



MSc-PhD Seminar SS 2026 (LVA 796.300 and 230.340)

June 22nd, 2026 – Room HS 436

Hosts: Supervisors of MSc- and PhD-projects, Dept. Environment and Biodiversity

10:00 – 10:15 **Welcome (Ulrike Berninger)**

Session 1 (Community ecology)

Chair: Jana Petermann, Sophie v. Merten

10:15 – 10:30 **Corinna Etl**

Chemical attraction of psychodid-fly pollinators to influorescences of *Arum maculatum*

10:30 – 10:45 **Stefan Lienbacher**

The impact of metallophyte vegetation and plant-microbe interactions on mineral weathering

10:45 – 11:00 **Julia Witter**

Behavioural responses to visual and olfactory cues-flight cage experiments with *Megachile sculpturalis*

11:00 – 11:15 **Raphael Schallegger**

Alpin butterfly responses - a multilevel approach on evaluating adaptation of butterflies to climate change

11:15 – 11:30 **Martina Stangl**

Hydrogeological patterns and alpine spring metacommunities

Lunch break (11:30– 13:00, 90 Minutes)

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Session 2 (Biodiversity and global change)

Chairs: Karin Gross, Stefan Dötterl

13:00 – 13:15 **Azmeraw Bezabih**

Dominance of exotic trees in urban parks of Bahir Dar City and its implications for biodiversity conservation and carbon storage

13:15 – 13:30 **Anna Götz**

Climate versus geographic space: haplotype diversity of lecideoid lichen across drake passage

13:30 – 13:45 **Kerstin Marschner**

Geographic origin and phylogenetic relationships of *Gentiana brentae* within the *Gentiana verna* group

13:45 – 14:00 **Emily Watson-Cook**

Reconstructing past plant communities at the margins of alpine glaciation using sedaDNA

Coffee break (14:00 – 14:30, 30 Minutes)

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Session 3 (Behaviour of birds, misc.)

Chairs: Maximilian Ganser, Bea Apfelbeck

14:30 – 14:45 Melanie Kaluppa

Environmental drivers of sociality and cooperation in a tropical cooperative breeder

14:45 – 15:00 Mareike Mittag

Temporal stability of positive tree diversity effects on leaf herbivory in a subtropical forest biodiversity experiment

15:00 – 15:15 Victor Renaud

Investigating the role of predation as a driver of sociality in bird in a context of global change

15:15 – 15:30 Beatrice Mayer

Effects of ferroptosis & lipid peroxidation on volume- & acid-sensitive outwardly rectifying chloride channels in human chondrocytes

15:30 – 15:45 Closing remarks (Jan Habel)

Abstracts (in alphabetical order)

→ hier bitte die neuen Abstracts einsetzen

Bezabih, Azmeraw, AG Habel, azmexalem@gmail.com

Beate Apfelbeck, Shimelis Aynalem Zelelew, Melkenh Wondie, Habel Jan Christian, Nega Tassie Abate

DOMINANCE OF EXOTIC TREES IN URBAN PARKS OF BAHIR DAR CITY AND ITS IMPLICATIONS FOR BIODIVERSITY CONSERVATION AND CARBON STORAGE

Urban parks represent critical components of green infrastructure providing ecological, social, and climatic benefits within urban environments. We quantified tree species diversity and carbon stocks in six urban parks of Bahir Dar City, Ethiopia, and compared the contributions of native and exotic tree species. We applied a total count method and recorded tree species, measured diameter at breast height (dbh) and height of trees. 1,282 trees from 26 species and 17 families were counted. Three exotic tree species, *Jacaranda mimosifolia* (21.61%), *Delonix regia* (20.44%), and *Grevillea robusta* (13.1%) accounted for more than half of all individuals. Due to their dominance, exotic tree species stored nearly three times more carbon (328.78 t) than native species (113.97 t). However, native species stored more carbon than non-native species, probably because of a greater dbh, which was the strongest predictor of C-stock. Although exotic trees contribute to carbon accumulation and urban greening, their dominance may affect the long-term conservation value of urban parks. Therefore, greater emphasis should be placed on planting native species in the city's urban parks and on conserving old native trees.

