

List of laboratory projects available to students undertaking a research project during their exchange studies (5-month laboratory project) or completing a 60-day internship at the Faculty of Biology, University of Warsaw.

These opportunities are available exclusively to students receiving an Erasmus+ scholarship from their home institution.

To take part in the project, contact the Principal Investigator (PI) to verify whether the position is still available and whether your knowledge and skills qualify you to participate in the research. After obtaining the PI's approval, send it to the ERASMUS coordinator at the following address: erasmusbiol@uw.edu.pl and you will receive step-by-step instructions.

PI name : Piotr Bębas and Rafał Stryjek (IP PAS)	e-mail: piotrbe@uw.edu.pl and rstryjek@psych.pan.pl
Length of the project: 2-3 months or one semester *	
2 months	
Preferable time for realization of the project: winter semester, summer semester, summer, vacation*	
End of summer semester/vacation	
Level of study: BSc, MSc *	
Both: BSc, MSc	
<p>We invite students to participate in a field-based research project focused on the behavior of free-living rodents at the Kumak Field Station in Urwitałt (the northeastern region of the Masurian Lake District in Poland, deep in the wilderness of a protected landscape park) – https://www.facebook.com/biolstacja/?locale=pl_PL. The project will make use of a remote data collection system for behavioral monitoring and analysis.</p> <p>Your responsibilities will include maintaining recording stations – such as regularly providing attractive food to lure animals – analyzing footage captured by remote cameras, and validating the collected data.</p> <p>A key component of the study involves observing animals caught in live traps and monitoring their behavior in semi-natural enclosures specifically designed for this kind of research. The study site is exceptionally rich in rodent species, which offers a unique opportunity to discover previously undocumented behaviors – particularly interspecific interactions that naturally occur in wild rodent communities.</p> <p>For more insight into our research methods, we recommend reviewing our published work:</p> <ul style="list-style-type: none"> • https://doi.org/10.1098/rsos.231692 • https://doi.org/10.1016/j.jneumeth.2021.109303 • https://doi.org/10.3389/fevo.2022.1054568 <p>This project will culminate in a BSc or MSc thesis and at least one scientific publication.</p>	
Laboratory: Institute of Evolutionary Biology – Mycology Group	
PI name : Julia Pawlowska	e-mail: julia.z.pawlowska@uw.edu.pl
Length of the project: 2-3 months or one semester	
Preferable time for the realization of the project: summer semester	

Level of study: MSc or PhD	
<p>1) FunDive - Monitoring and mapping fungal diversity for nature conservation (https://fun-dive.eu/). The project includes high-throughput nanopore barcoding of fungal specimens, collected by citizen scientists. It will include lab work, focused on nanopore library preparation and sequencing, as well as resulting data analysis and phylogenetic interpretation for selected genus.</p> <p>2) PestSpace – Improving resilience to the spread of plant diseases via a regional Pest Common Data Space (https://interreg-baltic.eu/project/pestspace/). The project covers field sampling for plant diseases on winter wheat and faba beans, recording symptoms and handling data in PlutoF data management system, high-throughput nanopore sequencing of plant material with visible diseases symptoms. It will also cover data analysis for selected subset of samples.</p>	
Laboratory: Institute of Evolutionary Biology	
PI name : Anna Karnkowska	a.karnkowska@uw.edu.pl
Length of the project: 2-3 months or one semester	
Preferable time for realization of the project: winter semester, summer semester, summer/vacation	
Level of study: MSc or PhD	
Brief description of the project available for ERASMUS student: The projects will aim to understand the diversity, ecology and evolution of microbial eukaryotes. The project could be focused (1) on environmental studies, including sampling, and short and long reads sequencing and analyses of data, (2) on the single-cell identification, sequencing, and analysis, (3) on the genome or transcriptome sequencing, reconstruction of metabolism and phylogenomics. The details of the project will depend on the timeframe and the background of the candidate.	
Laboratory: Department of Parasitology, Institute of Functional Biology and Ecology	
PI name : Katarzyna Goździk , e-mail: kj.gozdzik@uw.edu.pl	
Length of the project: one semester *	
Preferable time for realization of the project: winter semester, summer semester, summer/vacation *	
Level of study: BSc, MSc, PhD*	
<p>Brief description of the project available for ERASMUS student:</p> <p>Genetic characterization of <i>Neospora caninum</i> using microsatellites as genetic markers. <i>Neospora caninum</i> is a protozoan parasite that has been recognized as a cause of neuromuscular disease and reproductive disorders in infected animals worldwide. <i>N. caninum</i> is a parasite with a complex life cycle and wide range of intermediate and definitive hosts. In Poland the presence of the parasite was confirmed in cattle, bison, red deer, fallow deer as well as dogs, foxes, badgers and raccoon dogs. Despite of much data about the biology and epidemiology of the parasite, analysis of the genetic diversity as well as differences in pathogenicity between <i>N. caninum</i> isolates are limited. In this project molecular studies are planned, which aim to genotype <i>Neospora caninum</i> isolates maintained in vitro culture, using selected nucleotide sequences and comparing the results of sequencing with data deposited in GenBank as well as demonstrate phylogenetic differences between <i>Neospora caninum</i> Polish isolate and isolates from other countries.</p>	
Laboratory: Plant Metal Homeostasis	
PI name: Oskar Siemianowski	PI e-mail: o.siemianowski@uw.edu.pl
Length of the project: it could be both/either 2-3 months or one semester *	
Preferable time for realization of the project: winter semester, summer semester	
Level of study: any BSc, MSc *	
Brief description of the project available for ERASMUS student:	

