

## GENERAL ECOLOGY AND ECOLOGY OF INDIVIDUALS AND POPULATIONS

### **Reproductive and biological traits of herpetofauna on urban-rural gradient.**

supervisor: doc. RNDr. Marcel Uhrin, PhD. (marcel.uhrin@upjs.sk)

consultants: RNDr. Monika Balogová, PhD., Mgr. Peter Kaňuch, PhD.

study form: full time

**Annotation:** The recent investigations of a biological study of urban agglomerations have shown several specifics in the structure of diversity, behaviour and adaptations of organisms to the urban environment. These specifics are little studied in the case of amphibians and reptiles, and at the same time little attention is paid to the phenomenon of urban fauna in the conditions of Slovakia. The aim of the doctoral study is to collect and analyse information about Amphibia and Reptilia of some urban agglomerations in Slovakia, including the data mining from publicly available data (*citizen science*).

### **Macroecology of bats on the example of the Eastern Mediterranean and the Middle East.**

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study form: full time

**Annotation:** The Eastern Mediterranean and the Middle East are biogeographically valuable areas of high diversity, including cryptic; the territory also includes glacial refugia. With respect to bats, there has been an unprecedented increase in knowledge in these areas about the distribution and ecological demands of individual species. The aim of the PhD study is to compile the obtained data and their macroecological analysis focused on spatial aspects of selected traits (echolocation signals, habitat, geographical position, morphological aspects) and their possible interactions in order to understand the distribution of species in a wider ecological context.

### **Soil oribatid (Acari, Oribatida) communities along microclimatic environmental gradients.**

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study form: full time

**Annotation:** The diversity and distribution of soil fauna in the space is directly and indirectly affected by changes in environmental climatic factors. The entrance parts of caves and abysses represent specific habitats, where the microclimatic properties of the environment change significantly at short distances. Changes in the structure and diversity of plant communities are known along such gradients, but little data are documented on soil fauna. Cave entrance habitats often have significantly different microclimatic conditions compared to the wider surroundings. They thus represent potential refuges for relict species that are not able to tolerate the environment around of caves. The work is focused on the analysis of changes in abundance, diversity and species structure

of the model soil mite group communities along environmental microclimatic gradients in the entrance parts of selected caves in Slovakia.

**Screes in volcanic mountains of Slovakia as potential refugia of relict terrestrial invertebrates.**

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study form: full time

**Annotation:** Screes are complex and rugged habitats, unusually rich in shelters and micro-climatically diverse surface and underground microhabitats with conditions preserved over a long time scale. Data on invertebrates dwelling extensive screes in the Carpathian volcanic mountains are scattered and incomplete. This is despite the fact that specific forms of debris have developed here, eg. eroded lava streams and shallow soliflucted debris. The study is focused on diversity and microdistribution of invertebrates (mainly macroarthropod groups) in relation to microclimate and food sources in the screes in southern part of the Slanské vrchy Mts. It is also aimed at a comparative survey of invertebrate fauna among some volcanic mountains in Slovakia.

**Ecology, taxonomy and molecular phylogeny of subterranean Collembola (Hexapoda) of the Western Carpathians**

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study form: full time

**Annotation:** Collembola belong to dominant and the most diversified arthropod groups in subterranean environment. Recent observations suggest that karst caves of the Western Carpathian Mts are inhabited by ancient, pre-Quaternary lineages within some Collembola genera. The doctoral study is aimed at elucidation of ecological requirements of selected cave species in association with environmental factors of subterranean habitats. These data will be supplemented with detailed ecophysiological observations (temperature resistance, thermal span, etc.). Further step will be taxonomic delimitation of these species based on thorough morphology and molecular study of populations from several caves. Finally, molecular markers of different populations of the selected taxon and closely related congeners will serve for reconstruction of basic phylogeny of these unique lineages, and dating of their divergence in association with paleogeological history of the territory.

**Diversity of moss-mites (Acarina, Oribatida) in selected type(s) of forested or open patches of different size in the matrix of intensive farmland**

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study form: full time

**Annotation:** Intensive farming of agricultural soils dramatically affects populations of many species of soil invertebrates, which survive in farmland refugia, created by differently sized patches of habitats of different types

(forested, open or mixed), represented by forest fragments, shrubs, meadow patches, edges, etc. These fragments may be surprisingly bio-diverse, and could serve as potential source of recolonisation of degraded or newly-created areas. Similarly, they could serve as stepping-stones for colonisation by new species as a consequence of species area shifts caused by climate change. The study is focused on analysis of diversity of selected soil microarthropods within selected type of patches of different size, mutual distance and distance from source populations in areas of Slovakia with large-scale, intensively cultivated farmland.

**Diversity of moss-mites (Acarina, Oribatida) in green areas of different types within an urban environment.**

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study form: full time

**Annotation:** Green urban areas (parks, gardens, lawns, urban protected areas, urban wilderness and ruderalised patches) may represent important, species rich refugia for soil microarthropods in urban matrix. At the same time, these patches may, as a consequence of specific urban micro-climate, create alternative secondary habitats for specialised (xerotherm, steppic, halotolerant etc.) species, losing their original habitats in the broader landscape. The study is focused on analysis of diversity of model soil microarthropods within selected type of urban green patches of different size, mutual distance in urban environment, and estimate of minimum-size and habitat conditions enabling presence of selected valuable or specialised species.