



EKOLOGIE 2022

8th Conference of the Czech Society for Ecology
7th–9th September 2022, Brno, MENDELU

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8th Conference of the Czech Society for Ecology

7th–9th September 2022, Faculty of Business and Economics at Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic

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FOREWORD

Dear Colleagues,

On behalf of the hosting Czech Society for Ecology and the Faculty of Forestry and Wood Technology of Mendel University in Brno, we look forward to welcoming you all in Brno, Czech Republic on 7-9 September 2022 for the 8th Ekologie conference, a friendly event organized by the Czech Society for Ecology.

This ecology conference is being held at the Mendel University in Brno for the first time. The Mendel University is a place where ecology has a long and rich history, especially in the context of forest research and science. Brno has been known as one of the most popular Czech university cities and its reputation as a student city is well known. The British company Quacquarelli Symonds, which publishes a regular ranking of the best universities and evaluates university cities based on student references, declared Brno the sixth best student city in the world in 2021.

We are confident that Ekologie 2022 will have a high scientific impact and become a memorable experience to all participants from central Europe. The themes of the conference cover ecology *sensu lato* so they cover the entire field of ecology as well as its applications, including nature conservation. We received a wealth of diverse and high quality submissions and thus believe this will be an exciting and beneficial event for all participants. The COVID-19 pandemic interrupted the regular holding of the conference, but now you have the opportunity to meet in person again and discuss various topics and important projects. We believe that this Ekologie 2022 will be a memorable event and look forward to seeing you there!

Ondřej Košulič & Šárka Mašová
Main organisers



Marcel (Marek) Rejmánek, an honorary member of the Czech Society for Ecology

By Karel Prach

That was pleasure for me to agree to write a short *laudatio* on Marek Rejmánek, my former most important teacher who substantially influenced my own scientific career.

Marek graduated at the Faculty of Science, Charles University, Prague, where he was appointed as an Assistant Professor at the Department of Geobotany in 1972-1977, then he was expelled by communist officials. During the unfortunately short period he influenced his students, colleagues and even style of teaching, and introduced new courses, especially in quantitative ecology. In that time, and then for the whole his scientific career, he propagated something like pluralism in ecology. Though a synthetic person in his character, he always supported collecting field data including elementary floristic inventory as a basis for next syntheses. He has always put inspiring questions and supported discussion. I admire his large overview on ecological, but also philosophical and other relevant literature.

In 1983 he fled with the whole family from the communist regime and finally was employed at the University of California in Davis, where he has acted as a respectful professor until now. He belongs to leading World experts in ecology of invasions, but his influence is broader. He contributed to the first modern synthetic “invasive” book (Drake et al. 1989) and directly or indirectly stimulated the research on ecological invasions also in this country. During his whole stay abroad he has supported Czech colleagues, especially by sending literature (it was not easy during the communist dictatorship), and after 1989 he has delivered various lectures and even whole university courses, and intensely communicated with Czech colleagues.

Marek is a founder of quantitative terrestrial ecology in the Czech Republic. Many of his papers belong to top ones worldwide. I consider Marek Rejmánek to be the best Czech ecologist.



Jan “Šuspa” Lepš, an honorary member of the Czech Society for Ecology
The guy looks the same for at least fifty years ... by Petr Pyšek

I will start with a sentence whose variations are seldom missing in medallions celebrating influential personalities – Jan Lepš is one of the most prominent figures of Czech ecology; given the length of his career, it is now possible to add “of the turn of the 20th and 21st centuries”. In the following, I will try to explain why such a statement in his case is not a mere cliché.

He is an excellent scientist, a great and popular teacher, and above all, a man of strong moral integrity (time has given our generation the opportunity to prove this in spades). I am sure that whoever has met the peculiar personality with the lifelong nickname of Šuspa, some of these facets have stuck in their memory. Personally, I had the pleasure with the man and the scientist in the first place, although in the 1970s, at the Department of Botany at the Faculty of Science of the Charles University, I also took an exam in quantitative plant ecology with the then young assistant. Since then, our paths have crossed from time to time in our domestic botanical and ecological community, and it has always been rewarding and refreshing, be it over science or a beer.

Facts about the life of the renowned professor Lepš can be found in a number of anniversary articles (e.g., Krahulec F., *Zprávy České Botanické Společnosti* 48: 325-335, 2013), yet on the threshold of his seventieth birthday, there is already too much to fit even the most important into a short laudatio. Perhaps, only that he devoted the best years of his professional life to the Faculty of Biology (now the Faculty of Science) and, in fact, to the entire University of South Bohemia, which he cofounded in 1991. He might personally see it differently, after all, men have different perspectives on what were the best years of their lives, but I am given this impression by the timing of historical events.

Creating a university was just one of the opportunities that opened up for his generation in the early 1990s, and Šuspa seized them like only a few others when he opened the door to



HONORARY MEMBERSHIP II

the world of international science. To his existing top research on plant succession and the mechanisms of maintaining species diversity, he added a number of other topics, including research in tropical rainforests in collaboration with Vojtěch Novotný in Papua New Guinea, where he focuses on the relationship between plants and herbivores. As a brilliant statistician, he left a deep mark in this respect as well; as co-author of several books (with Petr Šmilauer) and organizer of many courses, including international ones, he undoubtedly contributed to raising the level of statistical data processing among several generations of Czech ecologists, and not only Czech ones. And he has occasionally managed to smuggle humour into serious science – perhaps the most famous example is an article in which he discusses from a botanical point of view the gourds used by the natives of New Guinea to cover and protect their penises (according to the author's statement, this is his most read article on Research Gate)...

But still, allow some numbers to emphasize the importance of Jan Lepš as a scientific heavy-weight figure. Over 200 articles in journals registered on the Web of Science, many of them in top journals, over 20,000 citations, and H-index of 65 on Google Scholar make him one of the most cited Czech scientists. His position on the Czech scientific scene is illustrated, among other things, by the fact that he was elected a member of the Learned Society of the Czech Republic in 2015.

What else is inherently associated with Šuspa? The musical ensemble ŠuKaS (an acronym for Šuspa's Cacophonous Orchestra – you don't need to be a fan of this genre, but the bandleader's enthusiasm will get you, he plays with the passion of real jazz or rock stars), an infectious sense of humour, but also a massive beard that he could patent ... the guy looks like that for at least fifty years, and all that time he is the same nice, kind and decent person. Last but not least, he has an irresistible desire to dive into every waterbody he passes, the colder the better.

In all seriousness, I cannot think of a better candidate that we, as the Czech Ecological Society, could and should appreciate for what he has done for ecology in this country and beyond.



Detailed conference program (*Student contributions)

Wednesday 7. 9. 2022

From 11:00 Registration

12:00-12:10 Opening

12:10-14:00 1st session

12:10 **Keynote talk: Ondřej Mottl**

12:35 Irena Šímová

12:47 Jan Smyčka

12:59 Anna Tószögyová

13:11 Antonin Machac

13:23 David Hořák

13:35 Alena Sucháčková

13:47 Jakub Žárský

14:00-14:25 Coffee break

14:25-15:50 2nd session

14:25 **Keynote talk: Lucie Vítková**

14:50 Radim Matula

15:02 Eva Chumanová

15:14 Ondřej Košulič

15:26 *Soham Basu

15:38 *Tomáš Hamřík

15:50-16:20 Coffee break

16:20-18:00 3rd session

16:20 Eliška Bohdalková

16:32 Samuel Dijoux

16:44 Lenka Harmáčková

16:56 Peter Mikula

17:08 Anna Šolcová

17:20 Jiri Tuma

17:32 Jakub Žák

17:44 Michael Mikát

18:00-19:00 Plenary talk

Jörg Müller

Measuring biodiversity across large scales

Quantifying rates of vegetation change of the last 18,000 years

The dynamics of the productivity-diversity relationship during the last 21,000 years

Do the species with large geographic ranges diversify faster?

Serious mathematical biases in the calculation of the Living Planet Index

The dynamics of bird diversity across regions and elevations of the New World

A hazy barrier? Exchange of avifaunas along elevation of Mt. Cameroon

Czech Republic as a crossroad: biogeographic application of the Czech butterfly barcoding

The Cryogenian Cradle of Land Plants

Forest ecology and management in the changing world

Ecological forestry and the willingness of foresters to adopt new management principles

Varying effects of tree composition and diversity on microclimate of European forests

Invasive pathogens of woody plants in the Czech Republic: identification, impact and management

Impact of ash dieback on multi-trophic biodiversity in a hardwood floodplain forest

Resistance and Resilience of South Moravian floodplain forest in increasing drought events

The optimal frequency of canopy thinning to maintain spider diversity in open oak-dominated woodlands

Vojtěch Jarošík's Award (winners, talks of awardees)

Universality in biodiversity patterns: variation in species–temperature and species–productivity relationships...

Community structure and collapses in multichannel food webs

Foraging specialization and niche overlap in Australian songbirds

Global variation in song frequency of passerines is best explained by changes in their body size

Abrupt vegetation and environmental change since the MIS 2: A unique paleorecord from Slovakia

Ant-termite interactions: an important but under-explored ecological linkage

Reproductive senescence in a short-lived fish

Polyandrous bee provides extended offspring care biparentally as an alternative to monandry based eusociality

Between chainsaws and bark beetles: lessons learned for biodiversity management in forests

20:00 Social evening in the Pegas Alehaus

9:00-10:25 **4th session**

09:00 **Keynote talk: Kateřina Kopalová**

09:25 Vojtěch Kubelka

09:37 Jules Segrestin

09:49 Petr Pokorný

10:01 Tomáš Telenský

10:13 Vladimír Remeš

10:25-10:45 **Coffee break**

Spatio-temporal patterns in ecology I.

Diatoms as model organism for studying ecology and biogeography in Antarctica

Animal migration to northern latitudes: still advantageous strategy or maladaptive behaviour?

Drivers of the spatial stabilization of a grassland metacommunity

The case of the „Moravian Yellowstone“: Cryptic northern refugia decrypted?

Novel model reveals important patterns in population dynamics of long-distance migratory birds

The evolution of secondary syntopy in honeyeaters: insights from unbiased co-occurrence analyses

10:45-12:00 **5th session**

10:45 *Donam Tushabe

10:57 *Ernesto Bonadies

11:09 Štěpán Janeček

11:21 *Marie Smyčková

11:33 Jaroslav Vojta

11:45 Tomáš Herben

Spatio-temporal patterns in ecology II.

Correlates of pollen thermotolerance

Population trends of tropical insect pollinators after 10-years of monitoring on Barro Colorado Island, Panama

Spatiotemporal pattern of specialization of sunbird-plant networks on Mt. Cameroon

Lighter and less structured primary forests host more herb species

Large-scale distribution of open-canopy forests reflects historical settlement pattern

Long-term fluctuations of plant populations: are there any clues about their mechanisms

12:00-13:00 **Lunch**

13:00-15:00 **Poster session (with coffee and refreshments)**

15:00-16:15 **6th session**

15:00 **Keynote talk: Jan Hrček**

15:25 *Michaela Mojžišová

15:37 *Anna Mrázová

15:49 David Boukal

16:01 *Warbota Khum

16:15-16:25 **Coffee break**

Trophic and mutualistic interactions I.

Bridging field and laboratory ecology: impact of warming on *Drosophila* -parasitoid networks

Reservoirs of the crayfish plague pathogen and its diversity in Czechia and Central Europe

Interactions between plants, herbivorous insects and predators: mechanisms and ecological importance

Global change and species invasions in simple communities: a modelling study

Effects of local and landscape factors on spider-insect prey food webs in mango orchards

16:25-18:05 **7th session**

16:25 Katerina Sam

16:37 *Tereza Novotná Jaroměřská

16:49 Eva Kaštovská

17:01 *Sophie Mennicken

17:13 Aditi Pandit

17:25 Caio Cesar Pires de Paula

17:37 Robert Troup

17:49 *Sailee Sakhalkar

Trophic and mutualistic interactions II.

The impact of ants and vertebrate predators on arthropods and plants: a meta-analysis and a case study

Enigmatic consumers on glaciers: uncovering carbon and nitrogen stable isotopes of tardigrades and rotifers...

Plant-microbial-soil interactions as drivers of ecosystem C and N cycling

Orchid-mycorrhizal fungi networks are more specialized in Mediterranean than in Central Europe

Natural existing arbuscular mycorrhizal-bacterial biofilm associations and their functional behavior

Inside the leaf microbiome: how to quantify the extent of foliar endophyte colonization?

Elevational patterns of specialisation in pollination networks in rainforests of Mount Cameroon

Nectar robbing and thieving in Afrotropical rainforests: quantification, patterns and drivers

18:15-19:45 **General Assembly of the Society – Valné shromáždění ČSPE (in Czech)**

20:00 **Banquet**

Friday 9. 9. 2022

9:00-10:25 8th session

09:00 **Keynote talk: Martin Jiroušek**

09:25 Tomáš Václavík

09:37 Vojtěch Kolář

09:49 Jan Lepš

10:01 Michal Choma

10:13 Ricarda Pätsch

10:25-10:45 Coffee break

Biodiversity conservation

Fallows as a tool for biodiversity conservation and restoration

The impact of agri-environmental measures on habitat suitability of farmland birds

Do we know how to protect the littoral zones of fishponds?

Resistance and resilience: it is much easier to destroy species rich meadow than to restore it

Recovery of ectomycorrhizal fungi community after forest dieback along vegetation regeneration

Niches of Pannonian halophytes differ by salt types

10:45-12:10 9th session

10:45 Martin Volf

10:57 *Priscila Mezzomo

11:09 *Klára Pyšková

11:21 Jan Čuda

11:33 Miroslav Kutal

11:45 Martin Duľa

11:57 Jan Klečka

12:10 Announcement of the best student presentations, Closing ceremony

Animals of prey: from herbivory to predators

Differential macroevolution of chemical diversity in lowland and highland willow species

Can herbivore traits predict the specificity of induced plant responses?

Browsing pressure and shrub species richness in different habitats of the Kruger National Park

Habitat and bedrock modify plant-herbivore relationships in a South-African savanna

No evidence that wolf hunting reduces livestock damages in Slovakia

The first insight into feeding and hunting behaviour of Carpathian lynx

The role of among-individual differences in behaviour for predation by spiders

12:30-13:30 Lunch

- 1* Tiba Jassam Kaison AL-IMARI Functional analyses of benthic diatoms in brownish forest lakes, Hungary
- 2* Dominik ANÝŽ Do selfing rates rise with elevation as pollinator activity decreases in Afromontane grasslands?
- 3* Michal BARTÁK Role of moths in nocturnal pollination of flowering plants in tropical ecosystems
- 4 Tomas BARTONICKA Animals on the road: a new book about the human-wildlife conflict on roads
- 5* Martina BERNATOVÁ Multiple predator effect of arthropod and vertebrate predators on vitality of pear trees
- 6* Eva BÍLKOVÁ The effect of environmental variables on the development and survival of *Sympetrum striolatum* larvae
- 7 Martin BITOMSKÝ Modes of evolution of tissue element stoichiometry in co-occurring grassland herbs
- 8* Pavel Karel BYSTRICKÝ Common amphipods *Gammarus fossarum* in eastern Czechia are several frequently co-occurring species
- 9* Tereza CAHOVÁ Soil diatom communities of Ile Amsterdam, South Indian Ocean
- 10* Kateřina CZAJOVÁ Effect of plant secondary metabolites on the caterpillar gut microbiota of monophages and polyphages
- 11 Sylvain DELABYE Elevational and seasonal intraspecific differences in tropical moths' sizes on Mount Cameroon
- 12* Michaela DRGOVÁ Estimates of true arthropod density in bryophytes
- 13* Daniel DUSÍK Microannelids of oak-dominated coppices of the Podyjí National Park, Czechia
- 14* Sara FERNANDEZ GARZON Trophic plasticity in Australian ants: A stable isotopes approach
- 15* Jan FILIP Latitudinal patterns in specialisation of plant-pollinator interactions
- 16* Fernando GAONA Habitat specialization of butterflies and moths along an elevational gradient on Mount Cameroon
- 17* Andrea GARGULÁKOVÁ Catch them all! Became a science data hunter with our species identification mobile applications.
- 18 Petra HÁJKOVÁ Holocene history plays an important role in forest-steppe formation
- 19* Jan HÄUSLER Rake in the forest
- 20 Martin HEJDA Plant diversity of a South African savanna is determined by local rather than large-scale factors
- 21 Eva HEJDUKOVÁ Biological soil crust microalgae manipulation experiments in the High Arctic
- 22 Jan HOLÍK Neighbourhood effects on woody plant selection and bark stripping by deer
- 23* Markéta HOUSKA TAHADLOVÁ Which natural enemy is important in temperate forest understory? May tree life strategy be the key?
- 24* Marie HOVORKOVÁ Ant succession in post-mining sites: comparison of temporal changes with space for time substitution
- 25* Kristína HRIVNÁKOVÁ Variability of the alpine lake Prostdredné Spišské pleso (High Tatras) due to climatic factors
- 26* Terezie CHAMRÁTHOVÁ Can hemiparasitic *Melampyrum arvense* serve to control the spread of invasive *Erigeron annuus*?
- 27* Constantinos CHARALAMBOUS The temporal variability in the shape of the density-occupancy relationship in waterbirds
- 28* Panayiotis CHRYSANTHOU Unraveling the age structure of old-growth oak coppice woodlands in Eastern Mediterranean
- 29 Milan CHYTRÝ Pladias.CZ and FloraVeg.EU – online ecological databases of Czech and European flora and vegetation
- 30 Jitka JANCŮCHOVÁ LÁSKOVÁ Nonlethal effect: Mere predator presence affects behavior, stress hormones and arthropod assemblages
- 31* Anni JAŠKOVÁ Acknowledging boreal rich-fen forests in the EUNIS habitat classification
- 32 Veronika KALUSOVÁ Overview of European alien plant checklists
- 33 Josef KAŠÁK Shortage of declining and sun-exposed trees in forests limits longhorn beetle *Ropalopus ungaricus*
- 34 Jitka KLIMESOVA Mind the roots and rhizomes!
- 35* Ishmeal Nubitgha KOBE Nocturnal pollination in tropical rainforests of Mount Cameroon
- 36* Monika KOLÉNYOVÁ Does deadwood origin matter? The way a tree dies affects the wood-inhabiting fungal community development
- 37 Marie KOTASOVÁ ADÁMKOVÁ Cattle grazing and mowing: an opportunity for ecological restoration of meadow wetlands
- 38* Přemysl KRÁL Facilitation or competition? Microtopography affects interspecific interactions in vegetation of alder carrs
- 39* Jing LEONG Evolution of chemical defenses in Salicaceae and the plant-herbivore arms race
- 40 Olga LEPŠOVÁ-SKÁCELOVÁ Rescue of critically endangered *Potamogeton praelongus* Wulfen: problems after restoration of a river oxbow
- 41* Martin MARTINKA The power line clearing as a barrier for soil invertebrates
- 42* Marek MEJSTŘÍK The effects of stand density, standards and species composition on biomass production in coppices
- 43 Radek MICHALKO Landscape and local factors affect incorporation of agrochemicals in local food webs.
- 44* Jan OULEHLA Can construction of pools in wetlands be the cause of habitat degradation and negative changes of vegetation?
- 45 Jan PERGL Spread of alien plants along the Trans-Siberian railway: the effect of biogeographical zones
- 46 Michal PLÁTEK LIFE for Insects. Conservation of Selected Natura 2000 Insect Species of Western Carpathian Mts.
- 47* Jindřich PRACH Broadleaf or coniferous? Landscape scale vegetation reconstruction from fossil pollen, Třeboňsko
- 48* Martin PRACH The past and the present of European larch in Central Europe
- 49* Veronika PRIELOŽNÁ Community Ecology Parameter Calculator in R
- 50 Jiří PROCHÁZKA Impact of the glaze ice on saproxylic beetles in Podyjí National Park 5 years after the disturbance.
- 51 Petr PYŠEK Alien plants of the Czech Republic: checklist update, introduction dynamics and impact assessment
- 52* Grace RIDDER Possibilities and limitations of hierarchical modeling of species communities with large datasets
- 53* Petra RYCHLÁ HULEJOVÁ Impact of conservation thinning in oak woodlands of NNM Kukle on epigeic spiders (Araneae)
- 54 Zuzana SEJFOVÁ Changes in occurrence and abundance of alien plant species over eight years along the Labe river
- 55 Jiří SCHLAGHAMERSKÝ Does snowmaking affect soil and epigeic fauna on ski runs in the Giant Mountains (Krkonoše, Czechia)?
- 56* Antigoni SOUNAPOGLOU Plant-pollinator interactions along an elevational gradient in forests of the Krkonoše Mts.
- 57 Jan ŠEBESTA Long-term change in understory of non-managed temperate deciduous forest: indirect effect of forest management
- 58 Tamara TĚŠITELOVÁ Hemiparasitic plants vs. invasive Asteraceae: effects of species identity and genotype selection.
- 59* Martin VAŠIČEK Influence of management practices on arthropod communities in dry species-rich grasslands in the Western Carpathians
- 60 Ivana VAŠIČKOVÁ Drivers of wind mortality associated with severe windstorms in primeval mountain forest
- 61* Pavla VYMAZALOVÁ Impact of active conservation management on spiders and carabid beetles in a protected oak forest
- 62 Matthias WEISS Bark and ambrosia beetles on native and transplanted dead wood along an altitudinal tropical forest gradient
- 63* Barbora WINTEROVÁ Marine Protected Areas of Sri Lanka: Strengths, Shortcomings and Suggestions for Improvement

