Institut de Ciències del Mar

Pg. Marítim de la Barceloneta, 37-49
08032 Barcelona
+34 932 309 500
www.icm.csic.es

PhD POSITION TO APPLY TO THE SPANISH FPU PROGRAM

Research Project - **MINIOM**

Prokaryotic **MINI**aturization and the hidden micr**O**bial diversity: ecology and dispersal of ultra-small cells along the terrestrial-**M**arine continuum (**MINIOM**)

Reference: PID2022-142480NB-I00

PhD Supervisors: Clara Ruiz-González

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

Project description

The discovery of ultra-small prokaryotes (i.e., ultra-small Bacteria and Archaea) has expanded our knowledge of microbial life at the lower size limit and has evidenced that, with most commonly used sampling and sequencing techniques, we may be missing a large fraction of the actual prokaryotic diversity present in natural ecosystems. In the ocean, recent studies have unveiled that some ultra-small prokaryotic groups may be more relevant than previously assumed, harboring a large metabolic diversity with unknown impacts on oceanic biochemical cycles. At the same time, other ultra-small groups may be normal-sized cells that miniaturize and inactivate in response to unfavorable conditions, making up the so-called microbial “seed banks” that can reactivate if conditions change. Despite the relevance of these two groups, almost nothing is known about the biogeography and role of ultra-small prokaryotes in natural ecosystems, which limits our capacity to understand or even predict microbial responses to environmental changes. **MINIOM** aims at exploring the **abundance, diversity, dispersal and role of ultrasmall planktonic prokaryotes (hereafter UMP)** in marine ecosystems but also in coastal groundwaters connected to the sea, where these tiny microbes have been found to be abundant and might also play key

Pg. Marítim de la Barceloneta, 37-49
08032 Barcelona
+34 932 309 500
www.icm.csic.es

roles. Through the combination of genomics, flow cytometry and microscopy techniques, experiments and field data, some of **the aspects that this PhD thesis could address** include i) quantifying and characterizing the taxonomic composition and role of marine UMP across different sites and over time; ii) distinguishing between true UMP (recently discovered small-sized enigmatic groups) and facultative UMP (normal-sized prokaryotes that miniaturize under particular conditions) within marine microbial communities; iii) determining the role of UMP in coastal groundwaters connected to the sea, where the activity of these microbes might determine the quality of the groundwater reaching the sea; and iv) to determine the dispersal potential of UMP across the groundwater-marine continuum given that, due to their small sizes, UMP may be more easily disperse than larger prokaryotes. All this will allow estimating the magnitude and the role in the ocean of this hidden but presumably important ultra-small fraction of prokaryotic diversity.

Requirements of the candidate

• Degree in Biology, Biochemistry, Microbiology, Environmental Sciences, Bioinformatics, Marine Sciences, Biotechnology, or similar.

• Good academic record. Good level of spoken and written English, good writing skills.

• Curiosity, desire to learn, to work in a team and to develop professionally in a multidisciplinary environment between the fields of microbiology, ecology, oceanography, hydrogeology, bioinformatics and molecular biology.

• Desire to travel, work in the field and know laboratories of other countries.

Hosting research team

Project supervised by Dr. Clara Ruiz González at the ICM-CSIC (Barcelona, https://www.icm.csic.es.). The selected candidate will join a multidisciplinary group with several doctoral students, technicians and post-docs (Ecology of Marine Microbes group: https://emm.icm.csic.es) in an institute that develops a large number of marine research projects of varied topics. The group maintains an important training commitment with its students to ensure maximum use of learning, and this includes participation in courses and conferences, stays in national and international laboratories, seminars and other training strategies.

Pg. Marítim de la Barceloneta, 37-49
08032 Barcelona
+34 932 309 500
www.icm.csic.es

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 evaluated for a final selection.
- 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:

Clara Ruiz González : clararg@icm.csic.es
