

## Research Internship Proposal: Master 2

# The role of arthropods in (metal-)contaminant cycling within mountain ecosystems (CONCIOUS)

Equipe: EcoBIZ

### Encadrants:

Encadrante principale – Dr Sophia V. HANSSON (CR, CNRS)

Encadrant secondaire – Dr Antoine LECERF (MCF, UPS) & Dr Benjamin Pey (MCF, INPT-ENSAT)

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### Descriptif:

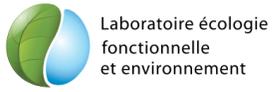
The emission and spread of global contaminants such as lead (Pb), cadmium (Cd), mercury (Hg), uranium (U) or rare earth elements (REE), from local to global pollution sources, is of high global concern as these contaminants pose a risk to the health of humans and wildlife alike<sup>(1)</sup>. For example, a recent study<sup>(2)</sup> showed that ground-dwelling hunting spiders can bioaccumulate mining related metals such as Ag, Cd and Hg (i.e. occasionally reaching body concentrations up to 100 times higher than in surrounding soils), but also that differences in accumulation and excretion capacities occurs both between elements and between age groups. Further, by linking food webs in the aquatic environment to the terrestrial, spiders act as a corner stone species in bioaccumulation processes, and can thus enable a continued transfer of nutrients and contaminants between food-webs and across ecosystems<sup>(3-4)</sup>. Yet the role of spiders as bioindicators of metal contamination, in an ecosystem health context, is still not well understood.

The central theme of this study is therefore to understand the environment – biota – contaminant interaction and to establish a preliminary overview of the biotic response to anthropogenic perturbations (e.g. mining and/or long-range atmospheric deposition) in alpine environments. Using a combination of state-of-the-art geochemistry (ICP-MS) and ecological isotopic tracers ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ), as well as samples (soil, vegetation, and spiders) already available via the EcoBIZ team, this M2-project aims to assess the role of hunting spiders in the cycling of traditional (i.e. metals & metalloids with a priority focus on Pb, Cd and Hg) and emerging (REEs, U & Th) contaminants in an alpine ecosystem (Haut-Videssos, Ariège). Within the framework of this pilot study, we will therefore test the hypothesis that *i) spiders are effective bioaccumulators of traditional and emerging contaminants, ii) contamination loads within populations varies between gender and age, as well as over seasons (i.e. spring, summer and fall), and that iii) spiders are reliable indicators of contamination loads in/near legacy mine sites in the Pyrenees.*

**(1)** AMAP. 2011. Arctic Pollution 2011. Arctic Monitoring and Assessment Programme (AMAP), Oslo. 38pp. **(2)** Hansson, S.V., Høye, T.T., Bach, L., Mielec, C., Mosbech, A., Søndergaard, J. 2019. Spiders as biomonitors of metal pollution at Arctic mine sites: The case of the Black Angel Pb-Zn-mine, Maarmorilik, West Greenland. *Ecological Indicators* 106, 105489. **(3)** Cristol, D. A., Brasso, R. L., et al., 2008. The movement of aquatic mercury through terrestrial food webs. *Science* 320(5874): 335. **(4)** Tsui, M. T.-K., Adams, E. M., et al., 2018. Understanding sources of methylmercury in songbirds with stable mercury isotopes: Challenges and future directions. *Environmental Toxicology and Chemistry* 37(1): 166-174.

### Candidate:

In search of a candidate for this M2 project, a call for applicants have been posted/circulated among/on;  
The ENSAT students



The SFE2 (<https://www.sfecologie.org/sfecodiff/>)

The “soil fauna dedicated” mailing list (<http://www.reseau-tebis.fr/>)