Internship 2019-2020 **Master 2 BEE**

TITLE of the internship: AQUATIC PLANT RESPONSE TO CLIMATE CHANGES AT THE KERGUELEN ISLANDS

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Summary :
Under climate changes, temperature increase modifies the plant growth and its phenology. Its effects are especially severe in aquatic plants (i.e. macrophytes), which constitutes both a resource and a habitat for a large diversity of organisms. Yet, the dynamics of macrophyte communities under climate change received so far little attention.

The intensification of temperature variations now exposes plant species to thermal constraints (stress) which modifies their biotic interactions. Stress and biotic interactions determine the pool of species displaying the functional traits that allow them to persist and even dominate the community. In particular, phenotypic plasticity supports species coexistence by increasing their ability to overcome abiotic and biotic filters through trait value adjustments. Previous studies demonstrated that plant individuals display opposite plastic morphological responses to competition and thermal stress. This response antagonism would thus suggest the existence of a trade-off between traits supporting competitive ability and traits of thermal resistance.

Recently, many studies underlined the major interest of multidimensional approaches, i.e. multi-traits, in particular those based on hypervolume calculation. Nevertheless, this method has only been used so far to compare the response of different species to biotic interactions. In this context, we plan to transpose this method at the intraspecific level to determine (i) the growth strategies of plant species from the Kerguelen Islands and (ii) the intraspecific variability of these strategies through time in relationship with the increase in thermal constraints and the modifications of biotic interactions. This study aiming at highlighting species hypervolume variations in response to climate changes, this internship will necessitate the measurement of plant individual traits and the development of new tools to make statistical comparisons. This study will be based on the aquatic plant communities of the Kerguelen Islands as climate changes are especially rapid in this region of the world.

Other information:

Insertion within an ongoing research project

Programme IPEV 136 'SUBANTECO: Subantarctic biodiversity, effects of climate change and biological invasions on terrestrial biota' (2018-2021) and FRB project (gratification stages M2).

Publications on the field of research:

- Lavorel S., Garnier E. 2002. Predicting changes in community composition and ecosystem functioning from plant traits: revisiting the Holy Grail. Functional Ecology, 16: 545-56.
- Blonder B., Lamanna C., Violle C., Enquist B. J. The n-dimensional hypervolume. Global Ecology and Biogeography, 23: 595-609.
- Bittebiere A.K., Saiz H., Mony C., 2019 - New insights from multidimensional trait space responses to competition in two clonal plant species. Functional Ecology, 33: 297–307.