**Master 2 internship project**

**Year 2023-2024**

**Laboratory/Institute:** LPCV/IRIG CEA Grenoble **Director:** Eric MARECHAL

**Team:** MetalStress **Head of the team:** Jacques BOURGUIGNON/Stéphane RAVANEL

**Name and status of the scientist in charge of the project:** Claude ALBAN **HDR: yes ⌧ no ☐**

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**Program of the Master’s degree in Biology:**

**☐** Microbiology, Infectious Diseases and Immunology **☐** Structural Biology of Pathogens

**⮽** Physiology, Epigenetics, Differentiation, Cancer **☐** Neurosciences and Neurobiology

**Title of the project:**

Mechanisms of Translocation of Trace Metals and Radionuclides in *Bidens pilosa*: Evaluation of Potential for Phytoremediation

Objectives (up to 3 lines): The objective of the M2 internship project is to gain insights into the mechanisms of translocation of toxic metals onto the aerial parts of a new plant hyper-accumulator model.

Abstract (up to 10 lines):

Understanding the physiological, biochemical and molecular mechanisms that control the response and adaptation of plants to trace metal element (TME)-induced stress is a prerequisite for improving food safety and for selecting species suitable for phytoremediation. *Bidens pilosa* seems to be in this sense an ideal natural resource for this type of study. Indeed, this plant presents exceptional properties of tolerance to environments polluted by TMEs such as uranium, cadmium or lead, which it accumulates in leaves, and it presents a rapid growth and a relatively high biomass. In this context, the objective of this project will be to analyze in detail the capacities of absorption, translocation and sequestration of these metals in *B. pilosa*, to evaluate the performances of this plant for the remediation of polluted soils and to elucidate the molecular mechanisms promoting the translocation of these metals in its aerial parts.

Methods (up to 3 lines): Physiology (plant culture in standard and stress hydroponic conditions, measurements of photosynthesis and other physiological parameters); Molecular biology (RNA purification, cDNA cloning, qPCR analyses); *In silico* bioinformatics studies; Biochemistry (western blots); metal profiling (ICP-MS analyses); metabolite profiling (HPLC-MS/MS).

Up to 3 relevant publications of the team:

**Berthet S., Villiers, F., Alban, C. Serre, N. Martin-Laffon, J., Figuet, S., Boisson, A.-M. Bligny, R., Kuntz, M., Finazzi, G., Ravanel, S. and Bourguignon, J.** (2018) Arabidopsis thaliana plants challenged with uranium reveal new insights into iron and phosphate homeostasis. *New Phytologist*, **217**: 657–670

**Revel B., Catty P., Ravanel S., Bourguignon J. and Alban C.** (2022)High-affinity iron and calcium transport pathways are involved in U(VI) uptake in the budding yeast Saccharomyces cerevisiae. *Journal of Hazardous Materials*. Volume 422,126894,ISSN 0304-3894

**Sarthou M., Devime F., Baggio C., Figuet S., Alban C., Bourguignon J. and Ravanel S.** (2022) Calcium-permeable cation channels are involved in uranium uptake in Arabidopsis thaliana, *Journal of Hazardous Materials*, Volume 424, 2022, 127436, ISSN 0304-3894

Requested domains of expertise (up to 5 keywords):

Molecular biology, biochemistry, plant biology (not mandatory)