Zinc is a vital element for all living organisms, essential for their growth and development. Plants serve as the primary source of this nutrient in human diets. Therefore, enhancing zinc levels in the edible parts of plants is of great importance. Understanding how plants manage zinc is pivotal for improving the nutritional quality of crops, especially in regions with zinc-deficient soils. Our research focuses on the model plant tobacco (*Nicotiana tabacum* L.). Although tobacco is not edible, its metal transport is well studied and noteworthy, as it shows a relatively high proportion of zinc transported to the shoot compared with other plants (i.e., increased root-to-shoot transport). We investigate how plants absorb zinc and distribute it between roots and shoots, primarily using hydroponic systems that uniformly supply zinc to the entire root system. Recently, we explored a growth medium that allows both controlled composition and uneven nutrient distribution within a pot. This medium, known as transparent soil, consists of gel beads that supply nutrients and water to plants, simulating natural soil conditions. In one experiment, transparent soil containing zinc was layered on top of a zinc-free layer. Surprisingly, tobacco plants grown in this setup did not show typical signs of zinc deficiency in roots located in low-zinc areas. Instead, these roots appeared to receive sufficient zinc from other parts of the plant. This suggests that the flow of zinc toward the shoot (where edible tissues are found in many crops) may be partially redirected to roots lacking zinc at a given time. The mechanism behind this phenomenon remains unknown. Our objective is to uncover how plants allocate zinc among different root parts and organs. We are looking for an enthusiastic student who feels comfortable growing plants in a laboratory setting and is eager to learn new techniques to join us in this research.

Laboratory: University of Warsaw Herbarium

PI name : **Kamil E. Frankiewicz, PhD**

e-mail: k.frankiewicz@uw.edu.pl

Length of the project:

either 2-3 months or a whole semester (depending on arrangements with a student)

Preferable time for realization of the project:

winter semester, summer semester, summer, vacation

Level of study: **BSc, MSc** (suitable for both)

Botanical Time-Travel in Light: Ageing Plant Specimens to Decode Reflectance Signatures

The reflectance spectrum of plants is essentially their optical “signature”: it describes what fraction of incoming radiation at different wavelengths is absorbed and what fraction is reflected. It depends on the content of pigments (such as chlorophyll), water status, tissue structure and the degree of tissue degradation, and therefore carries information about plant condition, environmental stress and ageing processes. On this basis we interpret satellite and drone imagery used in ecology and precision agriculture. In this context, traditional herbaria represent an almost inexhaustible archive: they hold millions of dried specimens collected across regions and decades, potentially ideal for long-term analyses of vegetation change. However, they are still rarely used in spectroscopic studies, because we lack robust knowledge of how long-term storage and ageing of plant material affect the shape of the reflectance spectrum.

The aim of this project is to investigate how controlled ageing of botanical specimens alters their reflectance spectra. The student will carry out an experiment using an ageing chamber, subjecting selected plant samples to accelerated ageing under strictly controlled conditions. Subsequently, they will perform a series of reflectance measurements (e.g. in the visible and near-infrared range), process the data using basic statistical and visualisation methods, and finally relate the observed changes to the possibilities and limitations of using herbarium material for the interpretation of remote-sensing data and for monitoring plant condition.