ABSTRACTS OF
PRESENTATION
SESSIONS

QUANTIFYING RATES OF VEGETATION CHANGE OF THE LAST 18,000 YEARS

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Assessing the biodiversity consequences of climate change ideally draws from different lines of evidence to understand the degree, rate, and nature of ecological responses in comparison with historical records before human interference. Fossil pollen records can provide detailed insights into ecosystem responses to past natural and anthropogenic drivers of change during thousands of years. Here, we explore global rates of vegetation change during the last 18,000 years, based on an unprecedented global collection of over 1100 fossil pollen records from the community curated Neotoma Paleoecology Database. The analysis includes new sites added from tropical regions to have global coverage and uses a new statistical method for detecting rates of change. First, we show that late Holocene rates of vegetation change lack any precedent over the last 18,000 years, with respect to magnitude and global scope. This finding is remarkable given the large climate-driven vegetation changes associated with the end of the last glacial period. Second, biodiversity dynamics during the Anthropocene is a major topic of interest, with several papers demonstrating globally enhanced rates of local turnover during the 20th and 21st centuries. Here we show that this acceleration in rates of change began millennia ago (4.6 to 3.1 ka) for terrestrial communities, suggesting that the acceleration in turnover over the last two centuries is the tip of a deeper trend. Finally, we show how the spatiotemporal patterns of vegetation change are consistent with known climatic forcings and land-use history, but that there are continental differences in terms of the timing of the vegetation change acceleration. Our work contributes to the piling collection of evidence showing the global and long-term anthropogenic effects on ecosystems, but also emphasises the need for further collaborations between ecologists, paleoecologists, and archaeologists to understand the deeper origins of the current Anthropocene.

THE DYNAMICS OF THE PRODUCTIVITY-DIVERSITY RELATIONSHIP DURING THE LAST 21,000 YEARS

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Spatial diversity patterns are linked to productivity variation, but how the diversity-productivity relationship (DPR) changes in space and time is unclear. There are three possible scenarios: (1) equilibrium dynamics, where diversity is always positively related to productivity in both time and space, (2) out-of-equilibrium dynamics, where diversity is determined by productivity in equilibrium, but diversity changes lag behind productivity changes, leading to a mismatch between temporal and spatial diversity-productivity patterns, and (3) disequilibrium dynamics where the equilibrium between diversity and productivity does not exist or is irrelevant. We used North American pollen data from the last 21,000 years to distinguish these scenarios. Whereas temporal DPR appeared only when productivity rapidly changed, spatial DPR was pronounced only when productivity stabilized. This pattern provides evidence for the out-of-equilibrium dynamics of diversity and indicates that current rapid climate changes can disrupt the spatially consistent DPR.

DO THE SPECIES WITH LARGE GEOGRAPHIC RANGES DIVERSIFY FASTER?

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Range size is a universal characteristic of every biological species, and is often assumed to determine diversification rate. However, the relationship between range size and past and future diversification of species remains elusive. On one hand, there are strong theoretical arguments that large-ranged species should have higher rates of diversification. This theoretical view is challenged by observations that small-ranged species are often phylogenetically clustered and form spatially localized hotspots, claimed to be the cradles of biodiversity. The research of range-size evolution is a notoriously complex task, because the range sizes evolve not only anagenetically (range expansion or contraction), but also cladogenetically (range size change between mother and daughter species during speciation). We use a cladogenetic state-dependent diversification model applied to mammals to show that in general, small-ranged species indeed diversify slower, as theoretically expected. However, this pattern is reversed in many mammalian taxa. The ancestral state reconstructions suggest that both range size evolution and diversification are strongly influenced by idiosyncratic and spatially localized events, such as colonization of an archipelago or a mountain system, which often overdrive the general pattern of range size evolution.

SERIOUS MATHEMATICAL BIASES IN THE CALCULATION OF THE LIVING PLANET INDEX

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The LPI measures the overall population trend of vertebrate species during last decades and has been repeatedly used for evaluation of the current state of the biosphere. The Living Planet Report, published by WWF, states, based on the LPI, that vertebrate populations decreased by more than two-thirds since 1970. This is in striking contrast with the studies based on the same population data (Living Planet Database, LPD) which show that in average, increasing and decreasing vertebrate populations (winners and losers) are more or less balanced. We show that the calculation of the LPI is seriously biased by several mathematical and statistical issues which produce asymmetry in weighting decreasing and increasing populations. When these errors are corrected, the recalculated LPI does not show overall significant decline nor increase of vertebrate populations. This does not necessarily mean that the human-made changes in the Anthropocene lead to a perfect balance of winners and losers; instead it may indicate that available data (collected in the LPD) are not sufficient for proper evaluation of the current state of the biosphere.

THE DYNAMICS OF BIRD DIVERSITY ACROSS REGIONS AND ELEVATIONS OF THE NEW WORLD

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Three prominent explanations have been proposed to explain the dramatic differences in species richness across regions and elevations, (1) time for speciation, (2) diversification rates, and (3) ecological limits. But the relative importance of these explanations and, especially, their interplay and possible synthesis remain largely elusive. Integrating diversification analyses, null models, and GIS, I study avian richness across regions and elevations of the New World. My results reveal that even though the three explanations are differentially important (with ecological limits playing the dominant role), each contributes uniquely to the formation of richness gradients. Further, my results reveal the likely interplay between the explanations. They indicate that ecological limits hinder the diversification process, such that the accumulation of species within a region gradually slows down over time. Yet, it does not seem to converge toward a hard ceiling on regional richness. Instead, species-rich regions show suppressed, but continued, diversification, coupled with signatures of possible competition (esp. Neotropical lowlands). Conversely, species-poor, newly-colonized regions show fast diversification and weak to no signs of competition (esp. Nearctic highlands). These results held across five families of birds, across grid cells, biomes, and elevations. Together, my findings begin to illuminate the rich, yet highly consistent, interplay of the mechanisms that together shape richness gradients in the New World, including the most species-rich biodiversity hotspots on the planet, the Andes and the Amazon.

A HAZY BARRIER? EXCHANGE OF AVIFAUNAS ALONG ELEVATION OF MT. CAMEROON

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Janzen's hypothesis suggests that high species richness in tropical mountains is a result of climatic stability and narrow elevational ranges of species. Avian species richness patterns vary among mountains despite the majority of them can be classified as monotonous decline or hump-shaped. Here, we provide insights into a monotonously declining number of bird species along the elevation of Mt. Cameroon. We found that diversity and abundance within different foraging guilds change differently with elevation. In contrast to species richness, total abundances show a hump-shaped pattern. New species are added into communities mostly by niche packing and functional space estimated using foraging traits is overdispersed in higher elevations. Interestingly, the biggest decrease in number of species, the highest bird abundances, the biggest change in community composition and ecological traits of birds is observed at mid-elevations. There, the two worlds of birds meet each other, the lowland and the montane, which are likely ruled differently. The edge between them is not very clear, however from time to time the dense tropical cloud enters the forest. Maybe darkness and coldness of these clouds discourage the lowland birds from trips to high elevations. Anyway, the two bird worlds lie on the top of each other and form the richest places in the World.

CZECH REPUBLIC AS A CROSSROAD: BIOGEOGRAPHIC APPLICATION OF THE CZECH BUTTERFLY BARCODING

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Barcoding, i.e., sequencing a part of the mitochondrial gene COI, was first used for species identification. The European butterfly fauna was exemplary for continental-wide evaluations of barcoding performance. The overall genetic patterns across Europe suggest that the diversity is highest in the south and declines towards the north. Still, the amount of database sequences decreases north-eastwards and the biogeographic patterns may remain overlooked. We added ~1000 sequences from 140 species representing the full extant Czech butterfly fauna. We employed the Bayesian analysis of population structure in each species and scored the resulting distribution patterns of the clusters found in CZ. Although the most common pattern was a lack of diversity in the barcode (N=40), other Czech samples were possible to assign to European lineage (N=22), Balkan-Eastern (N=20), mix of European lineages (N=17), continental-temperate (N=16), Western (N=10), Central-European (N=7.5) and Italian-Balkans (N=6.5). Using CCA analyses, we linked these lineages to species habitats and Czech Red List categories. Steppe and meadow species reached CZ from south and east, while bog species displayed continental-temperate or Central-European patterns. Generalists comprised of mixed lineages. Endangered species had distinctive lineages, whereas non-Red Listed species consisted of mixed lineages or European lineages. Extensive barcoding data might get us a comprehensive overview of biogeographic history.

THE CRYOGENIAN CRADLE OF LAND PLANTS

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The terrestrial habitats of Snowball Earth during the Cryogenian period (between 720 and 635 Ma before present–Neoproterozoic Era) were dominated by global snow and ice cover up to the equatorial sublimative desert. The most recent time-calibrated phylogenies indicate that within the Streptophyta, multicellular charophytes evolved in the Mesoproterozoic to the early Neoproterozoic. At the same time, Cryogenian is the time of the likely origin of the common ancestor of Zygnematophyceae and Embryophyta and later, also of the Zygnematophyceae–Embryophyta split. This common ancestor is proposed to be called Anydrophyta; here, we use anydrophytes. We deem it highly likely that anydrophytes evolved in response to Cryogenian cooling. Also, later in the Cryogenian, secondary simplification of multicellular anydrophytes and loss of flagella resulted in Zygnematophyceae diversification as an adaptation to the extended cold glacial environment. We propose that the Marinoan geochemically documented expansion of first terrestrial flora has been represented not only by Chlorophyta but also by Streptophyta, including the anydrophytes, and later by Zygnematophyceae, thriving on glacial surfaces until today. The loss of flagella and sexual reproduction by conjugation evolved in Zygnematophyceae and zygomycetous fungi during the Cryogenian in a remarkably convergent way. Thus, we support the concept that the important basal cellular adaptations to terrestrial environments were exapted in streptophyte algae for terrestrialization and propose that this was stimulated by the adaptation to glacial habitats dominating the Cryogenian Snowball Earth.

ECOLOGICAL FORESTRY AND THE WILLINGNESS OF FORESTERS TO ADOPT NEW MANAGEMENT PRINCIPLES

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Although the theory of considering nature as a template for forest management has been discussed in the past few decades, its implementation into practice has not yet properly taken place in Central Europe. Therefore, a concept of ecological forestry that can be applied in temperate forests of Central Europe is presented. The aim of ecological forestry is to enhance biodiversity meanwhile producing timber that generates a viable income. Case studies of ecological forestry based on practical experience are presented along with the necessary aspects of ecological forestry such as retention or creation of key structural and functional biological legacies. The use of traditional silvicultural practices requires a substantial alteration in order to reach the major aims of ecological forestry. This requires both a significant development of commonly used methods and changes in forestry professionals' mindsets since human decision-making is key when adopting novel practices, which is the case of ecological forestry in Central Europe. Therefore, the willingness of foresters to adopt new management principles is described in order to highlight the necessity to have forestry professionals that are enthusiastic and prepared in order to start using novel forest management practices that are suitable in the time of global climate change.

VARYING EFFECTS OF TREE COMPOSITION AND DIVERSITY ON MICROCLIMATE OF EUROPEAN FORESTS

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Due to climate change, European forests face rising temperatures and increasing severity and frequency of droughts. However, forests may buffer a significant part of the negative climate-change effects. These buffering effects likely depend on tree structure, composition, and diversity, which can be manipulated by forest management to support these climate-change mitigation functions of the forests. Here, we present the results of the project in which we measured soil moisture, temperature, and air temperature in forests with varying species composition and diversity in several locations across Europe, spanning from the boreal to the Mediterranean climate zone. Our data show that the most pronounced differences in the measured microclimate variables were between pure coniferous and pure broadleaved forest stands. Broadleaved stands had greater summer maximum and winter minimum air and soil temperatures but conserved better soil moisture, especially in late summer and autumn. Mixed forests had microclimate very similar to pure conifer forests, which indicates that conifers are the primary driver of microclimate in the mixed stands. We also found that increasing tree density and cover reduced temperature extremes but decreased soil moisture. The results suggest that foresters may influence forest microclimate by varying tree composition and structure. However, the species that mediate temperature extremes may differ from those that best conserve soil moisture.

INVASIVE PATHOGENS OF WOODY PLANTS IN THE CZECH REPUBLIC: IDENTIFICATION, IMPACT AND MANAGEMENT

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Invasive pathogens of woody plants have been increasing in number and impact worldwide in recent decades and pose a serious threat to natural as well as managed ecosystems. Early identification of harmful alien species and susceptible areas and habitats are crucial for effective management of their invasions and protection of ecosystems and their biodiversity and functions. We chose eleven model species already or potentially harmful to autochthonous woody plants and their communities in the Czech Republic and developed spatial predictions of i) the environmental suitability for these pathogens in the country and ii) their potential impact on woody vegetation in NATURA 2000 habitats. Expert knowledge species distribution models with GIS were used to solve the task. The resulting predictive maps show susceptible habitats and areas that face or could potentially face considerable risk of severe damage caused by the pathogens as well as the areas at the low risk. Moreover, we can expect a combined effect of different invasive pathogens in many locations and habitats. An accompanying methodology describing identification of the pathogens and suggesting mitigation and adaptation strategies was created. We believe that our results can serve as effective management tools to control invasions, reduce their impact and help to protect forest woody species and their communities in the Czech Republic.

IMPACT OF ASH DIEBACK ON MULTI-TROPHIC BIODIVERSITY IN A HARDWOOD FLOODPLAIN FOREST

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European ashes suffer heavy dieback due to the introduction and spread of the invasive fungal pathogen *Hymenoscyphus fraxineus*. The ash dieback has resulted in significant structural and environmental changes and in alterations of various biotic interactions within lowland forests. On the other hand, the forest successional theory would predict a positive impact on biodiversity due to the opening of forest canopies. Surprisingly, there is only a limited number of empirical studies investigating how this invasive species affects multi-trophic biodiversity of infested forests in different successional stages. In this study, we hypothesized that the impact of ash decline on biodiversity will be strongest in young stands and will decrease with the succession stage due to the higher resilience of older stands. Further, we assumed that the strongest infestation homogenizes the habitat structure through the total opening of canopies and consequent spreading of ruderal and pioneer plant species. This reduces niche availabilities and ultimately overall multi-trophic biodiversity. As we hypothesized, the effect of ash decline on diversity was particularly weaker in the old than in the young stands, but the relationship between biodiversity indicators and infestation was hump-shaped in all successional stages. The ultimate impact of the ash-dieback was therefore highly negative because the strong infestation of the ash stands greatly reduced the multi-trophic biodiversity.