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Dötterl Stefan, Tribsch Andreas

CHEMICAL ATTRACTION OF PSYCHODID-FLY POLLINATORS TO INFLORESCENCES OF *ARUM MACULATUM*

Floral scents often mediate plant-pollinator interactions in deceptive pollination systems. In the dung-mimicking plant *Arum maculatum* (Araceae), floral scent of its trapping inflorescence is hyperdiverse, comprising over 280 compounds which vary across floral organs. However, the attractive compounds are unknown so far and previous studies focused on the scents of individual harvested organs, leaving the actual volatile composition within the intact, enclosed pollination chamber unexamined. Here, we tested in field bioassays for attractiveness of natural scent samples and several synthetic compounds, and non-invasively sampled the enclosed chamber and compared its scent with the scent of exposed appendix as well as the male and female flowers. Preliminary analyses suggest that the unmanipulated chamber contains much higher amounts of scent than previously believed, that, as expected, differ in their volatile composition from the appendix, but surprisingly also from female and male flowers. Natural scent samples but not synthetic mixtures successfully attracted the main pollinator (female *P. phalaenoides*), suggesting that the synthetic blend used lacks crucial bioactive compounds.

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Ulrike Ruprecht

CLIMATE VERSUS GEOGRAPHIC SPACE: HAPLOTYPE DIVERSITY OF LECIDEOID LICHEN ACROSS DRAKE PASSAGE

The opening of the Drake Passage played a pivotal role in driving the climatic and biogeographic isolation of southern polar ecosystems. As a dominant component of the terrestrial vegetation in both southern South America (sSA) and Antarctica, lecideoid lichens serve as excellent model organisms for investigating how the contrasting geographic and climatic conditions across the Drake Passage shape genetic diversity.

This study aimed to: (1) identify climatically overlapping regions between sSA and Antarctica; (2) evaluate the relative influence of climate versus geographic isolation on haplotype diversity in two lecideoid lichen species and their photobionts; and (3) assess the interaction patterns between myco- and photobionts across geographic and climatic gradients.

Results indicate that climatic overlap is largely restricted to high-elevation Andean habitats and maritime Antarctica, representing key zones for potential biotic exchange. Overall, climate exerts a stronger influence on haplotype distribution than geographic distance. Shared haplotypes frequently occur in climatic conditions predominant in sSA but outside the overlapping climatic space.

Interaction patterns confirm robust climate structuring, with association clusters primarily driven by climatic principal components rather than geographic separation.

Kaluppa Melanie, AG Habel, melanie.kaluppa@stud.plus.ac.at
Prof. Dr Jan Christian Habel, Dr. Beate Apfelbeck

ENVIRONMENTAL DRIVERS OF SOCIALITY AND COOPERATION IN A TROPICAL COOPERATIVE BREEDER

Global change is rapidly transforming tropical forests through habitat degradation, fragmentation, and increasing climatic instability, with profound consequences for biodiversity. Tropical birds are particularly vulnerable because their slow life histories may limit rapid adaptation to environmental change. Yet their longevity often promotes stable social groups and cooperative behaviors that could buffer environmental pressures. Despite growing interest in sociality as a resilience mechanism, little is known about how habitat change and climatic variability influence the formation and year-round maintenance of social systems.

Using an Afrotropical cooperative breeding forest bird as a model system, this project combines a unique long-term demographic dataset with behavioral observations, high-resolution tracking, and bioacoustic monitoring to better understand the underlying mechanisms of cooperation and identify its ecological drivers. By investigating variation in cooperative breeding, seasonal group cohesion, and vocal communication across environmental gradients and independent forest archipelagos, this project will test whether cooperation can buffer the effects of environmental change or whether ecological pressures undermine the social mechanisms that sustain populations.

Lienbacher Stefan, AG Hörger, stefan.lienbacher@plus.ac.at
Anja Hörger, Christoph van Hagke, Stefan Dötterl, Jussi Grießinger, Flora Boekhout

THE IMPACT OF METALLOPHYTE VEGETATION AND PLANT-MICROBE INTERACTIONS ON MINERAL WEATHERING

Plants and microorganisms are biological drivers of rock weathering and soil formation, but the underlying mechanisms are still not fully understood. In metal-rich habitats, specialized plants and microbial communities interact with unusual geochemical conditions and thereby likely impact the local soil and bedrock chemistry. In this project, we aim to identify how metallophyte vegetation and associated microbial communities influence their belowground environment and contribute to rock weathering. By disentangling plant effects, microbiome effects and their interaction, we aim to identify the biological drivers of element mobilization, mineral transformation and early soil formation.

To address this, we will combine observations from natural metalliferous sites with a controlled mesocosm weathering experiment using metal-containing rock flour as a defined weathering substrate and contrasting plant strategies, including accumulator and excluder species. We will assess porewater and leachate chemistry, plant element uptake and microbial community composition to link biological treatments with weathering-related element fluxes. The presentation will focus on the conceptual framework and experimental strategy of the project, providing an approach to investigate biological processes at the interface between the bio-and geosphere.