Laboratory: The Bird Song Lab, Department of Ecology and Environmental Conservation	
PI name : Jan Jedlikowski	PI e-mail: janjedlikowski@uw.edu.pl
Length of the project: 3 months	
Preferable time for realization of the project: summer semester	
Level of study: BSc or MSc	
Brief description of the project available for ERASMUS student:	
<p>Most vocal interactions in animals involve a single signaller, yet in some species two or more individuals produce collective displays. It is not unusual to hear several individuals singing side by side at the same time. Competing males, for example, often engage in countersinging interactions, attempting to avoid being drowned out by their rivals. However, when collective signals arise from cooperation rather than competition, they are expected to differ in both form and meaning from two solo signals produced independently.</p> <p>Using two bird species with simple and innate vocal repertoires (the water rail <i>Rallus aquaticus</i> and the little crane <i>Zapornia parva</i>) as a model, we aim to test several hypotheses to determine: (1) whether coordinated signals have a stereotyped structure that occurs repeatedly and predictably over time; (2) whether the degree of signal coordination encodes information; and (3) what types of information may be transmitted in these signals.</p> <p>I am looking for a student to participate in bioacoustic data collection. The project will run from early April to the end of June. The fieldwork will be intensive, so candidates with experience in field research and strong motivation for hard work will be preferred.</p>	
Laboratory: Department of Molecular Virology	
PI name : Piotr Golec	PI e-mail: piotr.golec@uw.edu.pl
Length of the project: 2-3 months or one semester * at least 3 months	
Preferable time for realization of the project:; summer semester, summer, vacation *	
Level of study: BSc, MSc *	
Brief description of the project available for ERASMUS student:	
Work with bacteriophages, including their isolation and characterization, as well as evaluation of their antibacterial properties. Analysis of their potential to prevent and eradicate bacterial biofilms.	
Laboratory: Institute of Functional Biology and Ecology, Department of Hydrobiology	
PI name: Piotr Maszczyk p.maszczyk@uw.edu.pl	
Length of the project*: one semester.	
Preferable time for realization of the project*: winter semester or summer semester or/and summer/vacation	
Level of study: MSc or PhD	

Brief description of the project available for ERASMUS student:

Body size strongly determines how ectothermic organisms function, grow, and reproduce. Under higher temperatures, many species grow faster but reach smaller adult size, a pattern known as the temperature–size rule (TSR). However, it is still unclear whether this pattern results from physiological limitations or from adaptive life-history responses that maximize fitness. In this project, the student will use laboratory experiments with *Daphnia* to test how increased temperature affects growth, body size, and reproduction. The project will compare responses across generations and between populations with different histories of predation pressure. This will allow us to assess whether temperature-induced responses resemble those caused by physiological stress (e.g. oxygen limitation) or by predator-related adaptive strategies.

Laboratory: Institute of Evolutionary Biology – Faculty of Biology – University of WarsawPI name : **Yohan Pochat-Cottilloux**PI e-mail: y.pochat-cottilloux@uw.edu.pl

Length of the project: 2-3 months or one semester *

Preferable time for realization of the project: winter semester, summer semester

Level of study: BSc, MSc *

Brief description of the project available for ERASMUS student:

As part of our NCN-funded project on terrestrial vertebrate communities in the Miocene of Europe, the student will contribute to the description and analysis of fossil squamates and amphibians. Material is available from several unpublished collections originating from Poland, Ukraine, and France, and the student may choose a locality of particular interest.

A background in paleontology is required. Familiarity with osteological terminology, comparative anatomy, and scientific imaging techniques (e.g., macrophotography, μ CT data handling) will be advantageous.

Research tasks and expected outcomes will be adapted to the student's level (BSc/MSc) and the duration of the stay. Depending on progress and results, the project may lead to a co-authored publication in an international peer-reviewed journal. Participation in fieldwork may also be possible, depending on the timing of the stay.

Laboratory: Mammalian Evolution Lab, Institute of Evolutionary BiologyPI name : **Sergi López-Torres**PI e-mail: s.lopez-torres@uw.edu.pl

Length of the project: one semester

Preferable time for realization of the project: winter semester, summer semester, or summer/vacation

Level of study: MSc or PhD

The candidate would be able to choose from a variety of different projects, mainly with a focus on Euarchontoglires (the group that includes primates, treeshrews, colugos, rodents, lagomorphs, and related fossil forms) and other fossil mammals. Such topics include:

- Resolving the phylogenetic position of primitive mammalian lineages, like early primates, early rodents, or stem members of Euarchontoglires.
- Ancestral state reconstruction analyses for primitive stages of primate evolution.
- Morphological description of various fossil mammalian lineages, including early primates, early members of Euarchontoglires, cetartiodactyls, perissodactyls, and eulipotyphlans.