RESISTANCE AND RESILIENCE OF SOUTH MORAVIAN FLOODPLAIN FOREST IN INCREASING DROUGHT EVENTS

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Drought frequency and intensity has increased in Europe in last twenty years as an effect of global climate change and led to the forest degeneration and reduced the productivity and vitality. Floodplain forests are facing such drought risks aroused from climate change and deepening of ground water level through the modification of the river channels to reduce flood. This study was performed in South Moravian floodplain forest. We evaluated the productivity and ecological stability through the resilience components of radial growth. The study is focused the resilience, resistance and recovery of Pedunculated Oak and Narrow leaved Ash of approximately 120 years. Sampled trees represented the dominant and co dominant layer of the canopy. The hypothesis used for the study were (i) Oak and Ash respond differently to climate change and ground water alteration and (ii) Species specific response differs among the sites with different water management.

To confirm the hypothesis tree cores were collected and measured from both species and resilience components were derived from the measurements. Drought severity was deduced through calculating Standardized Precipitation Evapotranspiration Index from the continuous temperature and precipitation data during the year of 1960 – 2017.

Results revealed that the Pedunculated Oak is more resilient than Narrow leaved Ash and Climate change is reducing the resilience of both species. Stress resistance and recovery differs between the species.

THE OPTIMAL FREQUENCY OF CANOPY THINNING TO MAINTAIN SPIDER DIVERSITY IN OPEN OAK-DOMINATED WOODLANDS

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A fine mosaic of patches in various successional stages is a key to maintaining high biodiversity in open temperate woodlands. However, the abandonment of human-induced disturbances such as coppicing has caused these open woodlands to become homogeneous, which resulted in a loss of arthropod biodiversity depending on the disturbance regime. Despite the important role of active interventions in the management of temperate woodlands, the information on its optimal frequency for arthropod conservation is scarce. We investigated the effects of successional development on ground-dwelling spider diversity in experimental clearings in oak woodlands of Podyjí NP, Czech Republic. We sampled ground-dwelling spiders using pitfall traps within 10 experimental plots in different years of succession: first, second, fifth, sixth and unmanaged stands as a control. We collected a total of 9 314 specimens belonging to 137 species. The species richness increased in the sixth year after canopy thinning. The trait diversity (RaoQ) was very low in the control stands, which primarily contained spiders with a preference for shaded habitats. Each group of succession stage hosted separated spider communities. Canopy thinning supported light-demanding species and species of conservation concern. Our results indicate that small-scale canopy thinning carried out at short time intervals supports the diversity of ground-dwelling spiders in open oak-dominated forests.

UNIVERSALITY IN BIODIVERSITY PATTERNS: VARIATION IN SPECIES— TEMPERATURE AND SPECIES—PRODUCTIVITY RELATIONSHIPS REVEALS A PROMINENT ROLE OF PRODUCTIVITY IN DIVERSITY GRADIENTS

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Temperature and productivity appear as universal positive large-scale correlates of species richness. However, the strength and the shape of species–temperature (STR) and species–productivity (SPR) relationships vary widely, and the causes of this variation are poorly known. We analysed 1) published species richness data for multiple taxa sampled in various regions and 2) different clades within vertebrate classes globally, to test for the effects of spatial scale and characteristics of examined taxa and regions on the strength and direction of STRs and SPRs. There are striking differences in the variation of the relationships among types of data, between ectotherms and endotherms and also between STRs and SPRs. Some sources of this variation are of statistical nature (e.g. the relationships are stronger if the range of temperature or productivity variation is wider), but non-statistical sources are more important and illuminate the processes responsible for the origin of biodiversity patterns. The SPRs are generally stronger and less variable than STRs, and SPR variation is weakly related to the explored factors – the SPRs are stronger in warmer regions in ectotherms, while clade size is the only factor consistently affecting the strength of the SPR in endotherms. In contrast, STRs are weaker and more variable, and this variation is linked to region characteristics – most importantly, STRs are stronger in the regions where temperature positively correlates with productivity, indicating that productivity plays a role even in the STRs. The effect of temperature on species richness is thus complex and context-dependent, while productivity is a more universal driver of species richness patterns, largely independent of particular characteristics of given region or taxon. Productivity thus appears as the main proximate driver of species richness patterns, probably due to its effect on the limits of the number of viable populations which can coexist in a given environment.

COMMUNITY STRUCTURE AND COLLAPSES IN MULTICHANNEL FOOD WEBS

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Most aquatic food webs include benthic and pelagic habitats that differ strikingly in energy sources, nutrient flows and properties of species that inhabit them. It was proposed that their balance is mediated by mobile apex predators, but theoretical explanations of the observed patterns have been lacking. Through this talk, I will present you how our modelling study provides a framework that explains for the first time the empirically observed coexistence of communities in such multichannel food webs linked by mobile apex predators. I will first explore how species traits and environmental stressor can lead to ecological surprises (e.g., emergent Allee effects, alternative stable states) in marine and freshwater systems. I will then demonstrate how the interplay between differences in mesohabitat productivities and consumer body sizes typical for many benthic and pelagic communities: 1) determines the persistence and collapse of the top predator and 2) promotes species coexistence or extinctions in linked food webs. These outcomes highlight that a 'symmetry in asymmetries' is critical to maintain multichannel food webs through two compensatory levels of asymmetry (i.e., competitive abilities of the consumers and their vulnerability to predation) that modulate the energy flows in the different food web channels. I will conclude by exploring how anthropogenic disturbances such as the widespread habitat eutrophication can have profound effects on freshwater communities, including sudden population collapses and cascading extinctions.

FORAGING SPECIALIZATION AND NICHE OVERLAP IN AUSTRALIAN SONGBIRDS

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Niche partitioning is presumed to play a prominent role in shaping species richness by facilitating species coexistence. Narrow specialization should enable finer partitioning of resources and thus enhance local coexistence of species and higher species richness. While niche partitioning is assumed to be most important on fine spatial scales shaping local coexistence of species, the role of abiotic conditions and historical effects should be more prominent on coarser regional scales shaping spatial variation in species richness.

We used comprehensive data on five sets of ecological traits in Australian songbirds (Passeriformes) to test the specialization-richness relationship across three spatial scales. We employed habitat, diet, and foraging (stratum, substrate and methods) categories to calculate ecological specialization.

Richness-specialization relationships were stronger at regional scales than at the local scale. Positive richness-specialization relationships were equally common in assemblages both exceptionally species rich and species poor for given environmental conditions. Finally, we found that species partition the ecological space in terms of what part of vegetation they forage on, but not by the foraging method they use for obtaining food.

We showed that species richness and specialization in Australian songbirds were often tightly related, but the relationship changed between individual ecological and behavioural traits and across spatial scales.

GLOBAL VARIATION IN SONG FREQUENCY OF PASSERINES IS BEST EXPLAINED BY CHANGES IN THEIR BODY SIZE

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Frequency is a fundamental parameter of a birdsong because it influences the efficiency of sound transmission. Body size is expected to constrain song frequency and frequency parameters of song may also be sexually selected. Moreover, lower sound frequencies generally propagate further, especially in closed habitats; thus, the adaptive acoustic hypothesis predicts that species from closed habitats should emit lower-frequency sounds than species from open areas. However, the relative contributions of these factors to the explaining variation in birdsong frequency have not been thoroughly investigated yet. Here, we analysed song peak frequency (the frequency at maximum amplitude) across 5,085 passerine bird species (Passeriformes) and evaluated these hypotheses. A phylogenetically-informed cross-species analysis revealed that song frequency consistently decreases with increasing body size and, to a lower extent, also with male-biased sexual size dimorphism. Interestingly, we found weak but positive correlation between song frequency and tree cover or habitat closeness, providing no support for the adaptive acoustic hypothesis as originally proposed. Our results indicate that the global variation in song frequency of passerines is mostly driven by natural and sexual selection causing evolutionary shifts in body size.

ABRUPT VEGETATION AND ENVIRONMENTAL CHANGE SINCE THE MIS 2: A UNIQUE PALEORECORD FROM SLOVAKIA (CENTRAL EUROPE)

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The present study presents the first comprehensive reconstruction of local and regional environment at the Western Carpathian/Pannonian Basin border, including a first chironomid-based paleoclimate reconstruction and $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ records from travertine, to investigate abrupt biota and climate shifts since the Marine Isotope Stage (MIS) 2. A range of biotic and abiotic proxy data in organic-calcareous sediment sequence were analysed using a multi-proxy approach to produce a detailed reconstruction of past ecosystem conditions. The results illustrate that the most prominent abrupt change in the local environment occurred directly at the MIS 2/MIS 1 transition at 14,560 cal BP as a consequence of increased precipitation and an increase in reconstructed mean July temperature by ~ 2.2 °C. Abrupt changes in local environment during the early Holocene were closely linked to travertine precipitation rate around thermal springs and thus indirectly to the climate until the arrival of the Late Neolithics around 6400 cal BP. Regional vegetation response (derived from pollen data) to the climatic fluctuations lagged, with the most prominent changes around 14,410 cal BP and 10,140 cal BP. Our data suggest the presence of a steppe-tundra ecosystem with evidence for low amounts of temperate broadleaf trees during the MIS 2, indicating close proximity to their northern glacial refugium. We demonstrate the ability of $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ stable isotope record from travertine to reflect abrupt climatic and environmental changes. The study provides evidence about benefits using travertine deposits coupled with high-resolution paleoecological data to investigate past biotic and abiotic responses to abrupt climate change.

ANT-TERMITE INTERACTIONS: AN IMPORTANT BUT UNDER-EXPLORED ECOLOGICAL LINKAGE

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Animal interactions play an important role in understanding ecological processes. The nature and intensity of these interactions can shape the impacts of organisms on their environment. Because ants and termites, with their high biomass and range of ecological functions, have considerable effects on their environment, the interaction between them is important for ecosystem processes. Although the manner in which ants and termites interact is becoming increasingly well studied, there has been no synthesis to date of the available literature. Here we review and synthesise all existing literature on ant–termite interactions. We infer that ant predation on termites is the most important, most widespread, and most studied type of interaction. Predatory ant species can regulate termite populations and subsequently slow down the decomposition of wood, litter and soil organic matter. As a consequence they also affect plant growth and distribution, nutrient cycling and nutrient availability. Although some ant species are specialised termite predators, there is probably a high level of opportunistic predation by generalist ant species, and hence their impact on ecosystem processes that termites are known to provide varies at the species level. The most fruitful future research direction will be to evaluate the impact of ant–termite predation on broader ecosystem processes. To do this it will be necessary to quantify the efficacy both of particular ant species and of ant communities as a whole in regulating termite populations in different biomes. We envisage that this work will require a combination of methods, including DNA barcoding of ant gut contents along with field observations and exclusion experiments. Such a combined approach is necessary for assessing how this interaction influences entire ecosystems.

REPRODUCTIVE SENESCENCE IN A SHORT-LIVED FISH

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Reproductive senescence is an age-associated decline in reproductive performance, which often arises as a trade-off between current and future reproduction. This assumption is violated in organisms with post-maturity growth whose reproductive output increases long after maturity. While reproductive senescence is frequently studied in animals with determinate growth at maturity (e.g. mammals), we have very limited understanding of reproductive senescence in organisms with an extensive post-maturity growth period (e.g. fishes). The aim of this study was to investigate how extensive post-maturity growth mould reproductive senescence in a short-lived fish, *Nothobranchius furzeri*.

We demonstrate that female fecundity increased steadily after maturity and reproductive senescence occurred long after the growth asymptote. The prime age for fecundity coincided with median lifespan and consequent decline in fecundity implies an association with somatic deterioration. Females with high early-life fecundity experienced a long lifespan, discounting the role of allocation trade-offs in reproductive senescence.

The present study reports a clear case of reproductive senescence in a fish. Animals with post-maturity growth have long been considered unsusceptible to aging but this conclusion may be related to the previous lack of longitudinal data rather than to the absence of reproductive senescence in such organisms.

POLYANDROUS BEE PROVIDES EXTENDED OFFSPRING CARE BIPARENTALLY AS AN ALTERNATIVE TO MONANDRY BASED EUSOCIALITY

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In Aculeate Hymenoptera, there is generally strong sexual dimorphism in behavior: females are long-lived and perform all care about offspring but males only mates with females and die. On the other hand, eusocial colonies are based on collaboration of multiple females raised in several hymenopteran lineages. We discovered the first case of biparental bee in *Ceratina nigrolabiata*, a small carpenter bee species. During nest provision, females and males live in pairs. Females perform provisioning of offspring by pollen and nectar and male guard nest against natural enemies. Removal experiments showed that females strongly decrease provisioning in absence of male which causes decreasing nest productivity. However, the nest is usually not guarded by one male through the whole nesting season and males have sequentially multiple partners. Therefore, females mate with multiple males during and before nesting season and male usually guard stepchildren. However, we found fitness increase for long-term guarding males also for females which have faithful partners. Paradoxically, multiple mating was probably an evolutionary prerequisite of biparental care because prolonged female receptivity selected for increased male lifespan, which allows them to participate in offspring care during nesting season.

BETWEEN CHAINSAWS AND BARK BEETLES: LESSONS LEARNED FOR BIODIVERSITY MANAGEMENT IN FORESTS

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Increasing disturbances in Central European Forests has opened the avenue for advanced research on the impact of resource pulses as deadwood, the role of microclimate in forests, on forest succession theory and on consequences of post-disturbance salvage logging. The forests of the Bohemian Forest play a pioneering role in this respect, as severe bark beetle infestations and later storms have already changed the forests here in the 1990s. Research into the effects on various taxa, as birds, bats, arthropods, fungi and plants, as well as ecosystem functions as carbon sequestration and clean water supply have led to new ecological evidence. The combination of new methods for detecting hyperdiverse or cryptic species via as meta-barcoding of insect bulks or wood samples, but also the use of remote sensing, have enabled well-replicated studies here despite the remote terrain. Important insights into the importance of a benign neglect strategy for highly threatened species in the core zone of national parks could be gained. Moreover, new and more nature-friendly management strategies for forests could be developed. The talk will summarize research from more than a decade in the forest most severely disturbed in Central Europe.

DIATOMS AS MODEL ORGANISM FOR STUDYING ECOLOGY AND BIOGEOGRAPHY IN ANTARCTICA

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Despite playing a vital role in Earth's biogeochemical cycles, we still have a limited understanding of how microbial communities are formed. Diatoms, single-celled photosynthetic eukaryotes, are dominant components of terrestrial and aquatic ecosystems globally and one of the most abundant and diverse eukaryotes in Antarctica. These organisms are remarkably well-preserved in sediments, and their taxa-specific morphologies, unique environmental tolerances, and constrained biogeographical distributions, make them ideal indicator taxa for investigating limnoterrestrial and climatic changes. We conduct our research in Antarctica, Earth's least anthropogenically impacted continent, meaning there are only limited instances of non-native introductions and low levels of pollution. This, along with its isolation from other continents, makes Antarctica a continent sized natural laboratory for investigating interactions between spatial scale, environmental characteristics, and microeukaryote assemblage structure through long term monitoring, sediment cores, and by investigating historic museum specimens. Our work lends little support to the 'everything is everywhere' theory, and instead demonstrates that diatoms in Antarctica exhibit strong levels of endemism and spatial structuring across the continent. These results may help to predict how microbial, specifically protist, diversity and assemblage/community structure will change following imminent climate changes in Antarctica.

ANIMAL MIGRATION TO NORTHERN LATITUDES: STILL ADVANTAGEOUS STRATEGY OR MALADAPTIVE BEHAVIOUR?

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Every year, many wild animals undertake long-distance migration to breed in the North, taking advantage of seasonally high pulses in food supply, fewer parasites and lower predation pressure in comparison with equatorial latitudes. However, growing evidence suggests that climate change-induced phenological mismatches have reduced food availability. Furthermore, novel pathogens and parasites are spreading Northwards, and nest or offspring predation has increased at many Arctic and North temperate locations. Altered trophic interactions have decreased the reproductive success and survival of migratory animals. Reduced advantages for long-distance migration have potentially serious consequences for community structure and ecosystem function. Changes in the benefits of migration need to be integrated into projections of population and ecosystem dynamics and targeted by innovative conservation actions.

DRIVERS OF THE SPATIAL STABILIZATION OF A GRASSLAND METACOMMUNITY

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Despite great progress in our understanding of the mechanisms governing ecosystem stability in local communities, we still lack knowledge on a larger spatial scale. Previous attempts to disentangle the processes simultaneously affecting metacommunity stability encountered conceptual and methodological barriers. We propose a framework aiming at disentangling the relative effects of population stability and different types of synchronies on metacommunity stability. Our framework relies on closer links between mathematical indices and ecological mechanisms than previous work. In a grassland metacommunity, we found higher stability at a larger spatial scale, mainly due to statistical averaging (portfolio effect). We also found that positive synchrony between populations (within and between species) prevailed at the metacommunity level, while anti-synchrony emerged at the local scale.

THE CASE OF THE „MORAVIAN YELLOWSTONE“: CRYPTIC NORTHERN REFUGIA DECRYPTED?

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The existence and identification of temperate species northern refugia during the Last Glacial Maximum (LGM; ca 19–26 ka BP) has been a hot research topic for over decades. A better understanding of where and how temperate species survived the Quaternary ice ages is key for understanding climate-driven range expansions and the influence of ice-age legacies on present-day mid- and high-latitude biodiversity patterns. The fundamental question sounds as follows: Which specific landscape features, hydrologic, and physiographic characteristics could promote the maintenance of long-term microclimates under a deteriorating climate during the LGM? Based on our novel findings we assume that hydrothermal areas may hold the answer. In order to know how hydrothermal settings could promote the temperate species in the former periglacial zone in Europe, we investigated newly discovered record of ancient hydrothermal area that is located in Moravia, Czech Republic. Our fossil record, covering the entire LGM, is extraordinary rich in plant fossils including thermophilous species and thus provides an excellent insight into the environment of this so far poorly documented period. We are able to provide for the first time the detailed explanation for physiographic mechanisms and climatic basis for existence of the temperate “cryptic refugium” within the LGM periglacial zone of Europe.

