



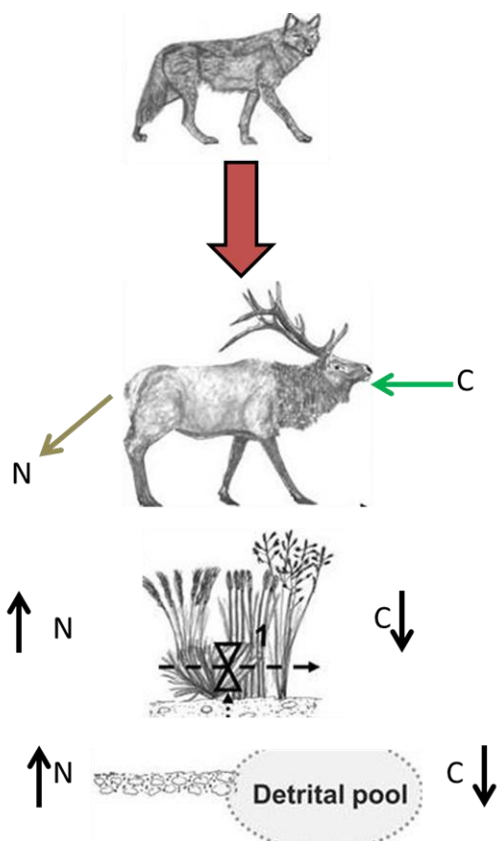
Postdoctoral and PhD positions at the Mammal Research Institute, Polish Academy of Sciences, Białowieża, Poland

within the project „**The multilevel impact of predation-induced stress in ungulates on the functioning of the temperate forest ecosystem**” funded by the National Science Center, Poland, (MAESTRO, grant no 2021/42/A/NZ8/00126)

1. The project and working environment
 - 1.1 The project

Predation plays a key role in regulating ecosystem processes by both consuming prey and inducing non-consumptive behavioral and physiological changes among prey animals (Creel & Christianson 2008). Recent studies suggest the possibility of both mechanisms influencing the circulation of elements in the environment, especially the cycle and sequestration of carbon in the ecosystem (Atwood et al. 2015.; Schmitz & Leroux 2020; Wyatt et al. 2021). The project framework is based on the concept of the general stress paradigm (GSP: Hawlena & Schmitz 2010), which postulates that animals subjected to predation risk-induced stress should relocate resources used for growth and reproduction (processes requiring proteins) to emergency functions (processes requiring high-energy carbohydrates). The GSP argues that stress-induced gluconeogenesis breaks down proteins into glucose and nitrogen, the excess of which is excreted into the environment. To compensate for higher energetic demands when stressed, the prey animals should select for carbon-rich, low nitrogen resources, which can affect the flux of elements through biotic and abiotic components of environment. However, no empirical studies involving large mammals have been performed to test these assumptions. **The aim of this project is to investigate the impact of the risk associated with the presence of large carnivores (wolves and lynx) and the potential stress it causes in their ungulate prey (red deer and roe deer) on the functioning of a temperate forest ecosystem.**

The project will be carried out in the Białowieża Primeval Forest, Poland, where previous studies revealed high spatial variability in predation risk at the macrohabitat (forest complex landscape) and microhabitat (forest gaps and closed canopy) scales, and complex interactions between ungulates and predators influencing the perception of predation risk by prey animals and allowing behavioural flexibility in their response to stress. **We hypothesize that if predation stress induced by large carnivores has a significant effect on the physiology of their prey, it should have a measurable effect on the stoichiometric composition i.e. the proportional share of carbon and nitrogen at different trophic levels of the ecosystem.**



The specific goals include investigating: 1) stress level in ungulates (measuring faecal glucocorticoid metabolites), 2) food composition of red deer and roe deer (DNA metabarcoding), 3) carbon and nitrogen ratio in plant species consumed by ungulates, plant communities, litter and soil and ungulate urine nitrogen content (elemental analyses), 4) fiber fractions and crude protein content in plants and ungulate faeces (near-infrared spectrometric analyses), 5) digestible carbohydrates' contents in plants selected by

ungulates (spectrophotometric analyses), 6) ungulate behaviour (video-recording). Collecting biological samples will be performed in a gradient of predation risk in the Białowieża Forest determined in previous studies (Bubnicki et al. 2019), with use of a set of experimental enclosure plots.

References

- Atwood et al., 2015. Predators help protect carbon stocks in blue carbon ecosystems. *Nat. Clim. Chang.* 5, 1038–1045.
- Bubnicki J. W., et al. 2019. Linking spatial patterns of terrestrial herbivore community structure to trophic interactions. *eLife* 8: e44937
- Creel, S., D. Christianson. 2008. Relationships between direct predation and risk effects. *TREE* 23:194–201.
- Hawlena, D., and O. J. Schmitz. 2010. Physiological stress as a fundamental mechanism linking predation to ecosystem functioning. *Am. Nat.* 176:537–556.
- Schmitz O.J. and Leroux S.J. 2020. Food Webs and Ecosystems: Linking Species Interactions to the Carbon Cycle. *Ann. Rev. Ecol. Evol. Syst.* 51:1, 271-295
- Wyatt, K.H., et al. 2021. Trophic interactions regulate peatland carbon cycling. *Ecol. Lett.*, 24: 781-790.

1.2. The working environment

Mammal Research Institute, Polish Academy of Sciences (MRIPAS) in Białowieża, founded in 1952, conducts research in the field of ecology, ethology, morphology, population genetics as well as population management and conservation of mammals and other terrestrial vertebrates. The mission of the Institute is to acquire, advance, and disseminate knowledge of natural patterns and processes in order to improve the scientific basis for effective nature conservation activities and sustainable development. We focus mainly on Białowieża Primeval Forest (UNESCO Biosphere Reserve and World Heritage Site) as a study area, but also on other regions of Poland and the world. The Institute employs 60 people, including researchers, PhD students, and qualified technical and office staff.

