Post-doctoral position project « PONDS » – 14 months

Postdoc position to study the response of plant metabolome in response to rising temperatures in aquatic plants of the sub-Antarctic regions

MISSIONS

All climatic scenarios predict that both temperatures and their variations should increase in the forthcoming decades, with side-effects on plant growth and phenology (Hollister et al., 2005) that should ultimately affect interactions between species (Williams et al., 2007). Climate change effects are especially severe in aquatic plants (i.e. macrophytes) (Lacoul & Freedman, 2006), which are both a resource and a habitat for a diversity of organisms (Keddy, 2010). Yet, its consequences for the dynamics of macrophyte communities received little attention so far. Moreover, one challenge in ecology is understanding the mechanisms and extent of thermal stress that influence plant biodiversity and community structure.

At the species scale, previous studies demonstrated that plant individuals display opposite foliar trait responses to competition (Bittebiere et al., 2012) and thermal stress (Shah & Paulsen, 2003). For instance, in terrestrial plants, competition and thermal stress respectively induce an increase (Bittebiere et al., 2012) or a decrease in leaf area (Shah & Paulsen, 2003), likely affecting their photosynthetic efficiency and thus individual biomass production.This global response relies on signaling, developmental, and metabolic pathways of thermal stress response. These pathways are based on shared regulating mechanisms that can be antagonistic (Vasseur et al., 2011; Gruber et al., 2013). Although stress responses at the cellular level are well known, the commonalities of stress responses at higher levels or organization (from species to community) have not yet been clearly addressed (Sulmon et al., 2015). Metabolome of individuals results indeed from a large diversity of factors (Ahlstrand et al., 2018). Secondary metabolites have been demonstrated to be of great importance in defense processes against stress (Hennion et al., 2012) and plant-plant interactions (Hennion et al., 2016). Nevertheless, examples of metabolome response to plant-plant interactions remain scarce in the literature (Hennion et al., 2016; Walter et al., 2011; Scherling et al., 2010; Mraja et al., 2011), and none was conducted in an additionally stressful context. Yet, modifications in individual morphology may rely on metabolome response to environmental factors (Labarrere et al., 2019). Overall, this literature knowledge raises the question of how plant individuals can simultaneously cope with plant-plant interactions and thermal stress based on metabolic and morphological responses, and how it ultimately affects their performances.

In this context, the hired post-doctoral fellow will have to study the metabolome response to rising water temperatures in aquatic plant species from the Iles Kerguelen (sub-Antarctic region), in a context of plant-plant interactions. This study will rely on experimental and field approaches.

ACTIVITIES

- Design field surveys and experimentations under controlled conditions

- Perform experimentations on plants under controlled conditions

- Analyze plant samples to determine the composition in metabolites

- Statistically analyze the data

- Write the manuscript to publish the results.

REQUIRED SKILLS

The post-doctoral fellow should have:

- some experience in metabolites analyses (sample extractions, and metabolic profiles analyses and interpretation)

- already published paper(s) in the field of metabolomics

WORKING CONTEXT

The post-doctoral fellow will be part of the LEHNA lab (in Villeurbanne, France; https://umr5023.univ-lyon1.fr/) and of the BAH team (https://umr5023.univ-lyon1.fr/equipes-de-recherche/bah). The post-doctoral fellow will also have the opportunity to work in collaboration with members of the ECOBIO lab (in Rennes, France).

To apply: https://emploi.cnrs.fr/Offres/CDD/UMR5023-ANNBIT-002/Default.aspx