

Ph.D. thesis offer in Marseille and Sète, France:

Contribution of the viral compartment to the functioning of the *Ulva* “sea lettuce” holobiont. Application to regional aquaculture.

Ulva sp. are endemic algae on the coast of Provence. As they are causing green tides which can be toxic to the surrounding population, there is a need in developing protecting measures. *Ulva* are used in several biotechnological applications; for instance, the French start-up Eranova (based at Port-Saint-Louis-du-Rhône) – current collaborator of the project – cultivates *Ulva* in raceways to further use them to produce biodegradable bioplastics. Therefore, understanding the factors involved in the algal growth represent both major and biotechnological issues, but also an immediate public interest.

Ulva grow together with microbial and viral communities, forming a supra-organism defined as an holobiont. The algal biology is deeply influenced by its interactions with its microbial and viral partners but their identification, the underlying mechanisms of these interactions and the holobiont response to perturbations are not well known. Within the HOLOGREEN project, we propose to understand the functioning of the *Ulva* holobiont and its response to environmental variations. HOLOGREEN brings together 3 laboratories (MIO and AFMB in Marseille, MARBEC in Sète) and a start-up (Eranova) for an integrated study of all of the compartments of the *Ulva* holobiont (alga, microbial eukaryotes, prokaryotes and viruses) in contrasting environments, mainly in seaweed farming. The potential outputs of HOLOGREEN include the understanding and prevention of green tides and a better understanding and control of the algal growth for the production and transformation of *Ulva* biomass.

Within HOLOGREEN, the Ph.D. student will study the microbial and viral compartments to elucidate its influence on the functioning of the *Ulva* holobiont. He/she will use a multidisciplinary approach to characterize the diversity and dynamics of the microbial and viral communities associated with the green algae cultivated in the Eranova’s raceways using molecular biology and bioinformatics approaches (including metabarcoding, metagenomics). The metabarcoding data will allow identifying the microbial community diversity and metagenomic data will allow identifying the nature of viruses and their genes attesting to the mechanisms of infection. The dynamics of microbial and viral communities will allow characterizing their influence on algal growth and identifying virus hosts among the microbial flora and the *Ulva* itself. The Ph.D. student will also cultivate these viruses in the laboratory to allow their detailed characterization (morphology, genome, evolution, infectious cycle).

The first year, the Ph.D. thesis will be based in Sète (MARBEC) and the 2nd and 3rd years will be based in Marseille (MIO). The Ph.D. thesis will be supervised by Angélique Gobet (MARBEC) and Guillaume Blanc (MIO). We seek a candidate with skills in molecular biology, microbiology and bioinformatics (a very good knowledge of the R software is required). International applications are welcome.

Deadline to apply on June 24th 2021. Interviews are planned on June 28th 2021.

Requirements to apply: (1) To own a master degree before the start of the Ph.D. (2) To be younger than 30 years old (before March 2021).

Applicants should send us (guillaume.blanc@mio.osupytheas.fr, angelique.gobet@ifremer.fr): (1) A curriculum vitae, (2) A cover letter, (3) Contact details of at least 1 referee, and (4) The master degree diploma or equivalent letter indicating the success of the degree.