UNIVERSITY OF PRESOV IN PRESOV
FACULTY OF HUMANITIES AND NATURAL SCIENCES
17. NOVEMBRA 1, 080 01 PRESOV, SLOVAK REPUBLIC

Admission procedure for PhD studies – full time form academic year 2025/2026

Pursuant to § 54 of Act No. 131/2002 Coll. on universities and on Amendments to Certain Acts, as amended by later regulations, the Dean of the Faculty of Humanities and Natural Sciences of the University of Presov announces the commencement of the admission procedure for PhD studies in the academic year **2025/2026** in internal and external form. The study is opened in 1 PhD study program:

1. Environmental ecology in the field of study: ecological and environmental sciences

Candidates can send applications for studies (using form „Application for university studies, PhD - third degree") by **18 January 2026**. Admission interviews will take place on 30 January 2026.

To the application the candidate shall attach:

1. Curriculum vitae - CV
2. Notarized copies of educational qualifications (diploma)
3. Form for applicants for PhD studies (the form can be found on the faculty´s website: Faculty of Humanities and Natural Sciences, students, PhD studies, menu, Forms and documents)
4. A list of published and unpublished works, citations and references, peer reviews of these works, if any, and a list of the results of other professional activities
5. Submission of a project proposal (in English) on the selected topic of the dissertation
6. List of grades (from the faculty´s study department)
7. Admission fee payment receipt: **50.- EUR**

paid by postal order (U type) to:	or by bank transfer to:
Prešovská univerzita v Prešove Dekanát Fakulty humanitných a prírodných vied Ul. 17. novembra 1 081 16 Prešov	**Bank:** Štátna pokladnica ***IBAN SK68 8180 0000 0070 0007 8256*** ***SWIFT SPSRSKBA*** **Variable symbol:** 103003 **Constant symbol**: 0308

In case of bank transfer, a signed bank transfer order, payment order or printed proof of payment via internet banking must be sent, stating the applicant's first and last name and signature. The deadline for sending is within 5 working days after payment, to:

Prešovská univerzita v Prešove
Fakulta humanitných a prírodných vied
Ul. 17. novembra 1
081 16 Prešov

The admission fee must be attached to the 3rd page of the application form, otherwise the application will not be accepted.

Filled-in applications should be sent to:

Fakulta humanitných a prírodných vied Prešovskej univerzity v Prešove
Oddelenie pre vzdelávanie
Ul. 17. novembra č. 1
081 16 Prešov

More information:: Mgr. A. Boldižárová (tel. no. 051/75 70 621, e-mail: anna.boldizarova@unipo.sk)

Dissertation thesis topics in academic year 2025/2026

Study program: Environmental Ecology, full time study
Field of study: Ecological and Environmental Sciences

Assoc. Prof. Daniela Gruľová, PhD.

1. **Influence of Environmental and Agronomic Factors on the Phytochemical Profile of *Cannabis sativa* Cultivars for Ecological Agro-Applications**

Supervisor: Assoc. Prof. Daniela Gruľová, PhD.

This dissertation investigates how selected exogenous factors (light spectrum, irrigation regime, soil composition, nutrient availability, temperature variability) affect the quantitative and qualitative composition of key secondary metabolites in low-THC Cannabis sativa cultivars. Emphasis is placed on terpenes, flavonoids, cannabinoids and other bioactive compounds relevant for the development of ecological fertilizers and plant-derived pesticides. The research integrates controlled cultivation experiments with advanced analytical approaches (HPLC, GC-MS) to determine metabolic shifts under defined conditions. Results will support the selection and optimization of hemp varieties with maximized agronomic and ecological potential for sustainable agricultural applications within the HempPestOrg project.

2. **Advanced Extraction Strategies and Formulation of Bioactive Hemp-Based Preparations for Use as Organic Fertilizers and Botanical Pesticides**

Supervisor: Assoc. Prof. Daniela Gruľová, PhD.

The dissertation focuses on optimizing extraction methods for isolating bioactive compounds from Cannabis sativa with pesticidal or fertilizing potential. The research compares conventional solvent extraction, hydrodistillation, and supercritical CO2 extraction to determine the most efficient and environmentally friendly conditions for obtaining phytochemically rich extracts. Subsequent formulation studies will evaluate stability, biodegradability, synergistic effects among metabolites, and application efficacy. Laboratory bioassays and semi-field trials will assess herbicidal and insecticidal activity, as well as growth-promoting effects on selected crops. The goal is to contribute to the development of prototype organic products aligned with the outcomes expected at TRL 6 in the HempPest.

Assoc. Prof. Martin Kundrát, PhD., university professor

1. **Origin and adaptive patterns of secondary flightlessness: an alternative evolution of birds**

Supervisor: Assoc. Prof. Martin Kundrát, PhD., university professor

The transformation of the forelimb into a dominant locomotor organ characterizes the evolution of Paraves species, including modern birds. This adaptive transformation occurred independently, in several clades, and in different ways. Although the flapping wing became the dominant support for active flight, the secondary loss of this ability occurred frequently in bird evolution. The evolution of flightlessness is associated with several ecological, physiological, and morphological phenomena, which reflect adaptive requirements of a ground-dwelling lifestyles. The goal of our research is to understand how the loss of flight affects body proportions, especially wing polymorphism, at the microstructure level of bone tissues. For example, how do developmental heterochronies contribute to the diversity and functionality of wings and legs in partially or completely flightless birds? Within the framework of accelerated somatic maturation, we will investigate the hypothesis of multi-rate skeletal organ development that enabled the adaptive transition to flightlessness, and

why the loss of flight led to gigantism in some birds, while not in others. We aim to map these adaptive specializations within the evolutionary phylomorphospace and to examine the temporal and topological constraints on the evolution of flightless birds.