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Tribsch, Andreas

GEOGRAPHIC ORIGIN AND PHYLOGENETIC RELATIONSHIPS OF *GENTIANA BRENTAE* WITHIN THE *GENTIANA VERNA* GROUP

Gentiana brentae Prosser & Bertolli was described as a Brenta Group endemic species based on morphological characteristics, but its geographic origin, age, and phylogenetic placement within the *Gentiana verna* group remain unclear. This master thesis aims to investigate these open questions and to explore potential drivers for speciation, e.g. ecological and/or geographical factors.

RADseq libraries were prepared for 96 individuals representing multiple taxa of the *G. verna* group and sequencing data are available for downstream processing. SNP calling and phylogenetic analyses will be used to infer genetic relationships. In addition, climatic and edaphic variables will be integrated into niche modelling approaches.

By integrating genomic, geographic, and ecological data, this study aims to enhance understanding of diversification processes in alpine gentians.

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Plätzer Kristijan; Ritter Markus; Jakab Martin

EFFECTS OF FERROPTOSIS & LIPID PEROXIDATION ON VOLUME- & ACID-SENSITIVE OUTWARDLY RECTIFYING CHLORIDE CHANNELS IN HUMAN CHONDROCYTES

Background: Osteoarthritis (OA) involves cartilage degeneration with hypotonic and acidic extracellular conditions, activating volume- and acid-sensitive outwardly rectifying (VSOR/ASOR) chloride channels. VSOR channels regulate cell volume, proliferation and death; aberrant osteoclast activity triggers ASOR activation via extracellular acidification. OA pathogenesis further involves disrupted iron metabolism and lipid peroxidation, promoting ferroptosis. High ROS levels may induce swelling-independent VSOR activation, yet a direct link between ferroptosis induction and VSOR/ASOR activity remains uninvestigated.

Hypothesis: Induction of lipid peroxidation and ferroptosis affects VSOR/ASOR chloride channels and cell volume regulation in human chondrocytes.

Methodology: Immortalized (C-28/I2, TC-28/A2) and primary OA chondrocytes are treated with ferroptosis inducers (RSL3, IKE, 4-HNE). Patch clamp recordings assess VSOR/ASOR currents; cell volume is measured via Coulter method; viability via resazurin assay. A 3D-matrix tissue model will be established to mimic the OA microenvironment.

Analysis: PatchMaster (HEKA), GraphPad Prism 9; data as mean \pm SD ($n \geq 3$); t-test or ANOVA, $p < 0.05$.

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Jana Petermann

TEMPORAL STABILITY OF POSITIVE TREE DIVERSITY EFFECTS ON LEAF HERBIVORY IN A SUBTROPICAL FOREST BIODIVERSITY EXPERIMENT

Tree diversity effects on leaf herbivory are well documented but vary in direction across forest systems, typically negative in specialist-dominated forests, yet positive in generalist-dominated ones. How this relationship changes during stand maturation remains poorly understood. Using long term data from the BEF-China forest biodiversity experiment, we asked whether the effect of tree species richness on arthropod herbivory strengthens, weakens, or remains stable over 12 years of stand development. We quantified herbivory as percentage leaf area loss across four sampling periods between 2011/12 and 2023, along a richness gradient from monocultures to species-rich mixtures, using linear mixed-effects models.

Tree species richness had a consistently positive effect on herbivory. The richness \times sampling-period interaction was significant, driven mainly by shifts in overall herbivory levels rather than by changes in the richness effect itself. These preliminary results indicate a remarkably persistent positive effect, consistent with trophic interactions that establish early and remain stable in this subtropical system. Further analyses will test whether evergreen versus deciduous composition and lepidopteran biomass help explain these effects and the among-period differences in herbivory levels.

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Apfelbeck Beate Anna

INVESTIGATING THE ROLE OF PREDATION AS A DRIVER OF SOCIALITY IN BIRD IN A CONTEXT OF GLOBAL CHANGE.

Cooperative breeding, in which non-breeding individuals support the reproductive efforts of conspecifics, is one of the most complex forms of sociality. Despite extensive research, the ecological drivers underlying its evolution remain only partially understood. Predation has been proposed as a key factor in the establishment and maintenance of cooperative breeding, yet empirical evidence remains mixed. Simultaneously, anthropogenic global change (including large-scale habitat transformation, climate change, and exotic invasions) is reshaping trophic interaction in many systems. By altering predation pressure and predator communities, these changes could have a profound impact on the population dynamic and social organization of cooperative species. Taking advantage of a long-term study of an Afrotropical cooperative breeding forest bird, I aim to assess how anthropogenic habitat change influence sociality through its effect on predation dynamics, providing new insights into the links between global change, biotic interactions, and the evolution of complex social systems.