NOVEL MODEL REVEALS IMPORTANT PATTERNS IN POPULATION DYNAMICS OF LONG-DISTANCE MIGRATORY BIRDS

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Long-distance migratory birds are experiencing long-term population declines in Europe. Due to their complex annual cycle, there are two major classes of potential factors responsible for this decline. The cause might lie in the breeding grounds, where, for example, migrants' fecundity may be negatively affected by the trophic mismatch (i.e. when phenology of plants and insects advances faster due to climate change than the rather constricted phenology of migratory birds). Alternatively, it might be a result of changes in the non-breeding grounds that affect survival. We used capture-mark-recapture data from a constant effort sites (CES), which is a bird ringing citizen science programme of the Czech Bird Ringing Centre based on volunteer fieldwork. These CES data provide good coverage for 8 migratory species since 2004 at more than 50 sites in the Czech Republic. We developed a novel extension of the Pradel (1996) model which opens a new avenue to analyze CES data, allowing the decomposition of the population growth into survival and recruitment, facilitating the understanding of patterns in population dynamics. We also related the demographic parameters to the climate in the breeding grounds (temperature, GDD5, and plant phenology) and non-breeding grounds (water availability in the Sahel region and the rest of sub-Saharan Africa) and compared their importance in different species.

THE EVOLUTION OF SECONDARY SYNTOPY IN HONEYEATERS: INSIGHTS FROM UNBIASED CO-OCCURRENCE ANALYSES

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Allopatric speciation followed by the evolution of range overlap allows the build-up of regional diversity. However, local species richness requires that species co-occur (syntopy). Importantly, correct estimates of syntopy must be used to identify ecological traits facilitating it. We thus provide a new method to correctly estimate co-occurrence and demonstrate it on the evolution of secondary syntopy using both simulations and data on Meliphagoidea songbirds from Australia and Tasmania. Specifically, we performed probabilistic co-occurrence analyses on both unconstrained species occurrence data and data constrained by species ranges. In the latter, co-occurrence analyses were restricted to the area of range overlap for all species pairs. Simulations showed that co-occurrence analyses must be limited to sites in the area of range overlap between species. Without this spatial limit, syntopy was negatively biased, especially in common species. Accordingly, syntopy was negatively biased in Meliphagoidea when data from all sites were used, but this bias decreased with increasing sympatry, in agreement with simulations. When using correct estimates, syntopy increased with increasing divergence in the use of foraging stratum (ground, shrub, subcanopy, and canopy) and with decreasing divergence in diet. In conclusion, we introduced and validated a new and general method for calculating species co-occurrence and illustrated its practical use.

CORRELATES OF POLLEN THERMOTOLERANCE

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Pollen is one of the most temperature-sensitive stages in the plant life cycle. Yet, little is known about the drivers of pollen thermotolerance i.e. minimum, optimum and maximum temperatures of pollen germination (PG) and pollen tube growth (PTG). To address this gap, we compiled a dataset on cardinal temperatures for PG and PTG for 210 species representing 132 genera and 60 families occurring worldwide. Each species was characterized in terms of its phylogeny, climatic niche, growth form, pollination type, flowering phenology, height, and cultivation status. The data were analyzed with the help of linear mixed-effect models; the phylogenetic signal in the trait data was estimated using Bloomberg's K-statistics.

We detected a weak yet significant phylogenetic signal in all the temperatures for PG and PTG suggesting that closely-related taxa tend to share similar temperature requirements. At the population level, the temperature thresholds displayed comparatively lower variability of maximum temperatures as compared to their minimal counterparts suggesting low adaptability of pollen performance to rising temperatures. At the interspecific level, species growing in colder climates had significantly lower temperature requirements than species in warmer regions; this relationship was particularly strong in the cultivated species. The most striking result in this part of the analysis was that in the tropics pollen performance is already close to its physiological optimum that, most likely, will lead to a considerable reduction in crop yields with the increasing temperatures.

We conclude that further studies on pollen thermotolerance are needed to provide more reliable estimates of the effects of global warming on seed and fruit production.

POPULATION TRENDS OF TROPICAL INSECT POLLINATORS AFTER 10-YEARS OF MONITORING ON BARRO COLORADO ISLAND, PANAMA.

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In the last decades, anthropogenic activity has been responsible for a strong decrease in abundance and diversity of insect pollinators, which may result in a future pollination crisis event. The number of long-term studies addressing the anthropogenic and climate change impact in tropical insect pollinators abundance is scarce in comparison to their temperate zone counterparts. Since the tropics hold most of the angiosperm's plants in the world and most of them are pollinated by insects, data should be gathered to ensure the diversity and conservation of the most species rich forests on the planet. Here, we studied the population dynamics of tropical insect pollinators by modeling species abundance over the last >10 years. For this purpose, we used demographic census data from 25 species (5 species of beetles, 10 species of butterflies, and 10 species of bees) of the most abundant insect pollinators collected by the ForestGEO initiative between 2009 and 2021 as part of their long-term insect survey in the moist tropical rainforest of the Barro Colorado Island (Panama). Our group of species is represented by different levels of specialized pollination, from the specialized beetles of the genus *Cyclocephala* (Coleoptera: Scarabaeidae) to the generalist bees of the genus *Megalopta* (Hymenoptera: Halictidae). Preliminary analyses show a stable or slightly increase in abundance for most species though time, with few species showing a slight decrease in the last 10 years. Understanding pollinator's demographics is a powerful tool assess priority in species conservation efforts.

SPATIOTEMPORAL PATTERN OF SPECIALIZATION OF SUNBIRD-PLANT NETWORKS ON MT. CAMEROON

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A few studies from tropical Africa indicate that sunbird-plant networks are rather generalized. Unfortunately, these studies are limited to dry seasons and high elevations at the tree line, environments where niche-based hypotheses also often predict lower resource partitioning. In our study, we explored the specialization of sunbird-plant networks and their spatiotemporal variability on Mt. Cameroon (Cameroon). Using a combination of automatic video recordings and personal observations, we constructed eight comprehensive sunbird-plant networks in four forest types at different elevations in both the dry and wet seasons. As reported in previous studies, the montane forest plants, birds and whole networks were highly generalized. Nevertheless, we observed a much higher specialization in forests at lower elevations. Except at the lowest altitude, the wet season was also characterized by higher specialization. While less specialized flowering trees dominated in the dry season networks, more specialized herbs and shrubs were visited by birds during the wet season. As our findings do not support the generally accepted assumption that Old World bird-plant networks are rather generalized, we need further studies to understand the differences in bird-plant specializations on individual continents.

LIGHTER AND LESS STRUCTURED PRIMARY FORESTS HOST MORE HERB SPECIES

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Nature conservation in the Carpathians focuses on primary forest remnants as biodiversity hotspots. They are recognized by complex structural qualities such as tree size heterogeneity, dense canopy, or occurrence of ancient trees. Studies from managed forests suggest that complex structure increases the herb layer diversity. However, it is unclear if such a relationship takes place also in primary forests, where the structure is not driven by the time since anthropogenic impacts. We have tested the effect of structural complexity, light conditions, and canopy disturbances on the herb vegetation composition and richness on 150 plots in primary beech forests across Slovakia. The overall species richness is declining with the decrease of available light in the understory and this decline is true also for the richness of forest specialists, although their proportion to the other species is growing. Interestingly, we did not find any effect of canopy continuity or time since the last disturbance on the plot on the forest specialist's proportion. Our results suggest that, in contrast to managed forests, the richest stands of primary forests are characterized by relatively low structural complexity and much available light, and this is true also if only forest specialist species are considered. The positive relationship between structural complexity and herb richness in managed forests may thus reflect development towards more natural states rather than the general ecological rule.

LARGE-SCALE DISTRIBUTION OF OPEN-CANOPY FORESTS REFLECTS HISTORICAL SETTLEMENT PATTERN

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Activities like coppicing, grazing and litter raking left long-lasting footprint in forest community structure, composition, and diversity. Therefore, some authors speculate that current distribution of open-canopy forests reflects the historical disturbance pattern. However, there have been no studies supporting this hypothesis on the large spatial scale until now. We utilized the results of extensive habitat mapping conducted in the whole area of Czech Republic and tested the relation of oak-hornbeam and acidophilous oak forests distribution with natural conditions and spatial pattern of human settlements. We found that the probability of open-canopy forests occurrence increases with accessibility from settlements of various age and continuity. This effect was largely consistent for both communities across the whole study area and across different types of settlements (hillforts, villages, and towns). Further, in detailed view, there were some differences between oak acidophilous forests and oak-hornbeam forests. Most importantly, oak-hornbeam forests were more connected to old settlements while acidophilous oak forests tended to occur more in the vicinity of new settlements. Acidophilous oak forests also occurred mainly on continuously forested land. To sum up, our analysis shows permanent human footprint in the heterogeneity of forested landscape at large spatial scale.

LONG-TERM FLUCTUATIONS OF PLANT POPULATIONS: ARE THERE ANY CLUES ABOUT THEIR MECHANISMS

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Abundance fluctuations are ubiquitous phenomenon in population biology. Any long-term monitoring of plant populations shows fluctuations in population sizes, although their causes are often unclear. We used a 35 years long data on numbers of individuals in permanent plots in a mountain grassland to determine how common such fluctuations are, whether they are spatially correlated, what are typical time scales at which they are found, and to search for general mechanisms behind these fluctuations. As spatial correlation is the key signature of environmentally driven abundance fluctuations, we specifically searched for spatially uncorrelated fluctuations which are likely to be due to different drivers than climate. We used Fourier analysis of their time series to find their typical time scales. Finally, we are asking whether spatially uncorrelated species increases or declines are exponential in nature. Cases of exponential increase are likely to be driven by short-term releases of population control and loss of density-dependence and thus loss of negative feedback in species abundance. Our data show that such events constitute majority of species increases. Similarly, exponential decreases is likely to be driven by a sudden appearance of such controlling agent; however in contrast to increasing events, declines are typically are not exponential, indicating still a different mechanism.

IMPACT OF WARMING ON DROSOPHILA - PARASITOID NETWORKS: CONNECTING FIELD AND LABORATORY ECOLOGY

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We address the response of ecological networks to warming predicted with climate change using a model system in which we can link fieldwork and laboratory experiments. We first studied *Drosophila*-parasitoid networks in the field in Australian tropical rainforest and found that parasitism rate increases towards low elevations. We then took the component species to laboratory to conduct experiments. We found that parasitoids do best at temperatures similar to low elevation temperatures in the field, but that further increase in temperature leads to marked decline in parasitoid performance. In a second experiment we asked whether community context can reduce negative impacts of warming on timing of species interactions. We found that presence of alternative host can lead to better parasitoid persistence. Therefore, efficiency of biological control by parasitoids is at risk due to climate change, but we can partly offset this negative effect by encouraging presence of alternative hosts.

We continue to develop the study system to address fundamental questions in community ecology and evolution, including link between network structure and function, eco-evolutionary dynamics, and maintenance of species diversity in communities and genetic variation in populations.

RESERVOIRS OF THE CRAYFISH PLAGUE PATHOGEN AND ITS DIVERSITY IN CZECHIA AND CENTRAL EUROPE

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The causative agent of crayfish plague, the oomycete *Aphanomyces astaci*, is one of the most studied pathogens of aquatic invertebrates. It co-evolved with North American crayfish, which act as its chronic vectors. Crayfish plague has been affecting crayfish in Europe since the 19th century. The widespread presence of invasive American crayfish at this continent is nowadays the major driver of further declines of the native species. In the last decade, with the development of new molecular methods, we can not only screen for *A. astaci* presence, but also reveal pathogen genotypes involved in mass mortalities and chronic infections of carrier crayfish. Due to substantial introduction bottlenecks, *A. astaci* genotypes in Europe seem to be associated with original North American hosts, with which they were brought. Hence, the genotype assignment helps us to track the source of infections. However, in the regions with mutual contact of different American crayfish species, interspecific transmission of *A. astaci* may occur, making the dispersal pathways of the pathogen unpredictable. In the presentation, I will highlight the current situation with crayfish plague in Czechia, including the *A. astaci* diversity and its spatial and temporal prevalence. I will contrast these results with those from urban waters in Budapest, a European hotspot of alien crayfish diversity.

INTERACTIONS BETWEEN PLANTS, HERBIVOROUS INSECTS AND PREDATORS: MECHANISMS AND ECOLOGICAL IMPORTANCE

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Plant-animal interactions and plant chemical defence systems are the cornerstone of ecology and are of particular interest because together they shape terrestrial ecosystems. Despite this, the induced chemical defences of plants that attract insectivorous predators to deter arthropod herbivores (the 'Cry For Help' hypothesis) and their effect on bottom-up and top-down control have not yet been fully elucidated. We, therefore, conducted several complementary manipulative experiments in the field and in aviaries to assess the role of each trophic level in tri-trophic interactions. Our approach included artificial induction of plant defence systems using the plant hormone methyl jasmonate or actual herbivore damage, plasticine caterpillars assessing the attractiveness of induced plants to birds and other insectivorous predators, and comprehensive analyses of arthropod communities. Overall results of our research proved, among others, that: (i) Even birds with small olfactory bulbs (Great and Blue tits specifically) can smell and be guided by odours in various contexts of life; (ii) Birds can smell plants damaged by herbivorous insects; (iii) Birds can also distinguish between chemical and visual signals provided by herbivory-damaged plants; (iv) The use of methyl jasmonate as an inducer of plant chemical response seems to be an appropriate tool in manipulative experiments; (v) Conspecific tree species with advanced chemical defence communicate via volatile compounds.

GLOBAL CHANGE AND SPECIES INVASIONS IN SIMPLE COMMUNITIES: A MODELLING STUDY

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Environmental filters and species traits underpin invasion success of new species and their effects on local communities. Invasion frequency is predicted to increase with global change, yet we lack predictions on how species invasions interplay with food web responses to global change. Here, we use biomass-based models of community dynamics parameterized with empirically derived values to investigate how body size and trophic position of the invading species modulate the impact of invasion on community structure and stability across gradients of habitat productivity, warming and size structure. We study four classic food web modules consisting of two resident species and an invader: trophic chain, apparent and exploitative competition, and intraguild predation. We show that food web topology and community size structure jointly determine how communities respond to new invaders and how these responses change across environmental gradients. We predict that smaller invading species will be favoured under competitive interactions, whereas invading predators will benefit from size asymmetries between trophic levels. We also show that invasions may not only cause community collapses but also increase community resilience.

EFFECTS OF LOCAL AND LANDSCAPE FACTORS ON SPIDER-INSECT PREY FOOD WEBS IN MANGO ORCHARDS

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Landscape structure together with different farming management practices affect trophic interactions in local communities, which may alter ecosystem functioning and services such as biological control of pests. Many studies have investigated how local and landscape factors effect on the taxonomic and functional diversity of natural enemies, but the relative importance of changes in predator-prey interactions between these scales are poorly understood. Here, we addressed this gap of knowledge by sampling arthropods in 15 mango orchards of similar age (5–10 years) in different farming managements (organic and conventional), landscape composition (habitat types), configuration. During the season, we sampled arthropods with sweeping, sticky traps, beating for mango trees and leaves. We then measured the traits of spiders (body size and hunting strategies) and herbivory. We found that local factors and landscape components significantly affected the densities of spiders with decreased pest densities and reduce herbivory.

THE IMPACT OF ANTS AND VERTEBRATE PREDATORS ON ARTHROPODS AND PLANTS: A META-ANALYSIS AND A CASE STUDY

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Theory predicts that predators increase plant biomass by feeding on herbivores. However, it remains unclear whether different types of predators regulate herbivores to the same degree, and how intraguild predation impacts these trophic interactions. Specifically, we lack a more comprehensive look at the effects of various groups of predators on a global scale. Here we report a meta-analysis of 486 experiments on the effect of insectivorous vertebrates (birds and bats) and ants on abundances of predatory (spiders, ants, others) and herbivorous (chewers and others) arthropods; on arthropod richness and plant damage. Generally, the absence of vertebrate predators led to the increase of predatory arthropods by 18%, herbivorous arthropods by 75%, and plant damage by 47%. In contrast, after the removal of ants, the increase in the abundances of other predatory arthropods did not compensate for missing ants, herbivore arthropods increased their abundances by 53%, and plant damage increased by 146%. Further, we conducted an 8-month long standardized exclusion experiment along a latitudinal gradient spanning from Japan to New South Wales, and further investigated the trophic cascades not only in forest understory, but also in forest canopies and only partly confirmed the findings from the meta-analysis.

ENIGMATIC CONSUMERS ON GLACIERS: UNCOVERING CARBON AND NITROGEN STABLE ISOTOPES OF TARDIGRADES AND ROTIFERS FROM CRYOCONITE HOLES

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Tardigrades and rotifers are dominant consumers in currently the coldest biome on the Earth – glaciers and ice sheets. These small invertebrates live in cryoconite holes which are small water-filled ponds on the glacier surface (supraglacial environment). Cryoconite holes host organisms from microbes (e.g., cyanobacteria, algae) to invertebrates such as tardigrades and rotifers and often are considered as hot spots of supraglacial biological activity. Several studies highlighted the importance of cryoconite consumers, their high filtration rate, and their potential impact on microbial community structure. The position of these small consumers in the cryoconite trophic food web, and their food preferences are however still far from understood. We present results on the carbon and nitrogen stable isotopic composition of tardigrades, rotifers, and organic matter (OM) from cryoconite holes from alpine and polar glaciers. We aim to pioneer the field of tardigrade and rotifer position in the cryoconite food web. This is a necessary step in developing a better understanding of their role in nutrient cycling and glacial stoichiometry. Our data revealed that both consumers differed in $\delta^{15}\text{N}$ which likely signifies differences in their trophic position. The $\delta^{13}\text{C}$ values showed similarities between animals from similar glaciers and similar parts of the ablation zone. The $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values of OM in cryoconite used as a reference to potential food for consumers revealed that the consumers probably prefer only some compounds of OM.

PLANT–MICROBIAL–SOIL INTERACTIONS AS DRIVERS OF ECOSYSTEM C AND N CYCLING

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Plant–microbial–soil interactions drive the C and N cycling in ecosystems. The interactions are mediated through the flux of fresh photosynthates from the living roots (rhizodeposition) and via the carbon (C) fluxes from the litter decomposition, which supply substrate/energy to soil microorganisms. They transform the inputs together with preexisting soil organic matter (SOM) and release available forms of nutrients strongly limiting plant productivity. In this way, heterotrophic microbial activity feeds back on plant nutrition and system productivity. The input/quality of rhizodeposition and litter are regulated by factors which impact plant growth and biomass allocation. Both are recognized as key components of plant economic strategies allowing them to influence SOC dynamics and regulate nutrient cycling. In general, fast-growing acquisitive species are associated with larger rhizodeposition and faster microbially-mediated SOM mineralization, which feeds back in larger nutrient supply to plants compared to slow-growing conservative plants. The system dominated by acquisitive vegetation is highly dynamic, with faster soil processes and pronounced seasonal plant–microbial nutrient redistribution. The conservative vegetation is associated with lower rhizodeposition and production of less decomposable litter. The plant–microbe relationships are less-coupled in time and space, relying mainly on the slower microbial SOM mineralization, which results in larger soil C storage.

