

MSc thesis topics (Simon Baeckens group)

Heavy metal (in)tolerance of wall lizards in polluted post-industrial environments

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Decades of mining and metal-processing activities have left a strong environmental legacy across Wallonia, with numerous post-industrial sites still contaminated by heavy metals. Despite these harsh conditions, populations of the common wall lizard (*Podarcis muralis*) occur at many of these sites, raising an intriguing question: how do lizards tolerate chronic exposure to metal pollution?

This thesis will investigate the organismal consequences of heavy-metal exposure in wall lizards inhabiting post-industrial environments in Wallonia. Lizards from historically polluted sites will be compared with individuals from less polluted or non-polluted environments to determine whether chronic exposure is associated with changes in traits related to health, performance, and ultimately fitness. The precise focus can be tailored to the student's interests and may include, for example, immune function, functional morphology and locomotor performance, sperm morphology and performance, thermoregulatory physiology and behavior, or other relevant aspects of organismal function.

Depending on the research question, the thesis may combine field sampling, laboratory experiments, and organismal phenotyping. By linking variation in metal exposure to functional traits, the project will help determine whether wall lizards living in contaminated environments suffer measurable physiological or performance costs, show increased tolerance to pollution, or exhibit phenotypic responses that may allow them to persist in these highly modified habitats.

The thesis forms part of a broader research program investigating the ecological and evolutionary responses of wall lizards to chronic metal pollution in Wallonia's post-industrial landscapes. The project will involve fieldwork during spring and summer and is particularly suited to a student interested in ecotoxicology, evolutionary ecology, physiology, functional morphology, or herpetology. Multiple field visits between April and June 2027 are foreseen, and a driving license is desirable for fieldwork.



Ecological assessment of an emerging invasive snake population in Belgium

The introduction of invasive species by humans is a major threat to global biodiversity. In Belgium, a viable population of beauty snakes (*Elaphe taeniura*) has been established near the Hasselt train station since it was first observed in 2006. The population continues to grow, yet there is still little knowledge about how far the snakes have spread, how they interact with the environment, or what risks they pose to native species and ecosystems.

This thesis will assess the invasive potential of *E. taeniura* by combining field surveys with experimental work. Fieldwork around Hasselt will provide data on the population's distribution, abundance, and habitat use, while additional experiments (conducted either in the field or under controlled laboratory conditions) will investigate ecological and behavioral traits that may influence the species' establishment and spread. These approaches will improve our understanding of the species' invasion risk and inform future monitoring and management strategies.

The research will be carried out in close collaboration with scientists from the Institute for Nature and Forest Research (INBO) Flanders. Multiple field visits between April and September 2027 are foreseen, and a driving license is desirable for fieldwork.



Lizards in cliff ecosystems

Cliffs are highly heterogeneous environments, where steep gradients in temperature, solar exposure, moisture, and vegetation can occur over remarkably short distances. For ectothermic animals such as lizards, this fine-scale environmental variation may strongly influence where individuals occur and how they use their habitat. Yet, while the ecology of lizards has been extensively studied in many terrestrial environments, we know surprisingly little about how they exploit the vertical dimension of cliff ecosystems.

This thesis will investigate the distribution, abundance, and habitat use of lizards along vertical cliff faces, with a particular focus on how these patterns relate to fine-scale variation in microclimate. Fieldwork will primarily take place at Freyr, where lizards will be surveyed along vertical transects using visual encounter surveys. By combining observations of lizard occurrence and abundance with measurements of local environmental conditions, the project will examine whether lizards are distributed non-randomly across the cliff face and whether particular microhabitats or microclimatic conditions are associated with higher densities. Depending on the development of the project, repeated surveys may also be used to investigate how these patterns change across the day or season as thermal conditions shift.

The project will contribute to a broader research program on the ecology of cliff ecosystems and will be carried out in collaboration with researchers from the Universities of Liège and Utrecht. The thesis will involve substantial fieldwork during spring and summer and is particularly suited to a student interested in herpetology, spatial ecology, microclimate, and field-based ecological research.

Important: This thesis project will only be carried out if a student with the appropriate climbing qualifications and experience is available. The project involves data collection directly on cliff faces and therefore requires substantial outdoor climbing experience (KVB3 or equivalent, multipitch climbing, independent outdoor climbing, and rope-access skills). These skills are a prerequisite for the project and cannot be acquired as part of the thesis. We cannot teach students how to climb or provide the necessary climbing training within the framework of the thesis project.