<ul style="list-style-type: none"> - Sensory evolution in primates. - Dietary reconstruction in fossil rodents, and early members of Euarchontoglires. - Dental topographic analysis of modern gummivorous primates. <p>Many of these projects involved computer work on micro-CT data and specimen measurements.</p>	
Laboratory: Zakład Eko-Epidemiologii Chorób Pasożytniczych	
PI name : Mohammed Alsarraf	PI e-mail: m.al-sarraf3@uw.edu.pl
Length of the project: 2-3 months	
Preferable time for realization of the project: summer, vacation*	
Level of study: MSc *	
<p>Brief description of the project available for ERASMUS student:</p> <p>Dirofilariasis is an expanding zoonotic disease caused by <i>Dirofilaria</i> spp. nematodes vectored by mosquitoes. Despite being cosmopolitan parasites, the knowledge on the genetic diversity of <i>D. repens</i> and <i>D. immitis</i>, occurrence of subspecies/cryptic species or distinct genetic variants is insufficient. Humans can be infected by the range of <i>Dirofilaria</i> species and molecular identification of parasites from human cases is urgently needed. The main aim of study is to evaluate the genetic diversity of <i>D. repens</i> and <i>D. immitis</i> from different countries and continents using modern molecular techniques, including metabarcoding and whole genome sequencing. Second main aim is to genotype and identify species and haplotypes of nematodes infecting humans for better understanding of transmission routes.</p>	
Laboratory: Lab. of Systems Biology, plant chromatin remodeling group	
PI name : Rafal Archacki	PI e-mail: r.archacki@uw.edu.pl
Length of the project: 2-3 months or one semester	
Preferable time for realization of the project: summer semester, vacation	
Level of study: MSc	
<p>Brief description of the project available for ERASMUS student:</p> <p>Our lab studies chromatin remodelers and other chromatin regulators in <i>Arabidopsis</i>. The goal of this project is to determine how the SWI/SNF BAS complex and cooperating transcription factors contribute to the regulation of selected target genes. The student will apply standard RT-qPCR techniques to measure transcript levels in <i>Arabidopsis</i> mutants, as well as perform transient transactivation assays using promoter–luciferase reporters and different effectors. The project can be adjusted to last 2–3 months or a full semester by changing the number of promoters and effectors to be evaluated.</p>	
Laboratory: Department of Eco-Epidemiology of Parasitic Diseases	
PI name : Dorota Dwuznik-Szarek, phd	PI e-mail: d.dwuznik-szarek@uw.edu.pl
Length of the project: 2-3 months or one semester *2-3 month	
Preferable time for realization of the project: winter semester, summer semester, summer, vacation*	
Level of study: BSc, MSc *	
both	
Brief description of the project available for ERASMUS student:	

Diversity of ticks from Africa (Zimbabwe and Botswana) and from North America: morphological and molecular identification of tick species, and detection of pathogens using molecular methods: DNA isolation, PCR, nested PCR ect, electrophoresis, phylogenetic and statistical analyses (about 400 samples).

The material for the studies is obtained within the OPUS NCN grant: “Associations between *Babesia*, *Borrelia* and *Theileria* and tick vectors in different ecosystems of the world” (2023–2027)” PI: prof Anna Bajer

Tick- borne diseases are becoming an increasingly serious problem in both human medicine and veterinary medicine. The main goal of the current proposal is a global study on *Babesia/Theileria* occurrence in the most important tick species/genera from four continents (Asia, Africa, Southern and Northern Americas). Associated hypotheses with detailed aims are:

- ✓ There is high specificity in *Babesia/Theileria* (BT)– tick interaction. Certain species of *Babesia* are vectored by specific tick species. Due to scarcity of data on many hard tick species from remote areas, numerous *Babesia/Theileria* – tick interactions are yet to be discovered and described, to mitigate the risk they pose for human and animal health.
- ✓ Co-infections with different BT occur in ticks worldwide. The development of novel molecular methods (i.e. New Generation Sequencing, NGS) allows identification of co-infections in ticks, likely overlooked by standard detection techniques. Co-infections may be responsible for a more severe course of tick-borne disease.
- ✓ There is a specificity in *Borrelia burgdorferi* s. l. (Bb) – tick interactions. Spirochaetes of *Borrelia burgdorferi* s.l. are vectored by ticks of genus *Ixodes*. However, many *Ixodes* species from tropical and subtropical zones have not been studied, and the possible role of other genera of hard ticks needs to be verified as suspected borreliosis cases occur in geographies where *Ixodes* ticks do not occur.