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Jan Christian Habel, Jonas Eberle

ALPINE BUTTERFLY RESPONSES - A MULTILEVEL APPROACH ON EVALUATING ADAPTATION OF BUTTERFLIES TO CLIMATE CHANGE

Climate change is one of the major drivers for current biodiversity loss. Not only rising temperature levels, but also seasonal weather changes (e.g. in precipitation), lead to fast alterations of the available ecological niches in various regions, forcing species to speed up their adaptation to prevent extinction. Owing to their life cycle and the non-cryptic lifestyle of their adults, butterflies represent ideal model organisms for studying such effects: larvae highly depend on their food plants, while being unable to move across large distances, whereas imagines can escape certain conditions by flying away. Since the effects of climate change on butterflies in different life stages and their adaptation mechanisms are not well understood in detail, this project aims to investigate butterfly responses to climate change on three levels: (I) community, (II) behavior, and (III) genetics. (I) On the community level, the current state of species distribution in the Alps is compared with future projections to detect a potential geographical decoupling of butterflies and their host plants. (II) For the behavioral approach, a harmonic radar is used to compare flight patterns of a selected species in different altitudes. (III) To examine genetic responses, the quantity of gene products associated with heat stress in the transcriptomes of highland and lowland populations along an elevation gradient of a selected species are compared both in-situ and ex-situ.

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Petermann Jana; Hilberg Sylke

HYDROGEOLOGICAL PATTERNS AND ALPINE SPRING METACOMMUNITIES

I will present the disposition for my PhD thesis, which examines how benthic animal communities in alpine springs are structured and how habitat characteristics shape community assembly. We ask whether these communities can serve as natural tracers of hydrological patterns in systems where traditional hydrogeological methods, such as artificial tracers, often produce inconsistent results. Using metacommunity theory, we investigate both niche-based processes, such as environmental filtering, and stochastic processes, such as dispersal.

In the first phase of the project, we will quantify links between benthic communities and abiotic factors, particularly hydrodynamics and the physico-chemical properties of spring water. For the second stage, we hypothesize that dispersal, particularly through subterranean pathways may connect apparently isolated habitats, which springs are usually considered to be. Since dispersal in purely aquatic invertebrates has received little attention, especially compared with insects that disperse during terrestrial life stages, we use landscape genomics to assess whether gene flow in benthic invertebrates can reflect subterranean water flow pathways.

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Andreas Tribsch, Bernhard Salcher, Andreas Lang

RECONSTRUCTING PAST PLANT COMMUNITIES AT THE MARGINS OF ALPINE GLACIATION USING SEDADNA

Quaternary climatic fluctuations have shaped Alpine vegetation, resulting in patterns of high endemism and genetic diversity in former glacial refugia. Understanding historical vegetation dynamics in detail can inform predictions of future changes under warming conditions but reconstruction of past vegetation is limited by availability of preserved plant material, especially from the Last Glacial Maximum (LGM) and Late Glacial. Use of sedimentary ancient DNA (sedaDNA) has the potential to increase taxonomic resolution of past vegetation reconstructions, especially when combined with other palaeoecological proxies. We sampled sedaDNA from lacustrine sediments in and around the Alps to examine changes in plant community composition in response to climatic variability. We will apply metabarcoding of sedaDNA targeting the P6 loop of the *trnL* (UAA) intron. Our ongoing pilot studies are optimizing DNA extraction and PCR protocols to maximize recovery across sample ages and depositional contexts. Preliminary results show successful amplification of plant sedaDNA from samples spanning a range of ages, including material predating the LGM.

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Dötterl Stefan, AG Botanik, Habel Jan Christian, AG Zoologie

BEHAVIOURAL RESPONSES TO VISUAL AND OLFACTORY CUES - FLIGHT CAGE EXPERIMENTS WITH *MEGACHILE SCULPTURALIS*

Due to human influences, invasive pollinators, such as the East Asian bee *Megachile sculpturalis*, are increasingly able to establish themselves in non-native ecosystems. While some studies have investigated its dispersal history, no study has focused so far on the interaction between this invasive bee and its host plants in the new ecosystems and on the floral traits that the bee uses to find these host plants. We have already demonstrated that *M. sculpturalis* perceives a wide range of scent components and that its host plants predominantly feature blue and UV-blue-reflecting flowers. In the present study we will conduct behavioural experiments in the Botanical Garden to investigate the relative importance of olfactory versus visual cues and identify attractive odours. Moreover, we will determine whether there is an innate preference for a specific flower colour and whether learning affects the flower colour preference. This will help us to understand the floral characteristics that the bee uses to select its host plants.