ORCHID-MYCORRHIZAL FUNGI NETWORKS ARE MORE SPECIALIZED IN MEDITERRANEAN THAN IN CENTRAL EUROPE

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Orchids are known to form complex networks of interactions by associating with numerous orchid mycorrhizal fungi (OMF), mainly from Tulasnellaceae, Ceratobasidiaceae, and Serendipitaceae families. These bipartite networks may differ in architecture according to the specificity level of each partner: the modular network (dominated by highly specific interactions) and the nested network (dominated by generalist interactions with low specificity). Although there is evidence about the influence of biotic factors (e.g., level of specificity) on the network structure, there is still a lack of studies demonstrating the effect of abiotic factors on bipartite networks. Climatic conditions (e.g., annual temperature or precipitations) could influence the network architecture by creating different stress levels on orchid species that would further influence their specificity toward fungal partners. To understand the potential influences of both biotic and abiotic conditions on orchid-OMF networks, we identified the OMF communities of 17 orchid species from two different climatic regions (Czechia and Southern France) by using next-generation sequencing and we analysed the architecture of four orchid-OMF networks. Our results showed that OMF communities differ across co-occurring orchid species within each sampling site, with orchid species sharing more OMF within Czech sites compared to French ones. In general, the networks across all sites were significantly nested and modular but more modular in Southern France than in Czechia. These results may suggest that orchids' specificity towards their OMF partners may increase under higher hydric stress observed under a Mediterranean climate with a longer drought season.

NATURAL EXISTING ARBUSCULAR MYCORRHIZAL-BACTERIAL BIOFILM ASSOCIATIONS AND THEIR FUNCTIONAL BEHAVIOR

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In mutualistic symbiosis with host plant, arbuscular mycorrhizal fungi (AMF) access the carbon stored in the roots in exchange for increased uptake of nutrients and water from the soil. In the mycorrhizal-plant symbiosis, AMF-associated bacteria (AAB) serve as a third partner and are tightly linked to AMF. AAB are involved in mycorrhizal activity and nutrient uptake enhancement and have a direct or indirect impact on plant development. In order to create innovative biofertilizers for sustainable crop production, it is important to understand the function and process of this inter-kingdom natural coexistence. In our research, we used in vitro and in situ co-cultures to screen 33 different AMF species, and we characterized 231 AABs using 16S rDNA analysis. 109 selected AABs were examined for ten functional qualities that promote plant growth, and it was found that different bacterial strains had a variety of advantageous traits. The association of AABs was seen as biofilm and endobacteria using microscopic methods. Further, by using an in vitro assay system, an association recreation of 12 AAB-*Rhizophagus irregularis* was investigated to look at the impact on mycorrhization and functional capabilities. It was observed that AABs moved along the developing *R. irregularis* hyphae and spores. Different AABs had an impact on the AMF's development as well as its capacity to form biofilms, solubilize phosphate, and fix nitrogen. We discovered both the synergistic interactions and partnerships between the two cross-kingdom microbial partners. Understanding the molecular elements of these fungal-bacterial connections, which will enable their later use and modification for sustainable agriculture practices, is another area of focus.

INSIDE THE LEAF MICROBIOME: HOW TO QUANTIFY THE EXTENT OF FOLIAR ENDOPHYTE COLONIZATION?

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Quantitative estimates of the overall colonization extent by endophytic bacteria and fungi are still scarce, although they can serve as a useful proxy for the assemblage-level growth, turnover, and biomass of endophytes, as well as nutrient availability or the availability of space for colonization within the leaf endosphere. Here, we tested the bacteria-specific 16S primer pair 335F/769R and the fungal β -actin targeting primer in quantifying foliar bacterial and fungal endophyte colonization by qPCR using samples with high host plant DNA content. We used four phylogenetically distinct model plant species growing at different stages of vegetation succession at a mining reclamation experimental area (Sokolov, Czech Republic). Our results indicate that the extent of colonization by bacterial and fungal foliar endophytes is governed by different mechanisms and that these are host plant species-specific, as are the relationships between the endophyte colonization levels and foliar tissue stoichiometry. The extent of bacterial colonization was significantly higher and the fungi : bacteria ratios significantly lower in fast growing pioneer plants compared to the climax or expansive plant species, and no significant effect was observed regarding the ecosystem development stage on the colonization levels. We argue that this high-throughput, relatively low-cost approach can improve the interpretation of descriptive data on endophyte community composition generated by next generation sequencing in many field-based studies.

ELEVATIONAL PATTERNS OF SPECIALISATION IN POLLINATION NETWORKS IN RAINFORESTS OF MOUNT CAMEROON

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By the latitude-niche hypothesis (LNH), specialisation of interactions was predicted to increase with prevailing of biotic interactions importance over abiotic stress importance, i.e. towards the higher latitudes or higher altitudes. From the complete elevational gradient of Afrotropical rainforest on Mount Cameroon, West/Central Africa, we bring an unusually robust dataset of pollination networks from four different elevations (650 to 2,200 m a.s.l.) sampled during from both dry and wet season. The extreme local seasonality allows us to study also the temporal changes of the specialisation patterns along elevation. Our sampling covered all vegetation layers, from understory to canopies, as well as both day and night visitors. Altogether, we recorded 1,209 specimens of 217 plant species flowering at the studied communities, resulting in a >46,000 interactions with insect and vertebrate visitors. We confirmed the presumptions of LNH, because the network specialisation continuously decreased along elevation during the favourable conditions of dry season. Contrarily, during the extreme weather conditions of rainy season, no systematic pattern of specialisation was revealed.

NECTAR ROBBING AND THIEVING IN AFROTROPICAL RAINFORESTS: QUANTIFICATION, PATTERNS AND DRIVERS

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Conspicuous floral rewards can attract many non-pollinators, several of which can extract rewards without pollinating flowers, altering pollinator behaviour and affecting plant reproduction. Thieving visitors can easily extract the nectar in generalised flowers without touching stigmas or anthers. Floral traits that can exclude thieves, such as longer nectar tubes and fused petals may make such specialised flowers susceptible to robbers that pierce holes in flowers to reach nectar. However, the lack of community-wide studies of nectar exploitation across space and time makes it difficult to examine whether a trade-off between preventing robbing or thieving exists. Floral traits often mirror the energetic requirements and preferences of pollinators along elevational and seasonal gradients, which might also affect the frequency of cheaters. Using an extensive dataset for all flowering plants (194 spp.) in Afrotropical rainforest communities along a complete elevational gradient (650m – 2,250m) in the wet and dry seasons on Mount Cameroon, we analysed trends in the frequencies of cheaters and their floral trait associations. Of 14,391 recorded visits, ~4.3% were from robbers, and ~2.1% were from thieves. Cheaters were most frequent at mid-elevations, with more frequent robbing in the wet season and thieving in the dry season. We explored how the floral trait composition and trait associations of visitors suggest a trade-off between preventing nectar robbing or thieving.

FALLOWS AS A TOOL FOR BIODIVERSITY CONSERVATION AND RESTORATION

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The biodiversity of man-managed agricultural landscapes has changed substantially during last periods. Decline in species diversity is evident across all organismal groups, following the modern industrial way of agriculture. In the past, fallows have been used as a land that was allowed to lie idle during the growing season. Recently, the term “fallow” is used for 1) tilling land without sowing any crop or 2) the greening of tilling land by selected plants that benefit the environment. Farmers receive the green direct payment for the latter if they comply with the mandatory practices of greening. However, subsidies are not paid for land left without sowing any crop, i.e. fallow in the original sense, and no environmental measure exist for direct plant diversity support. To create small-scale top-soil disturbance by ploughing simulating arable land without chemistry application and sowing crops is possible rather in the nature protected areas, where the biodiversity conservation stand above the economic interests. In general, the ploughing lead to the appearance of common weed and ruderal species, including invasive ones, with low forage value for farmers and high risk of weed cummulation for neighbour farmland. On the other hand, some specialized endangered species can be supported. Fallow management can be effectively used as an easy tool to support disturbance-bound organisms, additional to grazing or alternative methods like military training grounds.

THE IMPACT OF AGRI-ENVIRONMENTAL MEASURES ON HABITAT SUITABILITY OF FARMLAND BIRDS

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Agri-environmental measures are one of the main tools of the EU's Common Agricultural Policy to counter the dramatic decline in the biodiversity of agricultural landscapes in Europe. However, their effectiveness has been questioned, as it varies for different taxonomic groups and depends on other factors such as agricultural management and the wider landscape context. Understanding which factors influence the effectiveness of agri-environmental measures is key to maximizing their positive impact on biodiversity. This presentation summarizes preliminary results from the European project BESTMAP (Horizon 2020), in which we investigated the effect of five groups of agro-environmental measures on the occurrence of selected farmland birds in two case study areas in Germany and Czechia. To do so, we used habitat suitability models based on field-level data (IACS/LPIS) on cultivated crops, farmland management and implemented agri-environmental measures, and data on environmental conditions in the wider agricultural landscape. Subsequently, we evaluated scenarios simulating how habitat suitability would change if agri-environmental measures were completely removed or, on the contrary, their area increased to the level preferred by nature conservation experts. The results indicate that some measures (e.g. vegetation buffers or grassland management) may be beneficial for most of the assessed species, while others have a diverse effect on different species at different spatial scales. Nevertheless, the current level of adopted agri-environmental measures is too low to significantly improve the habitats of farmland birds in agricultural landscapes.

DO WE KNOW HOW TO PROTECT THE LITTORAL ZONES OF FISHPONDS?

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Fishponds play a key role in current pondscapes in many developed countries. Many fishponds were impacted by the shift towards more intensive aquaculture and widespread eutrophication in the 20th century. These changes can undermine various ecosystem functions including the maintenance of aquatic and riparian biodiversity in the littoral areas. Here we analyse the changes of littoral areas of 46 protected and 20 unprotected fishponds in Czechia between the years 1950 and 2019. Protected fishponds had initially larger littoral areas than the unprotected ones, and the difference persisted over time. However, littoral areas decreased markedly in 38 protected and all unprotected fishpond categories, especially during the second half of the 20th century. Within protected fishponds, the trend was unaffected by the reserve establishment year, fishpond area and conservation target. Our results suggests that legal protection did not prevent the initial catastrophic loss of littoral areas and facilitated only modest recovery in recent decades, with negative implications for long-term maintenance of aquatic diversity. We conclude that littoral areas of fishponds urgently need effective protection. This would require a paradigm shift towards less intensive fish stock management, more frequent summer drainage, and effective reduction of all nutrient inputs to increase the water quality. Such measures can help recover the littoral areas and the associated biota.

RESISTANCE AND RESILIENCE: IT IS MUCH EASIER TO DESTROY SPECIES RICH MEADOW THAN TO RESTORE IT

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Stability of a community affected by an external perturbation consists of its resistance (ability to remain in the original state when facing the perturbation) and resilience (ability to return to its original state afterwards). We studied the two facets of stability in a species rich meadow community (Ohrazení site, up to 40 species per m²), originally mown and unfertilized, when subjected to change in management regime. Resistance was characterized by species composition change in response to regular fertilization with NPK fertilizer, abandonment of mowing and removal of the dominant species, *Molinia caerulea*, starting in 1994; resilience by return to the original species composition after cessation of fertilization and re-introduction of regular mowing on 2016. The dominant removal plots were kept without *Molinia* even after 2016. Regular monitoring during all the years provided species composition (and species richness).

The species composition changed rapidly after the introduction of the treatments; both cessation of mowing and introduction of fertilization led to pronounced decrease of the species richness, particularly fast in fertilized plots. Dominant removal had much smaller effect. The return to the original species composition has been slower, particularly in the fertilized plots. This slow return (i.e. low resilience) can be partially caused by increased levels of soil phosphorus, remaining elevated even five years after the fertilization was stopped (2021).

RECOVERY OF ECTOMYCORRHIZAL FUNGI COMMUNITY AFTER FOREST DIEBACK ALONG VEGETATION REGENERATION

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Between 2004 and 2008, a forest dieback in the Plešné lake watershed (Šumava Mts., Czech Republic) caused by bark beetle outbreak resulted in >90% loss of Norway spruce trees accompanied by a retreat and change in the community composition of ectomycorrhizal fungi (EMF). The advance of natural forest regeneration is variable due to the legacy of pre-disturbance forest structure and microsite heterogeneity. Thus, a gradient from open sites with retarded regeneration, through places with high density of young trees to fragmented remnants of survived mature forests occurs within the catchment. We asked whether is the forest regeneration mirrored by EMF recovery. In 2019, we sampled soil DNA at 41 sites within the catchment and identified soil fungal community composition. We found out that the relative representation of EMF within the fungal community ranged from ~2% in the plots with the least successful regeneration to >70% in the survived forest fragments. The EMF proportion was positively related to amount of survived (or grown-up) mature trees and/or regeneration density. In contrast, the EMF species composition was not substantially and unequivocally driven by the grown trees and regeneration counts. Within this highly heterogeneous catchment ecosystem, EMF community composition is probably determined by micro-site specific properties including pre-disturbance state and history rather than sole stand progression within the forest-life cycle.

NICHES OF PANNONIAN HALOPHYTES DIFFER BY SALT TYPES

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The Pannonian region is home to diverse salt-affected vegetation. While soil salinity and moisture are the main factors driving its species composition, the type and amount of salt may also affect plant occurrence. However, few quantitative studies have explored how species respond to salinity and salt composition in these habitats.

We studied the species' niches of Pannonian salt-affected vegetation and asked: (i) what are the characteristics of species' responses with respect to soil salinity, pH, and the ions contributing to salinity, (ii) which ions contribute most to the overall variance and, (iii) are most important for the occurrence of single species. We recorded species composition in 433 plots and collected soil samples in each of them. We measured pH, salinity, amounts of Ca²⁺, Cl⁻, CO₃²⁻, K⁺, Mg²⁺, mineral N, Na⁺, and SO₄²⁻ and calculated the sodium adsorption ratio (SAR). We fitted species response curves for each variable, analyzed the variance of ions contributing to salinity, and calculated their importance for single species.

Na⁺, SO₄²⁻, Cl⁻, and CO₃²⁻ have the highest variances in our data and are correlated with salinity, SAR, or pH. Pronounced halophytes all occur in Na⁺- and SO₄²⁻-rich soil but either have broad niches with respect to Cl⁻ and CO₃²⁻ or are limited to Cl⁻ (eg., *Salicornia perennans*), or CO₃²⁻-rich (eg., *Suaeda pannonica*) soil. In comparison, species of subsaline steppes have broader niches in low to mid ranges of Na⁺, SO₄²⁻, Cl⁻, and CO₃²⁻.

DIFFERENTIAL MACROEVOLUTIONARY TRENDS SUPPORT VARIOUS ASPECTS OF CHEMICAL DIVERSITY IN LOWLAND AND HIGHLAND WILLOW SPECIES

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Plants produce astonishing diversity of defensive metabolites in response to insect herbivores and abiotic stress. To find the underlying mechanisms behind the variation in plant chemistry, we need to understand how the prevailing selection pressures contribute to their concentration, richness and variation between plant species. Species-rich plant genera with broad elevational ranges are ideal model systems for studying the macroevolution of defences in plants experiencing different environmental conditions. Here, we studied willow species growing at different elevations and explored the macroevolution of their defences. Our results show that not only they invest into different traits but also that they show differential macroevolutionary trajectories in their chemistry. Lowland environments promote divergence, enhancing variation in chemical composition among willow species. Contrastingly, highland environments filter willows towards reduced chemical variation and support macroevolutionary increase in concentration and richness of metabolites important for survival at high elevations. In turn, our results show how countervailing trends in abiotic and biotic stresses generate various aspects of chemical diversity, explaining the complex trends in plant chemistry along major ecological gradients.

CAN HERBIVORE TRAITS PREDICT THE SPECIFICITY OF INDUCED PLANT RESPONSES?

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Plants have evolved various defenses to cope with herbivores. As a result, different herbivores often show differential responses to plant strategies – a defense acting against one herbivore can fail to affect another one. Therefore, deploying herbivore-specific responses can make plant defenses more efficient. Here, we measured which insect traits drive response induction in *Salix fragilis*. We exposed 149 plants to 24 herbivore species naturally associated with the crack willow. The insects belonged to different orders and feeding guilds and show different levels of specialization. Following herbivory, we quantified changes in volatile and non-volatile leaf metabolites. We then analyzed the correlation between herbivore order, feeding guild, specialization, chewing damage, and induced responses. Variation in volatiles was best explained by chewing damage and insect order, with Coleoptera and Lepidoptera eliciting different responses. The specificity observed in volatiles could potentially inform specialized predators or parasitoids. In contrast, responses in non-volatile metabolites were far less specific. Most of the non-volatile metabolites were downregulated, possibly indicating that plants redirected their resources from leaves irrespective of herbivore identity causing the damage. Our results show that diverse responses to herbivores can contribute to the diversity of defensive strategies plants employ.

BROWSING PRESSURE AND SHRUB SPECIES RICHNESS IN DIFFERENT HABITATS OF THE KRUGER NATIONAL PARK

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The association between herbivores and vegetation is among classical topics in savanna ecology. This topic has rarely been explored on a small, biological-community scale based on complete diversities of both groups rather than selected species of herbivores and plants. We continuously recorded the presence of large mammals using camera traps in Kruger National Park, South Africa. This was done in a set of 60 plots, 50 × 50 m in size, distributed along a water availability gradient to cover a range of savanna habitats in KNP: plots at (i) perennial water sources, (ii) seasonal rivers, and (iii) on crests, areas at least ~5 km away from any water source. Complete plant species lists, with data on their abundances expressed as percentage cover, were recorded in the same plots. This study system thus allows us to assess the impact of disturbances by elephants and other browsers in different water availability conditions. We predicted that seasonal river habitats, experiencing less browsing pressure than perennial sites, while getting more water than crests, would harbour the greatest diversity of shrubs, a life form most exposed to the impact from browsers. In this paper we test the effect of elephants and other browsers on species richness and abundance of shrub vegetation at the community scale. We explore the validity of the intermediate disturbance hypothesis for shrubs and analyse how the shrub community responds to the variation in browsing species' presence.

