

PhD position in aquatic ecotoxicology (2020-2023)

PhD project title:

Study of *in vitro* and *in vivo* ecotoxicity of lithium on the freshwater bivalve *Dreissena polymorpha*

Project description:

Lithium is a strategic material within the context of the energy transition and is rapidly becoming a metal of crucial importance. Its physical properties (lightness, high energy density, ...) are used for many industrial applications, currently dominated by the sector of batteries found in our computers, mobile phones or electric vehicles. Global demand for lithium will likely continue to grow over the next decade. This demand and the increasing uses lead to an open question about the consequences on the environment. Up to now, available data on this topic are scarce and very heterogeneous^{1,2}. Medical studies bring important knowledge since lithium remains the treatment of choice for bipolar disorder, but even in this field the toxic mode of action of lithium is still under debate³.

The work proposed for this PhD thesis project fits into this general framework. The characterization of the mode and mechanisms of action of Lithium on non-target organisms is essential to understand how the effects are translated from interactions at the molecular level between a toxic and its target biomolecule, to the whole organism, the populations and communities. While *in vitro* studies are useful to define modes of action, *in vivo* studies remain essential to integrate all of the disorders and translate it into physiological responses. The objective of the work performed during this PhD thesis is to acquire and improve knowledge of the modes and mechanisms of action of lithium in a context of chronic contamination. Because they are filter-feeders, sedentary and strong accumulators of pollutants, bivalve mollusks in general, and *Dreissena* spp. in particular, are good sentinel species. The benthic bivalve *Dreissena polymorpha* is proposed as biological model.

During *in vitro* studies (on primary cultures) and *in vivo* studies, a set of several biomarkers will be measured, linked to important physiological functions, in order to identify key events in the occurrence of adverse effects and thus define the general health status of exposed organisms.

¹ Aral & Vecchio-Sadus, 2008. *Ecotox. Environ. Safe.* 70, 349-356.

² Shahzad et al 2016. *Environ. Sci Pollut Res*, doi : 10.1007/s11356-016-7898-0.

³ Szklarska & Rzymiski, 2019. *Biol. Trace Elem. Res.* 189(1): 18-27.

Profile and Requirements:

The applicant should hold a Master's degree (or equivalent) in biological sciences with a background and/or strong interest in (eco)toxicology and ecology. Strong practical and analytical skills, ability to perform laboratory and field works, chemical analyses and statistical data treatments would be particularly suited to this position. Good social and collaboration skills and ability to work independently and in an interdisciplinary scientific environment are needed. Proficiency in oral and written communication is required.

Funding and additional information

Funding: Laboratory of Excellence Ressources 21, "Strategic Metals in the 21st Century"

<https://ressources21.univ-lorraine.fr/>

Starting date : October 1, 2020

Work location: Laboratoire Interdisciplinaire des Environnements Continentaux (LIEC, UMR 7360), Metz, France

<https://liec.univ-lorraine.fr/>

The PhD student will be registered at Lorraine University and at the Ecole doctorale SIRENa (Sciences et Ingénierie des Ressources Naturelles, ED 607)

Contact persons and Supervisors:

Supervisors:

Dr. Carole Cossu-Leguille (Pr., carole.leguille@univ-lorraine.fr)

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To apply, please send an email to carole.leguille@univ-lorraine.fr **AND** laetitia.minguez@univ-lorraine.fr with :

- A CV
- A cover letter
- A brief description of your previous works (max. 3 pages)
- A copy of the most recent academic transcripts
- One or two reference letters.

Application deadline: June 26, 2020.