2. Biodiversity, osteochronological growth patterns, and changes in genome size of semiaquatic tetrapods during the Turonian Thermal Maximum

Supervisor: Assoc. Prof. Martin Kundrát, PhD., university professor

Temperature-size ecological phenomena, such as temperature-cline rules versus temperature-rise rules, demonstrate that individuals raised at low temperature become larger than conspecifics raised at a higher temperature. Individuals in low-temperature habitats also exhibit increased cell size and genome. The striking variability in genome size between ectotherms and endotherms implies that a temperature effect is involved. Given the verified observation that genome size and cell volume are causally related brings us to the following fundamental questions in the study of fossils: how did the vertebrate cell volume (source for calculating genome size in extinct organisms) relate to environmental temperature during top thermal extremes in the last 100 million years? Could thermal maxima trigger higher extinction rates? Did temperature, as a selective factor, influence the early evolution of modern biota in the Upper Cretaceous and Paleogene? Can we link changes in the size of vertebrate paleogenome with the emergence of new groups of animals or/and innovations within the ancestral lineages? And what is the causal direction between a long-term decrease in body size and a thermal maximum (miniaturization) or post-extinction climate (the Lilliput effect)? The thermal maximum in the Cretaceous (Turonian: 94-93 Myr) and in the Paleogene (Eocene: 55 Myr) and the asteroid impact at the boundary of these periods (K/Pg; Maastrichtian-Paleogene: 65 Myr) significantly influenced the evolution of life on Earth. The sequence of the above global events provides an extraordinary experimental system for assessing the impact of temperature changes on vertebrate evolution. In the doctoral project, we will study this impact at the level of microstructure and developmental rhythm of skeletal tissues of semiaquatic vertebrates, primarily of Turonian age. We will test two hypotheses related to: 1) termoadaptive changes in bone tissue of these ectotherms; and 2) the impact of environmental factors on the genome size of the tetrapods with low versus high disparity. The project will provide original data on the dynamic interaction of life and climate; an evolutionary model of the adaptability of vertebrate morphospace in extreme climatic conditions; and an argumentative basis for assessing conflicting views on current global warming.

3. Chronological patterns of bone and dental tissue and changes in genome size of the ectotherm and endotherm reptiles during the Turonian Thermal Maximum

Supervisor: Assoc. Prof. Martin Kundrát, PhD., university professor

Temperature-size ecological phenomena, such as temperature-cline rules versus temperature-rise rules, demonstrate that individuals raised at low temperature become larger than conspecifics raised at a higher temperature. Individuals in low-temperature habitats also exhibit increased cell size and genome. The striking variability in genome size between ectotherms and endotherms implies that a temperature effect is involved. Given the verified observation that genome size and cell volume are causally related brings us to the following fundamental questions in the study of fossils: how did the vertebrate cell volume (source for calculating genome size in extinct organisms) relate to environmental temperature during top thermal extremes in the last 100 million years? Could thermal maxima trigger higher extinction rates? Did temperature, as a selective factor, influence the early evolution of modern biota in the Upper Cretaceous and Paleogene? Can we link changes in the size of vertebrate paleogenome with the emergence of new groups of animals or/and innovations within the ancestral lineages? And what is the causal direction between a long-term decrease in body size and a thermal maximum (miniaturization) or post-extinction climate (the Lilliput effect)? The thermal maximum in the Cretaceous (Turonian: 94-93 Myr) and in the Paleogene (Eocene: 55 Myr) and the asteroid impact at the boundary of these periods (K/Pg; Maastrichtian-Paleogene: 65 Myr) significantly influenced the evolution of life on Earth. The sequence of the above global events provides an extraordinary experimental system for assessing the impact of temperature changes on vertebrate evolution. In your doctoral project, we will study this impact at the level of microstructure and developmental rhythm of bone and dental tissue of ectotherm crocodylomorphs and endotherm dinosaurs, primarily of Turonian age. We will test three

groups of hypotheses related to: 1) the correlation of circadian dentin increments; 2) adaptive changes in bone tissue; and 3) the impact of environmental factors on the genome size of these vertebrates with low versus high disparity. The project will provide original data on the dynamic interaction of life and climate; an evolutionary model of the adaptability of vertebrate morphospace in extreme climatic conditions; and an argumentative basis for assessing conflicting views on current global warming.

Conditions for accepting applicants:
The condition for admission to PhD studies in Environmental Ecology is completion of a Master's study program in the field of Ecology or in a related field. In the case of graduates of related fields, the committee will decide the possibility of PhD studies.
Form of admission procedure:
Candidates for PhD studies apply for one of the dissertation topics. The admission procedure for PhD studies begins for the applicant with the delivery of his application to the faculty. Part of the admission procedure is the entrance exam, which is held at the FHPV Department of Ecology before a committee of at least three members, appointed by the dean of the FHPV on the proposal of the trade union committee. The admission committee will evaluate the result of the entrance exam in a closed meeting. In the case of several applicants for studies, they will determine the order of success.
Determining the scope and extent of required knowledge:
The content of the entrance exam is the presentation of: • work project focusing on the future dissertation, • knowledge of ecology and environmental science and related fields (according to the chosen topic) at the level of a master's degree graduate.
Additional terms and conditions:
Active knowledge of one world language.
Contact person:
prof. PaedDr. Ján Koščo, PhD. Department of Ecology, FHPV PU v Prešove Ul. 17. novembra 1 081 16 Prešov tel.: 051/757061