HABITAT AND BEDROCK MODIFY PLANT-HERBIVORE RELATIONSHIPS IN A SOUTH-AFRICAN SAVANNA

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How grazing interacts with environmental conditions in determining grass species richness and abundance in savanna is still insufficiently understood. In Kruger National Park, South-Africa, we recorded grass species and their covers in 60 plots of 50 × 50 m, selected to account for varying water and nutrient availability, thus located (i) near perennial rivers, near seasonal rivers, and on crests distant from all waterbodies, and (ii) on nutrient-rich basaltic and nutrient-poor granitic bedrock. The presence and abundance of large herbivores was recorded by 60 camera traps located in the same plots. Grass cover decreased significantly with grazer abundance and differed between habitats, with plots at crests showing the highest cover and plots near perennial rivers the lowest. The relationship between grazer abundance and grass species richness changed with the type of habitat; it was positive on crests but nonsignificant at both seasonal and perennial rivers. Similarly, the relationship between grazer species richness and grass species richness was positive on crests and on basalts, but negative near seasonal rivers. We suggest that the positive effect of grazer richness and/or abundance on grass species richness is due to grazers suppressing dominant grass species. In contrast, the decrease in grass species richness with grazer species richness at seasonal rivers indicates that the high grazer impact over-rides the resistance of some species to grazing and trampling.

NO EVIDENCE THAT WOLF HUNTING REDUCES LIVESTOCK DAMAGES IN SLOVAKIA

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Lethal interventions are among the most controversial issues within the large carnivore management and conservation toolbox. Variation in the legal status and management of grey wolves (*Canis lupus*) across European countries provides a good opportunity to test the effectiveness of different approaches, including whether current lethal management practices reduce livestock losses. In this study, we aim to evaluate the influence of a wolf-hunting scheme, justified in part by livestock losses, and based on annual hunting quotas, on livestock depredation levels in Slovakia, before June 1, 2021, when wolf hunting was banned. Wolves here feed predominantly on wild ungulates (97.7% consumed biomass; with domestic sheep comprising only 0.55% of the wolf diet), but the sheep were dominant among the reported domestic animal kills (90.1% of killed animals). We analysed the relationship between annual livestock damages caused by wolves at district level between 2014 and 2019 and the number and proportion from the total estimated wolves killed in the previous hunting season. We did not find a relationship between the number of killed wolves and livestock depredations, but a negative relationship between wild prey biomass and livestock depredations. Our results show that the old justification for wolf hunting quotas to reduce livestock depredations is not supported.

THE FIRST INSIGHT INTO HUNTING AND FEEDING BEHAVIOUR OF CARPATHIAN LYNX

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In Europe, the Eurasian lynx (*Lynx lynx*) has suffered from intensive persecution due to competition with hunters, resulting in its extermination in the late 19th century. Restoration of suitable prey and conservation efforts allowed the lynx to recolonize its historical range. Understanding the predation patterns of one of the European top predators is crucial for setting appropriate conservation and management measures. Using GPS telemetry data from three resident lynx males in combination with camera-trapping and snow tracking, we estimated kill rates, feeding and searching time and we compared lynx impact to human harvest on wild ungulates. The average annual kill rates were estimated to 65, 73 and 81 ungulates/year and 28%-30% of kills were parallel. Despite the high annual kill rates, we assume two lynx males have moderate or negligible impact on game management. Male lynx annual kill rates were equivalent to 8.59% (19.73% roe deer, 2.48% red deer, 0.32% wild boar) of the average annual human harvest within lynx home ranges. We provide the first insight into hunting and feeding behaviour of the Carpathian lynx.

THE ROLE OF AMONG-INDIVIDUAL DIFFERENCES IN BEHAVIOUR FOR PREDATION BY SPIDERS

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Spiders are among the most important invertebrate predators. However, there are gaps in our understanding of foraging behaviour of spiders and their impact on prey communities. One of the main open questions is whether consistent differences in behaviour among individuals, i.e. personality, affect their interactions with prey and their impact on prey abundance and community composition. We conducted a series of experiments with the nursery web spider, *Pisaura mirabilis*, to shed light on these issues. In lab experiments, we detected consistent differences in behaviour among individuals, in line with the concept of a bold-shy continuum of behavioural types. We then tested the consequences of among-individual differences in boldness for foraging behaviour of spiders in lab experiments and for their impact on prey communities in outdoor experiments. We found evidence that “bold” spiders have a higher foraging rate compared to “shy” spiders. In a field experiment conducted in cages placed in natural vegetation, we found that when multiple spiders forage together, the combination of behavioural types in the group (either 4 shy, 4 bold, or 2 bold + 2 shy) affected the weight gain of individual spiders. We also revealed the impact of the presence of spiders on the total abundance, biomass, and composition of prey communities. Overall, our experiments demonstrate that individual-level behavioural traits of spiders play an important role in predator-prey interactions.

POSTER SESSION

FUNCTIONAL ANALYSES OF BENTHIC DIATOMS IN BROWNISH FOREST LAKES, HUNGARY

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Among small waters of Hungary, numerous shallow lakes described by special features can be found, such as brownish forest lakes. Benthic diatoms as primary producers and well-known bioindicators are key organisms of the surface water. In this study, we used a trait-based approach to analyze the main environmental (physical and chemical variables, spatial factors) drivers which determine the diatom community structure. Different trait categories were applied: ecological guild, length\width ratio, the biovolume and the combination of these traits was also used. We worked on a data set comprising 174 diatom species, determined from 72 lakes of two regions. The most dominant ecological groups were the high and motile ecological guilds represented by the genera of *Nitzschia*, *Navicula*, *Eunotia*, *Pinnularia*, and *Gomphonema* species. Among the traits the large and middle cell size and middle length\width ratio were predominant in these forest lakes between 2014-2018. According to the NMDS analyses, regional differences among the lakes could be detected neither in case of the functional diversity indices nor the traits (individual and combined). Diatom composition based on the individual traits was primarily explained by Cl⁻ while the combined traits by Cl⁻ and pH. The highest share and pure effect of main variables (physical and chemical variables, spatial factors) was recorded in the case of combined traits and there was no significant effect of these variables on the functional diversity

DO SELFING RATES RISE WITH ELEVATION AS POLLINATOR ACTIVITY DECREASES IN AFROMONTANE GRASSLANDS?

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Self-compatibility and self-incompatibility in plants are usually not distinct categories but a continuum reflecting a plant reproductive strategy. Proportion of self-compatibility is known to change with latitude, as it is more favorable in harsh climatic conditions where the risk of not being visited by a pollinator increases. However, it is not much studied along elevation, especially in tropics, although the similar pattern towards higher elevation could be expected.

We studied the intraspecific variability in plant self-compatibility with rising elevation on Mount Cameroon to compensate the decline of pollinator activity.

Our study was performed in Afromontane grasslands above the timberline. We carried out hand-pollination experiments (four different treatments simulating autogamy, geitonogamy, outcrossing, and natural control) of seven flowering plant species growing along the elevational gradient. These treatments were carried out at four elevations across 1700 elevational meters (2300, 2800, 3500, and 4000 m a.s.l.).

Although we expected the general increase in self-compatibility towards higher elevations, the trend different among the studied plant species.

ROLE OF MOTHS IN NOCTURNAL POLLINATION OF FLOWERING PLANTS IN TROPICAL ECOSYSTEMS

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We reviewed the available knowledge on nocturnal pollination by moths in tropical ecosystems, evaluated their role, and pointed out the gaps in current research. Moths are relatively common visitors of flowers with nocturnal anthesis. Here we examine moths' adaptations for nocturnal foraging, especially the well-adapted olfactory and vision senses. Relatedly, there are several specialized floral traits to attract moths, often included in the moth pollination syndromes. The role of moths in pollination seems to differ on the species and the community level. Moths are relatively dominant visitors of flowers with moth-attracting floral traits (sphingophily or phalaenophily) within many plant families. In several cases of highly specialized plants, moths are even the only recorded visitors and/or pollinators. However, plants with moth pollination syndromes are uncommon in communities, and moths are generally infrequent visitors of flowers. Altogether, moths certainly play a significant role in the pollination of some plant species. Nevertheless, moths seem to be rather uncommon in comparison to many diurnal pollinators.

ANIMALS ON THE ROAD: A NEW BOOK ABOUT THE HUMAN-WILDLIFE CONFLICT ON ROADS

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This book presents a comprehensive overview of the issue of collisions between motor vehicles and wild animals (WVC) on transport infrastructure. It is an urgent topic, describing and explaining the conflict between human society and wildlife with examples from around the world, which has been escalating in the last decade with the rise of globalised transport. Czech and International police statistics provide an overview of animal mortality and data from citizen science. Millions of WVC take place every day on the global road network. It is estimated that up to 50% of the official WVC report with large ungulates can be underreported. Data on the roadkill of small animals are missing almost entirely in the official data. Crashes with large animals, usually ungulates, have fatal consequences for humans. Hundreds of people die in North America and Europe each year due to these crashes and thousands are severely injured. The problem of WVC has several sides: animals, motor vehicles, infrastructure designers and administrators and landscape planners. Animals move for many reasons across landscapes following green infrastructure. Therefore, those places where the green and grey infrastructures intersect are always critical. The negative impacts of traffic on wildlife are presented in the context of landscape change, the extent of the road network, the intensity and speed of passing vehicles, and species diversity.

The book answers questions such as how significant a problem for humans is collisions with animals? When and where do collisions occur most often? What are the consequences of collisions for vehicle crews? Where do the bodies of dead animals end up, and what are they used for? Are there solutions to this problem?

MULTIPLE PREDATOR EFFECT OF ARTHROPOD AND VERTEBRATE PREDATORS ON VITALITY OF PEAR TREES

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Both, invertebrate and vertebrate, predators can have positive or negative effect on tree vitality and physiology. However, there is limited number of studies investigating a multiple-predator effect between vertebrates and invertebrates and how it is affected by habitat structure in agroecosystems. We investigated how increased microhabitat complexity for invertebrate predators and exclusion of insectivorous bird and bats affect density of herbivores and vitality of pear trees. The study was conducted in four organic pear orchards. In each orchard, we selected 16 trees and divided them into four groups. Three manipulative treatments included: a) installation of cardboard bands on a trunk and branches to increase microhabitat complexity and enhance the abundance of invertebrate predators, b) exclusion of insectivorous birds and bats, c) combination of exclusion and cardboard bands. The fourth treatment was a control without any manipulation. We sampled arthropods, birds, and birds' prey from May to June 2022. We measured four physiological and vitality parameters of trees: a) defoliation, b) photosynthesis efficiency, c) leaf biomass and damage, and d) fruit weight and surface lesion. We expect that trees with cardboard bands and with access of vertebrate predators will have the highest vitality indicators as increased microhabitat complexity will reduce intraguild predation from birds on invertebrate predators and increase the complementarity between vertebrate and invertebrate predators.

THE EFFECT OF ENVIRONMENTAL VARIABLES ON THE DEVELOPMENT AND SURVIVAL OF *SYMPETRUM STRIOLATUM* LARVAE

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Several questions remain unanswered regarding Odonata larval hatching success and survival under different climate change scenarios. Therefore, laboratory rearing of larvae is an essential tool to study larval morphology, development, growth, and behaviour. However, no universal method for larval breeding exists.

We developed and tested a laboratory breeding system for the model species *Sympetrum striolatum*, with examination of environmental variables: water temperature, aeration, presence of artificial plant, and feeding frequency on egg hatching success, as well as development and survival rate of larvae.

We found a significant effect of water temperature and no effect of aeration on larval development rates and survival. The larvae benefited from the higher feeding frequency, but against expectation no positive effect of the presence of artificial plants was detected.

The results presented here reaffirm previous findings that research on environmental changes and biotop degradation needs to be done on terrestrial adults but inseparable on aquatic life forms such as larvae and eggs. Thorough understanding of the effects of environmental variables such as temperature on Odonata development and survival, in particular with regard to eggs and larvae, provides much information on specific biochemical, metabolic, and molecular mechanisms that underlie species community structuring.

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MODES OF EVOLUTION OF TISSUE ELEMENT STOICHIOMETRY IN CO-OCCURRING GRASSLAND HERBS

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Plant stoichiometry in aboveground tissues of angiosperms is strongly correlated with their phylogeny. However, macroevolutionary studies typically report that plant stoichiometry evolution has been constrained by an evolutionary pull towards an optimum value because plants require elements in specific quantities and proportions. If this pull has been strong, plant stoichiometry should not be correlated with phylogeny, however, this lack of phylogenetic signal is not usually observed in a lot of ecosystems. We examined the mode of evolution of plant stoichiometry traits on a set of 130 co-occurring angiosperm herbs from 33 families growing in a temperate semi-natural grassland. We found that all element contents (C, N, P, K, Ca and Mg) and their stoichiometric ratios (except for Ca:Mg) have been evolutionarily constrained but the strength of the evolutionary pull towards an optimum value differed between elements. Phosphorus and P:element ratios (especially P:Mg) were the most strongly evolutionarily constrained, while the evolution of Ca, Mg, Ca:element and Mg:element ratios (except for P:Ca and P:Mg) has practically followed a Brownian process. Our results indicate that elementomes of temperate grassland species are highly differentiated in Ca and Mg, but plants have maintained relatively stable P concentrations and P:element ratios in such ecosystems.

COMMON AMPHIPODS *GAMMARUS FOSSARUM* IN EASTERN CZECHIA ARE SEVERAL FREQUENTLY CO-OCCURRING SPECIES

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An increased number of invertebrate morphospecies were recently revealed as complexes of genetically divergent lineages. It is also the case of our most common amphipod *Gammarus fossarum*, which often prevails in stream macrozoobenthos. This species complex has particularly high diversity in the Carpathians, with local presence of numerous mitochondrial lineages of the Miocene age (up to ca 17 Ma old). We study the contact zone of some of these lineages in the westernmost Carpathians in eastern Czechia, focusing on their ecology and distribution at regional, local and microhabitat scales. We confirmed the existence of their effective reproduction barrier on both molecular and behavioral level. The syntopy or two or more *G. fossarum* lineages in the study region is very common, providing opportunity for their interactions and potential ecological differentiation. Distribution of common lineages within watercourse was significantly affected by the intensity of anthropogenic pressure in the surrounding landscape. However, lineage ratios in contrasting meso- and micro- habitats were comparable at the local scale. This frequent and temporally stable syntopy suggests existence of ecological mechanism promoting their coexistence. The differentiation of trophic niche or various sensitivity to common parasites may play an important role in the community assembly of these lineages, which are in fact reproductively isolated biological species with independent evolutionary histories.

SOIL DIATOM COMMUNITIES OF ILE AMSTERDAM, SOUTH INDIAN OCEAN

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Diatoms are widespread single-celled algae with an essential role in all ecosystems, including the terrestrial ones. They also belong among the most diverse groups of organisms in the sub-Antarctic region. The sub-Antarctic region comprises small and isolated islands set in the Southern Ocean. Ile Amsterdam, located in the warm part of sub-Antarctica, is one of the world's most remote islands. It is a small, geologically young volcanic dome surrounded by steep cliffs. Due to this geomorphology, permanent water bodies are restricted only to the caldera, and running water is almost absent on the island. The island's climate ranges from temperate to sub-Antarctic according to the elevation. This study shows the last piece of Ile Amsterdam's diatomological research. Following the research of freshwater and moss-inhabiting diatoms, this research brings information about the soil diatom communities. The analysis of 76 soil samples revealed 122 diatom forming specific communities according to the environment. Ten different communities were identified within the study, all with unique indicator species and species composition based on the different environmental conditions on the island. The soil diatom flora is as unique as freshwater and moss-inhabiting floras of Ile Amsterdam. It seems that moisture availability connected to the elevation, specific conductance and pH belong to the significant factors determining the species composition of each community.

EFFECT OF PLANT SECONDARY METABOLITES ON THE CATERPILLAR GUT MICROBIOTA OF MONOPHAGES AND POLYPHAGES

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Microbiota of insect herbivores has been extensively studied, but the role of plant secondary metabolites (SMs) has been neglected. As the main factor shaping the caterpillar gut microbiota (CGM) is the species identity, the response of the CGM to SMs may be species-specific. We aimed to determine how the CGM of polyphages and monophages reacts to SM in an artificial diet (AD). We hypothesized that the effect of SMs contained in the host plant would be smaller than that of non-native SMs, and that this effect would be more pronounced in monophages.

Seven polyphagous and two monophagous caterpillar species (from oaks) were fed by AD with tannin (oak-related compound), tannivin (artificial tannin-like compound), and salicylate (compound absent in oaks). The CGM composition of AD-fed individuals was compared with individuals fed by oak leaves, starved individuals, and AD enriched by microorganisms.

The responses of the CGM to SMs did not differ substantially between polyphages and monophages, contrary to our hypothesis. The CGM richness decreased on AD without SMs but was reestablished with the increasing SMs concentration. The CGM similarity between AD-fed caterpillars and AD increased with increasing SMs concentration, suggesting the recruitment from AD. Whether this microbiota is beneficial for the caterpillars (e.g. helps to degrade SMs), or the pathogens prevail as the concentration increases, remains to be resolved.

ELEVATIONAL AND SEASONAL INTRASPECIFIC DIFFERENCES IN TROPICAL MOTHS' SIZES ON MOUNT CAMEROON

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Bergmann's cline, which describes an increase of animal body size towards lower environmental temperatures, has been showed for ectotherms. Moths have shown various size patterns along temperature gradients in the few existing studies. However, intraspecific differences in sizes of moths along spatiotemporal temperature gradients are unknown from the Palaeotropics, which strongly constrain any general conclusions, or understanding of the responsible mechanism. We measured intraspecific differences in forewing sizes of 28 Afrotropical moth species, sampled in three different seasons along an elevational gradient on Mount Cameroon, West/Central Africa. A significant increase of size along the elevational gradient strongly prevailed (14 species) over a significant size decrease (5 species). Additionally, we found significant inter-seasonal differences in size for 22 species, mostly with longer forewings in the transition from wet to dry season, i.e. for species with caterpillars developing during the coldest season. We confirmed environmental temperature as a crucial factor for Afrotropical moths' sizes, prevailingly following Bergmann's cline. Nevertheless, an interactive significant effect of elevation and season on size was revealed for a third of the studied moth species. The responsible mechanisms can thus be assumed to be more complex.

