naturally released. These two features are very interesting for applications. However, we have observed that the oil content is very variable from one cell to the next. The aim of the present project is to understand the reasons behind this variability and be able to modeling this variability to build a model.

2. Objectives

The objective of this Master 2 research is: (1) to identify in the literature the best modelling strategies to address the question. (2) to propose and implement a model of the biological process and (3) to confront this model with experimental data available in the lab (microscopy observations : fluorescence and electronic microscopy)

3. Profile of the candidate

- The candidate must have:
- be registered in Master 2
- a good academic level attesting to his ability to combine practice and theory
- a level of professional oral and written English
- an interest for biological questions

4. Contact procedure Send to Damien.Pellier@imag.fr:

- Your Master marks 1
- Your CV Applications are managed on a case-by-case basis. You will be informed promptly by email of the admissibility of your application and if you are invited to a first interview.

5. References

- Modelling and Simulating Complex Systems in Biology: Introducing NetBioDyn – A Pedagogical and Intuitive Agent-Based Software January 2020 DOI:[10.4018/978-1-7998-1204-3.ch048](https://doi.org/10.4018/978-1-7998-1204-3.ch048) In book: Data Analytics in Medicine (pp.898-929)

- Jaussaud A., Lupette J., **Salvaing J.**, Jouhet J., Bastien O., Gromova M. and Maréchal E. Stepwise Biogenesis of Lipid Droplets in Nitrogen Starved *Phaeodactylum tricornutum* Cells. Front Plant Sci. **2020** Feb 11; 11:48