

PHD POSITION TO APPLY TO THE SPANISH FPU PROGRAM

Research Project - **Metabolic interactions in the ocean microbiome**

Reference: PID2022-136281NB-I00

PhD Supervisors: Ramiro Logares

Centre: Institut de Ciències del Mar (ICM-CSIC)

Project description

Project title: Interrogating the metabolic interactome of marine microbes (MAORI).

The MAORI project aims to fill a significant knowledge gap in understanding microbial interactions in the ocean, which are crucial for the functioning of this ecosystem and form the base of food webs. Utilizing state-of-the-art molecular and computational techniques, large omics datasets, and innovative experiments, MAORI seeks to advance our understanding of metabolic interactions among ocean microbes.

The project will leverage extensive omics datasets, including samples from the LTER Blanes Bay Microbial Observatory in Spain and the SOLA marine station in France, as well as global oceanographic campaigns like MALASPINA and TARA Oceans. Cutting-edge methods such as PacBio long-read DNA sequencing, new metabolic modeling approaches, and Empirical Dynamic Modeling (EDM) will be employed.

MAORI has four main objectives:

- **Spatiotemporal Analysis:** To study how community-level metabolic interaction networks in the ocean change across space and time.
- **Causality Determination:** To use EDM to identify the strength and influence of potential interactions among marine microbes over time.
- **Cooperation and Competition:** To investigate these aspects among co-occurring ocean microbes using species-level metabolic models that predict metabolite exchange and cross-feeding.
- **Experimental Validation:** To validate predicted metabolic interactions through experiments involving co-culturing, measurement of extracellular metabolites, gene expression, and Stable-Isotope Probing (SIP).

The project is expected to significantly contribute to our understanding of microbial interactions in the ocean, with implications for understanding the effects of ocean warming on ecosystem function.



Requierments of the candidate

- Degree in Bioinformatics, Biology, Microbiology, Ecology, or a related field.
- Programming skills (Python, R, Bash).
- Experience with multi-omics data analysis is a plus.
- Written and oral communication skills in English.

Hosting research team

We (log-lab; <https://www.log-lab.barcelona/>) are located at the Institute of Marine Sciences (ICM), CSIC, in Barcelona. Our main research lines aim at 1) understanding the structuring, evolution, and dynamics of natural microbial communities and populations using ecological theory, 2) disentangling the network of microbial interactions in ecosystems, and 3) linking the gene content of genomes, communities, and their variation, with ecological function and evolutionary processes. The CSIC is the largest public research institution in Spain, embracing 121 research institutes, and ranks third among Europe's largest research organisations. The Institute of Marine Sciences (ICM-CSIC) is the country's largest centre (~314 research staff) for multidisciplinary Marine Science, with a leading role in Southern Europe and the Mediterranean region. In 2020, the ICM received accreditation from the Severo Ochoa Excellence program, the highest national recognition of scientific excellence and leadership in Spain. Under the motto "Marine Research for a healthy planet", the ICM has a highly interdisciplinary character, with the ability to broadly address numerous questions and challenges related to marine sciences and technologies. A total of 30 doctoral theses were completed during the academic years 2020- 2022.

How to apply

- At the first step, the applicant will be evaluated based on the university degree. If appropriate, selected candidates could be invited for an interview. In case you are interested, please contact ASAP the PI of the project attaching your CV and your transcript record.
- At the second step, selected applicants, together with the PhD project, will be evaluated for a final selection.



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- Applications to the FPU scholarships must be submitted through [the following official link](#). The period of application is **from 17 January to 15 February 2024**.

Interested candidates, please contact the Principal Investigators:

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