ESTIMATES OF TRUE ARTHROPOD DENSITY IN BRYOPHYTES

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Bryophytes provide an ideal environment for a range of bryobionts and a food source for bryophages. As climate change alters the cover of bryophytes in the environment, these changes have an impact on invertebrate communities. Density of arthropods in mosses can be difficult to evaluate, since unbiased estimates cannot be made by any standard sampling method, including the sieving. Manual inspection is the only way to do it, although it is referred to as “dirty hard work”. Our aim was to quantify the attractiveness of individual bryophytes species for bryophages and bryobionts. At 42 localities, we collected 633 quadrates of moss layer with a size of 0.25 m². We gathered data for > 60 species of bryophytes and obtained > 7,500 invertebrates, including > 800 bryophages. We analyzed data for the 20 most common bryophytes (area > 1 m², occurrence in ≥ 10 quadrates) using GLMMs. *Campylopus introflexus* was the most preferred bryophyte for bryobionts but hosted low densities of bryophages. Bryophages and bryobionts densities did not correlate. The exception was *Pohlia nutans* preferred within both groups. Our results provide the first quantified comparison of the attractiveness of individual bryophyte species for arthropods.

MICROANNELIDS OF OAK-DOMINATED COPPICES OF THE PODYJÍ NATIONAL PARK, CZECHIA

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Coppicing is an ancient way of forest management. The mosaic of asynchronously harvested coppices has historically increased habitat diversity, providing open, more sunny stands in the early stage and more closed, shady ones later on. With the prevailing shift to closed-canopy high forest since the 18th century, the biodiversity of woodlands has declined. In 2016–2021, the Podyjí National Park Administration re-established 10 coppice stands at two sites near the villages Popice and Hnanice (South Moravia, Czechia). The effect of coppicing on small soil-dwelling annelids was unknown and was investigated in the present study. Three plots were delimited in each coppice stand re-established by logging and three plots in each adjacent neglected coppice. Data on soil chemistry were available, those on soil texture measured. One soil core per plot was taken in spring 2021. Microannelids (Enchytraeidae, Hrabellidae) were extracted by the wet funnel method and identified, confirmed by molecular barcoding if necessary. 21 species were found. The mean density for all plots was $43\,182 \pm 9\,918$ ind./m². Most individuals ($65,4 \pm 3,7$ %) were found in the 0-3 cm soil layer. The Hnanice site had a higher species richness, but no significant difference between re-established and neglected coppices was found. No correlation was found between abundances of microannelids and abiotic factors except for soil texture: abundances were positively correlated with the proportion of sand particles.

TROPHIC PLASTICITY IN AUSTRALIAN ANTS: A STABLE ISOTOPES APPROACH

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Ants are known for their plasticity on food resources, which promote their ecological and evolutionary success. Therefore, extreme variations in diet within and among seasons, feeding guilds, life cycle, and geography are expected, making this group of animals especially difficult to study and, thus, with a trophic ecology poorly understood. Consequently, we attempted to explore the trophic position dynamics in ants of tropical and temperate localities, as well as their vertical stratification changes in Australian forests (tropical Cairns and temperate Sydney). For this, stable isotopes were applied to study the trophic position and nutrient fluxes utilizing $^{15}\text{N}/^{14}\text{N}$ ratios, $^{13}\text{C}/^{12}\text{C}$ ratios as tracers and reveal seasonal changes in its trophic links. Our results showed that ants from both localities have a broad isotopic dietary niche and variation in resource use, however this might be an intraspecific trait which should be analyzed even further. Lastly, we would like to encourage more studies using integrative analysis of $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values, since it is a technology that can greatly contributed to the understanding of trophic relationships of tropical and temperate ants, as well as for tracing prey origins, proportions of diets and feeding periods.

LATITUDINAL PATTERNS IN SPECIALISATION OF PLANT-POLLINATOR INTERACTIONS

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Specialisation of pollination interactions, the key component of biodiversity, is considered to be among important causes and consequences of the latitudinal diversity gradient (LDG). According to the influential hypothesis, the high level competition in the speciose communities should generate highly specialised interspecific interactions. Consequently, the highly specialised species are expected to be more predisposed for speciation. Nevertheless, very limited (and hardly standardised) data exist to study these phenomena in plant-pollinator interactions. We have established the latitudinal gradient of study plots in natural semi-open habitats across ecosystems from South Africa to northernmost Norway. We are sampling the plant-pollinator interactions at these plots, including data on the floral rewards abundance and various traits describing plants and their pollinators. In our contribution, we will present the project, its aims, methodological approaches, and the first data summaries.

HABITAT SPECIALIZATION OF BUTTERFLIES AND MOTHS ALONG AN ELEVATIONAL GRADIENT ON MOUNT CAMEROON

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Understanding the causes and consequences of insect diversity patterns along elevational gradients is a longstanding problem in ecology, especially in the species-rich tropics. Ecological specialization (aka niche breadth) has been considered among the key drivers of the patterns. Following the elevational niche-breadth hypothesis, species' niche-breadth should decrease (i.e., higher specialization) with decreasing elevation because of an increased role of biotic interactions and more stable environments. Nevertheless, it has not been studied sufficiently yet.

We assessed the habitat specialization (based on descriptors of forest structure) of 138 species of fruit-feeding butterflies and 396 species of fruit-feeding moths along the elevational gradient on Mount Cameroon (from 350 to 2200 m a.s.l.). Unexpectedly, we found decreasing niche breadth along elevation for most groups, suggesting that species tend to be more specialized at the higher altitudes. However, geometrid moths showed the highest specialization at the mid elevations, whereas satyrin butterflies did not showed any significant elevation pattern. Overall, our findings did not support the elevational niche-breadth hypothesis.

CATCH THEM ALL! BECAME A SCIENCE DATA HUNTER WITH OUR SPECIES IDENTIFICATION MOBILE APPLICATIONS.

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In the last decades, citizen science, in which citizen volunteers share what they observe to provide information to the scientific community, has become a new powerful trend in the field of natural science research. Our research group Biorecords, from the Faculty of Science and Institute for Research and Applications of Fuzzy Modeling at the University of Ostrava, is using citizen science to collect occurrence data and pictures of species from the public through a friendly to use and interactive environment of mobile applications. Our applications run species identification using image, occurrence, and environmental data, and beyond that, each of them provides a catalog of species and the option to save user personal records.

Currently, three Hunter applications are being run by the Biorecords team: Dragonfly Hunter CZ, Herpeto-Hunter CZ, Orthoptera Hunter CZ, and the fourth application, Mammal Hunter CZ, is just in the process of publication. All three mobile applications are free to download (Android, iOS) and available in English.

We can see the bright future of interactive mobile applications providing easy and quick species identification (in the near future with the help of machine learning, image recognition, and fuzzy modeling) for the public in such an attractive, friendly and playful way, while scientists will benefit from a large amount of occurrence data saving a lot of money, time, and effort.

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HOLOCENE HISTORY PLAYS AN IMPORTANT ROLE IN FOREST-STEPPE FORMATION

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The Western Podolia (western part of Ukraine) represents the biogeographical crossroads between the temperate forest and the continental steppe biomes. Biologists have postulated the refugial character of the local steppes, but modern palaeoecological reconstruction of the environmental history of the region has been lacking. We fill this gap with a multi-proxy study of two profiles sampled in calcareous fens adjacent to species-rich steppe grasslands. The analysed profiles together cover the entire Holocene and the end of the last glacial period. All studied proxies support the hypothesis of Holocene persistence of open or semi-open landscape. The complete absence of wood remains in the Holocene sediments, and the persistence of fen specialists showed exceptional long-term stability of open wetlands. The continuous presence of light-demanding pollen taxa, the low abundance of closed-canopy trees compared to open-canopy trees, and stable concentrations of geochemical indicators of erosion suggest a semi-open landscape with a mosaic of forests, steppe grasslands, and other open habitats. Multivariate analysis showed the similarity of pollen assemblages to sites located in the forest-steppe zone at the interface of the Pannonian Basin and the Western Carpathians. The continuous presence of non-woody microcharcoal I in high abundance suggests the role of fire in maintaining open habitats. The archaeological record provides evidence of human activities throughout the Holocene near the study sites. Our results show that Western Podolia has become a biogeographical crossroad not only because of its position on the border between Central and Eastern Europe but also because of the unusual combination of a relatively humid climate and continuity of open or semi-open landscape since the Last Glacial Maximum.

RAKE IN THE FOREST

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Traditional forms of management practiced by man for centuries had a significant impact on the structure of the forest ecosystem. With the abandonment of these forms of management, during the last century forests went through a succession towards more dark and richer in nutrients conditions, leading to a decline in diversity in European lowland forests. The importance of restoring traditional practices and their positive impact on diversity has been documented by many studies in the last few years. This work focuses on the evaluation of the long-term effect of regular raking of leaf litter in lowland acidophilous thermophilous oak forest. After 5 years, the results of the experiment showed an increase species richness and abundance on the raked areas compared to the areas without intervention. After 10 years of raking the leaf litter, the amount of nutrients in the forest soil is significantly reduced, potentially preventing eutrophication. Long-term observation shows that in dry years the representation of perennial species does not decrease on raked areas to the same extent as on areas with left leaf litter. Our results lead us to the conclusion that raking leaf litter can be a very suitable tool for protecting the diversity of light forests in times of climate fluctuations.

PLANT DIVERSITY OF A SOUTH AFRICAN SAVANNA IS DETERMINED BY LOCAL RATHER THAN LARGE-SCALE FACTORS

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Savannas represent a dynamic system maintained by the interplay of aridity, grazing and fires. However, a little attention has been paid to the effects of local habitat factors, such as bedrock and water availability. As a part of the MOSAIK project, we sampled 60 vegetation plots 50 x 50 m in size in Kruger National Park, South Africa, located to reflect the two basic bedrocks (granite, basalt) and gradient in water availability: close to perennial rivers, close to seasonal rivers and on dry crests. We also used large-scale predictors, such as climate (temperature, precipitation), fire regime, human disturbance and vegetation productivity expressed by NDVI index. We used LMM models to test the effect of bedrock and water availability and ordination methods to test (i) differences in species composition, and (ii) effects of large-scale factors. We found that the local factors mainly determine plant diversity, with plots on granites harbouring more herbs and shrubs than plots on basalts and plots on crests harbouring less species than plots near seasonal and perennial rivers. Plots on basaltic crests were poorest in species. Out of the large-scale factors, only temperature was had a consistent and significant suppressive effect on plant diversity. Surprisingly, dense stands of *Colophospermum mopane*, although generally considered as species poor, were detected to host a considerable herbal diversity.

BIOLOGICAL SOIL CRUST MICROALGAE MANIPULATION EXPERIMENTS IN THE HIGH ARCTIC

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The polar environment is characterised by extreme natural conditions, which microalgae have to survive. Hardening by nutrient starvation, cold or desiccation was reported to increase the stress tolerance of many algae and cyanobacteria. Such microalgae appeared to be more resistant to freezing and desiccation stress and melt-freeze cycles in comparison to those growing under more favourable conditions. The field experiment focuses on resistance of biological soil crusts (BSC) microalgae to stresses associated with the seasonally changing Arctic conditions and climate change. Study sites were established in the High Arctic (Svalbard) in the summer 2022. Natural conditions in the field were manipulated by watering and fertilisation and in the future will be manipulated by additional watering and artificial thawing (in the winter season) to simulate rain-on-snow events and winter warm spell. The whole experiment will be ongoing the following two seasons. The photosynthetic and physiological activity of the experimentally hardened (starved) microalgae will be tested by measurements of photosynthetic parameters and fluorescence staining. Field observations and manipulation studies will be linked to laboratory experiments and analyses focused on physiological, morphological and ultrastructural observations. In the cooperation with University of Cologne metagenomic and (meta)transcriptomic profiles will be analysed since most adaptation/acclimation mechanisms are connected to metabolic changes. The combination of molecular biology and microalgal physiology methods together with field studies will allow complex insight into survival strategies of BSC microalgae, from sub-cellular to community levels.

NEIGHBOURHOOD EFFECTS ON WOODY PLANT SELECTION AND BARK STRIPPING BY DEER

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Ungulate herbivory and its impact on one plant species may be driven by other plants in the neighbourhood. Although such neighbourhood effects have long been recognized, there is limited understanding of how spatial variation in these effects relate to local plant density and distances between plants. We examined if the density of or distance to conspecific and heterospecific neighbouring woody individuals produce neighbourhood effects on bark stripping by deer, and how these effects differ in spatial scale and type (reduce/increase herbivory). Woody individuals were assessed for evidence of bark stripping by deer in a lowland old-growth temperate forest, mapping all woody stems ≥ 1 cm DBH. The spatial distribution of stripping was used to examine neighbourhood effects using spatial point pattern methods. The density and distance to neighbours and species identity of focal and neighbouring individuals contributed to a large spatial variation in neighbourhood effects. Neighbourhood effects arose mainly from the interactions between neighbouring shrub species and all tree species, and interactions between individual species pairs. Our study provides new insights into neighbourhood effects by showing how and at which spatial scales woody plant interactions modify deer herbivory. We advocate considering the life stage and relevant plant traits with multivariate spatial methods in order to elucidate the role of neighbourhood effects in complex plant communities.

WHICH NATURAL ENEMY IS IMPORTANT IN TEMPERATE FOREST UNDERSTORY? MAY TREE LIFE STRATEGY BE THE KEY?

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The theory of top-down ecological regulations predicts that plant natural enemies (herbivores and fungal pathogens) facilitate plant coexistence and diversity through suppression of their abundance, biomass and survival. These processes happen in a manner of disproportionate damage of dominant plant species inhibiting competitive exclusion, in other words - negative density dependence is observed. Natural-enemy-mediated density dependence affects numerous tree populations, but its strength varies substantially among plant species. Contrarily, insect herbivores are regulated by their own natural enemies (e.g., bird, bats, ants), which may buffer strong selective pressure caused by them. Forests represent significant ecosystems in terms of carbon, nutrient and water balance on Earth. However, to what extent trophic cascades play role in their current shape remains unclear, especially in temperate. In our study we aim to understand how trophic cascades affect forest plant communities. Specifically, we address how fungal pathogens, ungulates and insect herbivores directly alternate forest plant diversity, abundance, biomass and survival and whether indirect effects of insectivorous predators can be also detected. Using a three-year manipulative community-scale experiment in four temperate forests near Ceske Budejovice, we observed whether trophic cascades differ based on ecological strategies of tree seedlings, such as mycorrhizal association and leaf economic spectrum traits.

ANT SUCCESSION IN POST-MINING SITES: COMPARISON OF TEMPORAL CHANGES WITH SPACE FOR TIME SUBSTITUTION

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Ecological succession is often studied by observing set of various sites of different age positioned over the chronosequence and it is assumed that difference between these sites is similar to difference on one site sampled over time (space for time substitution). These approaches are however, namely in animal studies, seldom compared in long-term studies. Here we used chronosequence of reclaimed and unreclaimed sites in post-mining heaps near Sokolov and in surrounding landscape with ongoing secondary succession. We studied ant community in 2001 and we resampled at the same sites in 2020. This allowed us to compare real time changes after 19 years with succession trajectory predicted from chronosequence. Number of ant species increased with site age. Eurytopic species prevailed in both years, proportion of forest species increased over time while abundance of specialists on non-forest habitats peaked at intermediate succession stages (20 – 30 years). Very similar set of environmental parameters was found as drivers of ant succession in both survey. Namely it is site age, bare soil cover and tree canopy cover. Variation partitioning revealed that succession age on spoil heap accounted for 91-100% of total explained variability while effect of site identity was not significant. This indicate that space for time substitution explains substantial part of data variability and thus represents a sensible way how to study succession of ant communities.

VARIABILITY OF THE ALPINE LAKE PROSTREDNÉ SPIŠSKÉ PLESO (HIGH TATRAS) DUE TO CLIMATIC FACTORS

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Glacial lakes – "plesá" are a characteristic natural feature of the world's smallest glacially formed mountain range - the High Tatras (Slovakia). The vast majority are located above the tree-line, in a characteristic alpine environment with significant relief, exposed bedrock, and a high proportion of slope debris in their catchments, with a considerable elevation and slope. The geographical location, morphology, lithology, and land cover of these transparent oligotrophic lakes influence the geochemical properties and processes in their catchments, which are among the leading causes of their variability. The characteristic alpine climate fundamentally affects the existence, development, and processes in these specific lake ecosystems, thus considered sensitive indicators of even the smallest natural and man-made changes. For this reason, they are seen as early warning signals of global environmental changes, the intensification of which is predicted based on current climate trends. Our contribution aims to point out this variability based on regular measurements and evaluation of changes in selected physicochemical parameters of the alpine lake Prostredné Spišské pleso (2,010 m a.s.l.) during the summer season of 2022. Depending on climatic factors, identification of its variability will assess the current state and future development of these lake ecosystems, pointing out the critical impacts of a changing climate with a focus on processes in the catchment.

CAN HEMIPARASITIC MELAMPYRUM ARVENSE SERVE TO CONTROL THE SPREAD OF INVASIVE ERIGERON ANNUUS?

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Erigeron annuus (Asteraceae) is an invasive species from North America spreading into seminatural grasslands and ruderal vegetation across Europe. We studied whether the spread of the species can be controlled using *Melampyrum arvense* (Orobanchaceae), a hemiparasitic plant native to Europe.

We aimed at demonstrating the interaction between the two species by identification of functional haustorial attachment and by a field sowing experiment.

To study the anatomy of haustorial attachment, the two species were grown together in pots. Thin sections were prepared using haustoria forming on their roots and under passing light, a functional attachment was observed.

A field experiment consisting of experimental blocks with high *E. annuus* cover was established and run for two years. In each block, there was a plot sown with seeds of *M. arvense* and a control plot. The change of *E. annuus* cover in time was analysed using linear mixed-effects model.

