

PhD student position in diatom ecology in relation with a H2020 European program

Topic: determinism of blue *Haslea* blooms in natural environments.

The PhD project is part of the European program GHaNA (The genus *Haslea*, New marine resources for blue biotechnology and Aquaculture, H2020-EU.1.3.3, <https://cordis.europa.eu/project/rcn/206519en.html>). The *Haslea* genus encompasses more than 30 species identified so far in all seas and oceans. Some of these diatom species produce a blue pigment, called marennine, which accumulates at the apices of the cells before being excreted in the environment. This blue pigment displays different biological activities. The GHaNA program intends to explore the biodiversity of the genus *Haslea* and the potential exploitation of marennine-like pigments for food and cosmetics.

1. General information

- ✓ Title: Study of epiphytic communities on macroalgae during blue *Haslea* blooms.
- ✓ Affiliation : Le Mans University (LMU, France)
- ✓ Doctoral school: ED Sciences de la Mer et du Littoral
- ✓ Laboratory: Laboratory Mer - Molécules Santé (MMS, LMU, France) for genomics, STARESO (Station de recherches sous-marines et océanographiques, Corsica, France) and University of North Carolina (Morehead City, USA) for field experimentation, Laboratoire de Phylogénomique des Eucaryotes (U. de Liège, Belgium) for bioinformatics.
- ✓ Laboratory head-researchers: Nathalie Casse (LMU), Pierre Lejeune (STARESO)
- ✓ Supervisors: Jean-Luc Mouget, Myriam Badawi, Vincent Leignel

2. Subject and work

The iconic species of the genus *Haslea* is *H. ostrearia*, responsible for the greening of oyster gills during its proliferation in oyster ponds of Western France. In natural environments, *Haslea* blooms have been observed in Calvi Bay (Corsica, France), in the Adriatic Sea (Croatia), Eastern and Western Coast of the USA (Virginia, Maryland, North Carolina and San Juan Islands respectively), Colchester Bay in UK, as well as in several seashores of Australia and Tasmania.

The aim of this PhD project is to study the evolution of blue *Haslea* blooms in natural environments and to study their determinism by investigating the composition of (micro)organism communities of biofilms (microalgae, bacteria, cyanobacteria, animals) in which *Haslea* proliferates. Two main sites will be studied: Calvi Bay (Corsica), and Bogue Bay (North Carolina). A peculiar focus will be made on the notion of micro-environment found on macroalgae biofilms due to the biological activities of marennine-like pigments.

In Corsica (Calvi Bay), the candidate will study the development and composition of epiphytic communities of a few macroalgae species (*Padina*, *Halopteris*, *Acetabularia*) through a transect strategy for sampling developed by STARESO. Identification and quantification relative of communities (animals, filamentous algae, microalgae including diatom, prokaryotes) will be led by using a complementary approach, coupling genetic analysis (ribosomal RNA metabarcoding, RNA-seq) and morphological identification (light and electron microscopy). RNA-seq will be used to sequence eukaryotic mRNA. Bioinformatic analyses will lead to the functional and taxonomical identification of the different eukaryote members of the communities. Information about bacterial communities will be provided by 16S RNA metabarcoding of the same samples. Gene network analyses and multivariate analyses will be used to link abiotic factors (physico-chemical parameters) with biotic factors (community information).

In complement with this global approach, microflora composition will be assessed by using a morphometric approach. Taxonomical identification will be led in collaboration with different international partners in Poland (Szczecin University) and Croatia (Dubrovnik University). Micro-fauna will be identified through identification keys. Moreover, ecophysiological study of phytoplankton could be conducted thanks to other collaborations (Nantes University, Cardiff University) within the H2020 GHANA consortium.

3. Requirements

The candidate must have a degree in marine biology and ecology, preferentially with a strong background in marine communities. Good knowledge of molecular biology and/or bioinformatics (metagenomic studies, RNA-seq, R) as well as a good experience in diving will be helpful. At the beginning of the Ph.D., the candidate will learn how to identify and culture microalgae, especially *Haslea* strains.

The candidate must be autonomous, with good communication skills, especially in written and spoken English. As the Ph.D. project will imply travels and fieldwork for long periods of time in collaboration with other labs, the candidate must be ready for mobility.

4. Contact and application details

Foreseen starting date: January 2019 (3-year contract at LMU)

Send a letter of motivation and a resume to one of the contacts below:

- Jean-Luc Mouget : Jean-Luc.Mouget@univ-lemans.fr
- Vincent Leignel : Vincent.Leignel@univ-lemans.fr
- Myriam Badawi : Myriam.Badawi@univ-lemans.fr