The project' team involves 18 collaborators (including 1 postdoc and 2 PhD students) mainly from the MRI PAS, but also Aarhus University, Denmark, Leibniz Institute of Zoo and Wildlife Research, Germany and Łódź University, Poland. Most of analyses will be performed at the MRI PAS.



2. Description of postdoc position and requirements

We are looking for a highly qualified researchers (1 postdoc and 2 PhD positions available) interested in the ecosystem functioning with a good knowledge of the stoichiometry of ecosystems and biogeochemical cycles as well as the skills in biochemical analyses.

2.1. Tasks and duties of a **postdoctoral fellow**:

- a) Co-coordination of the project,
- b) Co-supervising 2 PhD students,
- c) Co-managing the laboratory of elemental, NIR, hormonal and digestible carbohydrates analyses,
- d) Supervising the flow and results of the analyses,
- e) Contribution to processing, analysing and interpreting the data,
- f) Collaborating on and leading the preparation of reports and scientific publications.

2.2. Tasks and duties of **PhD students**

- a) Collecting samples in the field,
- b) Performing the elemental, NIR, spectrometric and spectrophotometric analyses,
- c) Managing the camera-trapping video materials,
- d) Processing and statistical analysis of data,
- e) Contributing to preparation of reports.
- f) Preparing drafts of scientific articles as lead author.

2.3. Mandatory qualifications and skills (PhDs/Postdoc requirements differentiated with '/')

- a) MSc (for PhD position) or PhD degree (for postdoc; obtained in a maximum of 7 years, but preferably as long ago as possible within this period) in biology, ecology or other relevant subject,
- b) Some/Several relevant scientific publications in recognized scientific journals,
- c) Basic/Advanced understanding of non-consumptive predation-herbivory-environmental interactions,
- d) Basic/Advanced understanding of biogeochemistry and the stoichiometry of ecosystems, plant and soil chemistry,
- e) Basic knowledge on endocrinology,
- f) The postdoc is expected to have documented experience in conducting laboratory biochemical analyses (elemental analysing, NIR spectrometry, spectrophotometry). For the PhDs this will be an advantage,
- g) Intermediate/Advanced proficiency in statistics, knowledge of R language and environment,
- h) Some/Good experience in writing research papers,
- i) Skills in analysing and solving research problems. Ability to work both in a team and independently,
- j) Fluent English.

2.4. Additional important qualifications

- a) Skills in operating equipment for analysing the biochemical composition of biological samples (elemental analysing, NIR spectrometry, spectrophotometry).
- b) Driving license.

2.4. Additional things to consider

The **postdoc** position is planned for up to 5 years between 2022 - 2027. This means that you can be employed for a full duration of the project - 5 years (provided that you start working on the first day of the project) or shorter, but not less than 3 years.

PhD course is scheduled for 4 years, however an extension to 5th year is possible under special circumstances.

You will need to be present and work at MRI PAS in Białowieża, Poland (52.70398N, 23.84985E) most of the employment period. Periodic remote work, however, is also possible to consider. This is quite an isolated place (see illustration above, with ca. 1500 inhabitants), ca. 17 km from a nearest city.

3. What do we offer?

- a) Fully developed ambitious research project, the subject of which fits into the latest hot scientific topic in ecology of ecosystems.
- b) MRI PAS facilities located in the middle of the study area - **Białowieża Primeval Forest**, which is one of the most natural forest ecosystems in the European lowlands and biodiversity hotspot inhabited by a rich community of large mammals.
- c) Full-time salary (for **4 – 5 years**) and full coverage of all research costs and possible travel costs to and from Poland.
- d) Help with accommodation – relatively inexpensive flats in Białowieża, either located at the MRIPAS or to be rented from local residents.

4. When?

Start of work at:

Postdoc: autumn 2022 – winter 2022/2023

PhD: October 2022

Application deadline: **31 August 2022**

5. How to apply? Please send the following documents to the project leader Krzysztof Schmidt: kschmidt@ibs.bialowieza.pl:

- Certified copy of diploma or certificate of completion of studies (for the PhD obliged to provide them before the Doctoral School program begins).
- CV with detailed information on your education, scientific career, skills, list of publications.
- Certificates or other documents confirming knowledge of English (if available).
- Motivation letter.
- Include at least two reference persons (e.g., prior research supervisors) familiar with your qualifications, together with e-mail addresses.
- Signed declaration of consent for processing of personal data (links for PhD & Post-doc separate provided below).

6. Recruitment

The recruitment rules will follow regulations of the [National Science Center](#). The selection will be based on the qualifications of the candidates including scientific achievements, experience, awards, internships, skills and competences. An interview will be part of the selection of candidates.

Candidates selected for PhD positions will be asked to apply to the [Bioplanet Doctoral School](#) of the Polish Academy of Sciences and participate in the entrance examination (via Zoom/Skype, date to be determined). The school does not charge tuition fees and provides compulsory and optional courses (conducted in English) for doctoral students.

7. Contact person

Krzysztof Schmidt (kschmidt@ibs.bialowieza.pl; [ResearchGate profile](#)) is a principal investigator of the project and will be main supervisor of PhD students. It is highly recommended that you contact me as soon as you decide to apply for this position, if you want to learn details concerning the project, the PhD student duties or necessary qualifications and any other important issues related with the project – I will be happy to informally meet and talk to potential candidates (e.g., via Zoom), so do not hesitate to contact me.