With passing time, the cover of *E. annuus* decreased in all observed plots. However, the time × *M. arvense* sowing interaction had a significant effect on *E. annuus* cover as well, implying that *M. arvense* has a negative effect on *E. annuus* in plant communities.

We demonstrated that *M. arvense* parasitizes *E. annuus* and reduces its abundance in plant community. The hemiparasite may thus potentially serve as a tool to control the *E. annuus* invasion in European grasslands.

THE TEMPORAL VARIABILITY IN THE SHAPE OF THE DENSITY- OCCUPANCY RELATIONSHIP IN WATERBIRDS

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A positive density-occupancy relationship (D-O) has been frequently documented empirically, but the mechanisms behind it are theoretically diverse. It is usually tested inter-specifically at a community level, however the temporal variation in D-O remains underexplored. Distribution of waterbirds across a high number of waterbodies such as fishpond areas in Central Europe, offer a unique model system to test the D-O. Besides, understanding how the spatial distribution of fishpond foraging quality affects general patterns of avian distributions is crucial for adoption of proper and easy to implement conservation steps. We used 12 years of breeding waterbirds census data across 134 fishponds in the Třeboňsko Basin Biosphere Reserve, CZ to describe variation in the slope of the D-O and test for the role of environmental parameters and traits of birds in determining its shape. We did not find any annual differences in D-O, however, it significantly changes during the breeding season. The slope decreases in July on average compared to May and is significantly less variable in July. The statistical model showed that, apart from the month, spatial variation in water transparency had a significant effect on D-O. Furthermore, diet and body mass were the most important predictors of variation in D-O. We found that temporal change in water quality and its homogenisation across sites late in the breeding season lowers the slope of D-O by limiting number of suitable fishponds for local populations of birds.

UNRAVELING THE AGE STRUCTURE OF OLD-GROWTH OAK COPPICE WOODLANDS IN EASTERN MEDITERRANEAN

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Localities with coppice woodlands preserved up to these days are important historical traits and integral part of landscape. A dendroflora with such features in Cyprus is the endemic oak *Quercus alnifolia* Poech. This evergreen oak occurs only on the ultra-basic rock formations of the Troodos Massif and is the dominant species of dry habitats in pine and maquis woodlands. The species has a high ecological value since it coppices well from the base reinstating itself after disturbances and thrive on stony mountainsides.

The research took place in Paphos State Forest. The objective in this study was to reveal the age structure of the *Quercus alnifolia* coppices. For this purpose, we used tree-ring science as a proxy. To achieve the precise dating of the species, wood micro-sections were prepared from 162 samples which were collected in the form of disks. Only the most dominant and undamaged stems were selected out of 100 different coppice stools.

The study showed that the samples had a maximum age of 150 years with an average of 108 years, thus having an average stem diameter and stem height of only 13 cm and 6 m respectively. 67% of the population was more than 100 years with an average stem diameter and stem height of 14,3 cm and 6,5 m respectively.

These results are in identification with specific factors which outlined the present structure of this ecosystem: the establishment of the first provisions on Forest Management in 1881 and the final regulation of grazing in the 1940s.

PLADIAS.CZ AND FLORAVEG.EU – ONLINE ECOLOGICAL DATABASES OF CZECH AND EUROPEAN FLORA AND VEGETATION

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Pladias.CZ and FloraVeg.EU are comprehensive online ecological databases of flora, vegetation and habitats developed by Masaryk University, Institute of Botany of the Czech Academy of Sciences, and external contributors. Both databases are widely used for ecological research.

Pladias.CZ, launched in 2018 and focused on Czech flora and vegetation, contains critically revised information on vascular plants, including 13.6 million occurrence records dynamically displayed on maps, data on 120 plant characteristics (functional traits, ecological associations and others) and comprehensive information on the vegetation types of the national vegetation classification. The data are supplemented by electronic versions of national monographs and bibliographies of flora and vegetation, 23,000 photographs of plant taxa and vegetation types, digital maps with botanical information, and interactive identification keys of species and vegetation types.

FloraVeg.EU, launched in 2022, uses the database structure of the Pladias database but its scope is the whole of Europe. It contains (1) biological and ecological characteristics of the European flora, (2) standard phytosociological classification of European vegetation (EuroVegChecklist) and (3) standard classification of European habitats (EUNIS). This database also provides photographs of plant taxa, vegetation types and habitats, distribution maps of vegetation types and habitats, and other data. Compilation of more data is in progress.

NONLETHAL EFFECT: MERE PREDATOR PRESENCE AFFECTS BEHAVIOR, STRESS HORMONES AND ARTHROPOD ASSEMBLAGES

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Insect exposure to their predators can affect individuals and community processes, through direct consumption or nonlethal (i.e., nonconsumptive) effects. However, the links between behavioural, physiological responses and its impact on communities are not clear. In two independent experiments, we studied the effect of fear of birds in insect, and effect of fear of birds and spiders on plant and arthropod communities occurring on them. First, we found that locusts exposed to a real live bird ate less and hid more than locusts exposed only to bird calls. We supported these results by measured changes in adipokinetic hormone levels corresponding to the stress response in locusts. Second, we found that sole traits indicating the earlier presence of both spiders or birds led to significant differences in arthropod communities and plant herbivory. Earlier presence of birds around the plants affected future arthropod communities more than earlier presence of spiders. In both of our experiments, we showed that the proximity or even earlier presence of predator can affect processes at lower trophic levels. Yet, presence of real predator scares arthropods more than just sounds of the predators.

ACKNOWLEDGING BOREAL RICH-FEN FORESTS IN THE EUNIS HABITAT CLASSIFICATION

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Boreal rich-fen forests are transitional vegetation communities between boreal spruce forests and open rich fens, and therefore, hard to classify. They also bear a resemblance with the tall-herb spruce forests of European Russia. Boreal rich-fen forests are endangered, species-rich communities, dominated by *Picea abies* and *Betula pubescens* in the tree layer, and with a well-developed shrub layer in the Boreal context. The field layer is rich in grasses, sedges and particularly herbaceous species, such as *Filipendula ulmaria*, *Rubus arcticus*, *Viola palustris* and *V. epipsila*. The moss layer contains rich-fen specialists, such as *Sphagnum teres* and *Campylium stellatum*, intermixed with forest bryophytes, such as *Hylocomium splendens*.

Boreal rich-fen forests are relatively rare and have been overlooked in European vegetation classification syntheses including the EUNIS habitat classification and the EuroVegChecklist. So far, there has not been adequate data available for their analysis in the European context, and consequently, their syntaxonomical position is currently unresolved.

In the EUNIS habitat classification, boreal rich-fen forests resemble most closely *Picea* mire forests (T3K), but in the current version, they are defined by generalist conifer forest species and mire species, from which boreal rich-fen forests differ particularly through their specialist bryophytes. Since the time of the last update, new data has been added to the European Boreal Forest Vegetation Database (EBFVD) that would enable their acknowledgment and improvement of the type definitions of the EUNIS habitat classification (and also of the EuroVegChecklist).

OVERVIEW OF EUROPEAN ALIEN PLANT CHECKLISTS

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Macroecological research in invasion ecology depends on evaluation and assignment of the alien status of plant species in different regions of Europe. The development of national checklists of alien floras in many countries started in the 1990s based on the collation and expert evaluation of available floristic records for particular countries. Subsequently, continental-scale databases containing regional data on alien plants, such as DAISIE, GloNAF and Euro+Med PlantBase were developed. However, there are still gaps and inconsistencies among existing checklists and databases of alien plant species in terms of their up-to-dateness, completeness, comparability, data quality and consistency of species categorizations.

The aim of this project is to compile an overview of recently published national and regional alien checklists across European countries. We aim at unifying the taxonomy and nomenclature, invasion and residence time status categories and other information provided for the species using a common methodological approach. Based on the unified species lists, we will compare alien floras across Europe and identify main gaps in data availability and quality. We digitized complete or partial alien checklists for 42 European territories (countries or bigger islands and archipelagos with distinct history and biogeography). Species-status data obtained from published checklists will become part of the recently developed online database FloraVeg.EU.

SHORTAGE OF DECLINING AND SUN-EXPOSED TREES IN FORESTS LIMITS LONGHORN BEETLE *ROPALOPUS UNGARICUS*

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European mountain forests are unique ecosystems, and they harbour specific saproxylic beetle fauna, including relict species such as the longhorn beetle *Ropalopus ungaricus* (Herbst, 1784). This endangered species is endemic to European mountain forests and is considered to be monophagous on living sycamore trees (*Acer pseudoplatanus* L.). Insufficient knowledge of the species ecology limits its effective conservation. Hence, to investigate its habitat requirements, 175 sycamore trees (87 occupied and 88 unoccupied by the species) were surveyed in the Hrubý Jeseník Mts. and Moravskoslezské Beskydy Mts. in northern Moravia (Czech Republic). The species strongly preferred trees with reduced vitality, including variously damaged trees. The species was also documented to be much more abundant on sun-exposed trees, and the parts of the trunk mantle (south- and east-facing quarters) with the warmest microclimates were preferred. Surprisingly, trunk diameter seems to be an unimportant characteristic for this species (the diameters of occupied trees varied between 5 and 72 cm). In conclusion, *R. ungaricus* is a specialized species whose survival depends upon a continuous supply of sun-exposed declining and damaged sycamores in mountain forests. Hence, maintaining open stands with (declining/damaged) sycamores represents an essential tool for conservation of *R. ungaricus*.

MIND THE ROOTS AND RHIZOMES!

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About half of a plant is hidden belowground but majority of research is concentrated on aboveground parts, therefore our knowledge about a role of belowground organs in plant strategies is poorly known. Our mission is to increase awareness of plant ecologists about the hidden plant parts and to provide methodological and conceptual tools for research. Here we will overview our activities and sum up the main questions concerning roots and rhizomes in ecology.

NOCTURNAL POLLINATION IN TROPICAL RAINFORESTS OF MOUNT CAMEROON

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Plant-pollinator interactions form an important part of biodiversity in most terrestrial ecosystems. Studying these relationships at the community level can help in the understanding of the various patterns of the current biodiversity. Our knowledge of changes in pollination networks are limited. The lack of such knowledge is more evident in some species-rich regions in the tropics. Moreover, night pollinators in the tropics are mostly unknown. To fill in this knowledge gap, we will be presenting our large data set on nocturnal pollinators along the Afrotropical elevational gradient in rainforests of Mt. Cameroon. We sampled plant-pollinator interactions at four elevations (650m, 1100m, 1450m and 2250m a.s.l) in both dry and wet season, where we look at; i) To understand how season and elevation influences the role of nocturnal pollinators in plant-pollination interactions at community level, ii) To evaluate the role of floral traits in shaping the interactions between flowers and their nocturnal visitors. We video recorded visitors of all plants flowering during the study at the four elevations, by video cameras with IR night vision. We had over 26,138 hours of video recordings from 212 plant species within four elevations of which 146 plant species were visited by 1198 individual nocturnal pollinators. The most important floral visitors were moths, beetles and flies, which dominated mainly at mid elevations (1100m and 1450m a.s.l) during both seasons.

DOES DEADWOOD ORIGIN MATTER? THE WAY A TREE DIES AFFECTS THE WOOD-INHABITING FUNGAL COMMUNITY DEVELOPMENT

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We monitored wood-inhabiting fungal communities on 60 spruce logs in different decay stages divided into two classes – (a) uprooted and (b) fallen snags, trees that had remained standing dead (several years to a few decades) before falling. Fieldwork was carried out in 2021 at the Boubín primeval forest (Bohemian Forest, Czechia). On each studied log, we conducted both traditional fruitbody-based and eDNA-sequencing sampling. Our preliminary results (based on the former approach) show that the fungal assemblages differ between both classes of the studied trees. The fallen snags served as the preferred substrate for some extremely rare species, such as *Phellinidium ferrugineofuscum*, rediscovered in the Czech Republic after 25 years. Also, its successor – the hemiboreal polypore *Skeletocutis delicata*, until now known only from North Europe and Russia, was for the first time collected in Central Europe on the same substrate. Our findings point to the need for a targeted selection of objects when managing deadwood in forest stands. Not only the total amount of deadwood but also its diverse structure and origins represent key factors for the biodiversity of many dead-wood-dependent groups of organisms.

CATTLE GRAZING AND MOWING: AN OPPORTUNITY FOR ECOLOGICAL RESTORATION OF MEADOW WETLANDS

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Lowland wet meadows are unique biotopes that provide numerous ecosystem services and are important biodiversity hotspots. Today, however, most wetlands that do not have protected area status are at risk of significant degradation, primarily due to inappropriate agricultural management, drying of the landscape, eutrophication, and subsequent plant overgrowth. As part of a study conducted in the Spálený potok floodplain, the area was revitalized by mowing and cattle grazing. The overall biodiversity of the wetland community was assessed both on the experimental plots with and on the control plots without management. It was found that sensitive management resulted in fast start of restoration of the original valuable communities: Within two years of beginning mowing and grazing, undesirable species on the site were significantly reduced, and halophilic plant species began to reestablish themselves. Rare halophilous arthropods were noted at the site, and species richness of Orthoptera and Auchenorrhyncha increased greatly in the experimental plots managed by mowing. The opening of the site and its heterogenization also led to the return of several amphibian species and a significant increase in bird species diversity. Thus, we have shown that mowing and grazing are effective tools for ecological restoration of lowland wetlands, allowing us to make an important contribution to wetland conservation and restoration, including the protection of biodiversity of entire communities.

FACILITATION OR COMPETITION? MICROTOPOGRAPHY AFFECTS INTERSPECIFIC INTERACTIONS IN VEGETATION OF ALDER CARRS

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Facilitative interactions in plant communities may be more important than competitive ones, as is well known from research in arctic, alpine, or desert habitats, but this is a novel topic in productive and humid wetland communities. Due to hummocks created by *Alnus glutinosa* roots, alder carrs are characterized by heterogeneous conditions based on differences in available water on the top and bottom of the hummock, which can play an important role for survival during hot and drought periods. We asked: which interaction mechanism prevails on the top and bottom of alder hummocks? Are the individuals of *Carex elongata* facilitated by surrounding vegetation or is there more of competition for resources? Aboveground interactions were experimentally manipulated in the field, and fitness-related traits on *Carex elongata* were measured several times in the growing season. We found that plant height and stomatal conductance of plants growing on the top of hummocks were higher under the cover of neighboring plants, indicating possible facilitation. On the contrary, the number of plant shoots was the highest without the neighboring vegetation, indicating the predominant role of competition. These contrasting results are consistent with a scenario where some fitness-related traits reflect aboveground and others belowground interspecific interactions. These findings are important for protecting species diversity of the alder carrs and similar wetland habitats, which is an important topic with the ongoing global warming.

EVOLUTION OF CHEMICAL DEFENSES IN SALICACEAE AND THE PLANT-HERBIVORE ARMS RACE

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Plants and insects are involved in a complex coevolutionary arms race. Insect herbivory is thought to support diversification and escalation of plant defenses, giving rise various plant defensive metabolites. Macroevolutionary trajectories in plant chemistry depend on the nature of prevailing selection pressures and can include other trends. The willow family (Salicaceae) is an ideal model (ca. 55 genera) to investigate macroevolutionary trends in plant defenses across variable environments - ranging from tropical forests to arctic tundra. In addition to common secondary metabolites such as flavonoids and tannins, members of the Salicaceae produce salicinoids that are effective against many generalist insects. Past work on temperate Salicaceae suggested that some species lost salicinoids and employ alternative strategies due to several specialist herbivores that adapted to use salicinoids as feeding cues or for self-defense against predators. However, little is known about defensive roles and diversification of salicinoids in tropical Salicaceae. We will combine a high-resolution Salicaceae phylogeny based on whole genome sequencing with detailed metabolomics surveys to investigate the evolution of chemical diversity in Salicaceae, with an emphasis on salicinoids. This study system will elucidate how the diversity of individual metabolite groups changes during the plant-insect arms race and explain why and how plants switch to alternative defensive strategies.

RESCUE OF CRITICALLY ENDANGERED POTAMOGETON PRAELONGUS WULFEN: PROBLEMS AFTER RESTORATION OF A RIVER OXBOW

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Because of rescue critically endangered species of the Czech flora, *Potamogeton praelongus* Wulfen, revitalization of old river oxbow of Orlice near Hradec Králové were done in winter months 2018/2019. Monitoring of phytoplankton as indicator of environment changes was done before restoration and after it. Except for the ordered monitoring (NAC of the Czech Republic) of phytoplankton also periphyton was observed and consequently the studied area was extended (Stříbrný rybník Pond), situated above the locus. Standard sampling was enlarged with monitoring in the other terms (out of ordered monitoring), and in terms where some "unpredicted events" on the incoming Stříbrný stream. During our research, we found several activities that damaged aims and financial fund of revitalisation, a thrown away baskets with seedlings, zero penalties for "sport fishers" on the protected sites, problems with losers from the cottage settlement (here are soapy photos ..) and mainly about the AQUALAND on Stříbrný and Forests' ideas about the nature protection. Overall, from a serious beginning about forest protection, revitalization and research to the tone of aqua-Disneyland, glamor camping over a protected location and "ecological" behavior of the Forests incl. their ecological ones. And in conclusion, how much monitoring, effort, resources for revitalization and how is it all on or of little value if it is not taken comprehensively.

THE POWER LINE CLEARING AS A BARRIER FOR SOIL INVERTEBRATES

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The presence of transmission power lines (TPL) may lead to fragmentation if passing through a forest habitat. The aim of this study was to determine whether areas with dominant Wood Small-reed grass represent a dispersive barrier for forest soil arthropods and whether these animals may find refuges in shrub stands mainly composed of brambles. During the 14 weeks of pitfall trapping, 3331 arthropod individuals of the five groups (Oniscidea, Diplopoda, Chilopoda, Araneae and Opiliones) were collected and identified. Both univariate and multivariate methods were used to investigate community trends dependent on forest and TPL environmental characteristics. The presence of the TPL clearing significantly affected the community composition, indicating reduced dispersal possibilities for forest species. The lowest number of individuals and species was detected by the traps situated within dominant Wood Small-reed grass stands. