



PHBV-SEA: Probing the Potential of Marine Bacterial and Fungal Isolates for PHBV Degradation through Exploring Novel Biodegradation Strategies including Synergistic Approaches

LAB & PEOPLE

- Name of the hosting lab: Laboratoire Universitaire de Biodiversité et Ecologie Microbienne (UR3882)
General activities of the lab: Microbiology (Mycology and Bacteriology), Biotechnology
Website: <https://www.univ-brest.fr/lubem>
Number of staff / PhD: 38 / 10
- Supervisor name and contact: Dr. Gaëtan Burgaud (gaetan.burgaud@univ-brest.fr) and Pr. Emmanuel Coton (emmanuel.coton@univ-brest.fr)

TOPIC OF THE INTERSHIP

- Scientific context of the internship (max 20 lines)
Keywords
Bibliography

Plastics are associated with a worldwide pollution crisis, with strong negative impacts on both terrestrial and aquatic ecosystems. In marine environments, various organisms are colonizing plastic debris, but few studies have focused on fungal communities despite their non-trivial ecological roles in the marine environment (Burgaud et al. 2022). In a recent study, we have used a metabarcoding approach to highlight that (i) the fungal Kingdom is an integrated part of the plastisphere, (ii) plastic-associated fungal communities are relatively complex and distinct from those living in surrounding seawaters, and (iii) locations and inherent environmental parameters, type of plastics (conventional vs. biodegradable), and immersion duration have strong influence on fungal colonization. These first findings paved the way for complementary studies directed towards the use of a culture-based approach to generate a culture collection of microorganisms associated with plastics (fungi and bacteria) allowing us to generate ~2,000 isolates. Through a preliminary screening, we have identified several promising isolates capable of utilizing various plastic polymers as a sole carbon source, particularly showcasing their ability to utilize PHBV (3-hydroxybutyrate-co-3-hydroxyvalerate).

Plastics; plastisphere; marine fungi; marine bacteria; screening; biodegradation

Burgaud, G., Edgcomb, V., Hassett, B. T., Kumar, A., Li, W., Mara, P., ... & Roullier, C. (2022). Marine fungi. In *The Marine Microbiome* (pp. 243-295). Cham: Springer International Publishing.



2023-24 – doing a Master internship at UBO



Philippe, A., Noël, C., Eyheraguibel, B., Briand, J. F., Paul-Pont, I., Ghiglione, J. F., ... & Burgaud, G. (2023). Fungal Diversity and Dynamics during Long-Term Immersion of Conventional and Biodegradable Plastics in the Marine Environment. *Diversity*, 15(4), 579.

- Tasks and duties entrusted to the student:

The objective of this internship is to evaluate the ability of 5-10 already selected fungal and bacterial isolates to utilize PHBV as a carbon source under various conditions, including different temperatures, salinities, and types of PHBV (e.g., short-chain-length vs. medium-chain-length). The evaluation will employ a combination of classical methods (growth capabilities on culture medium, halo formation around colonies) and mid-throughput methods (Laser Nephelometry and/or OcellOscope). The screening will specifically focus on exploring the synergistic effect of fungi and bacteria in enhancing PHBV utilization and degradation. Additionally, complementary analyses such as FTIR, scanning electron microscopy, and weight loss measurements will be conducted to gain deeper insights into the biodegradation capabilities.

- Skills to be acquired or developed:

Skills in microbiology (including mycology), microbial physiology, screening strategies including mid-throughput screening ones, statistical analyses.

PROFILE OF THE DESIRED STUDENT

- Minimum level of study required: 2nd year of Master
- Field(s) of study: Microbiology / Biotechnology
- Scientific skills: Knowledge in basic microbiology (bacteriology and mycology), screening methods, data analysis
- Language skills required: English,

THE INTERNSHIP ASSIGNMENT:

Desired duration of the internship (in months): 6 months

Desired Starting date of the mission: From January to June 2024

Indicative weekly schedule: 35h / week

Remuneration: 500€/month, paid on national SEA-EU funds for a maximum of 5 months; additional Erasmus grant could be asked to your own university

Internship agreement: *an internship agreement will be signed.*

To SEA-EU students:

If you're interested please send your CV and letter of motivation to the scientist in charge, gaetan.burgaud@univ-brest.fr and emmanuel.coton@univ-brest.fr before the date 31/10/ 2023.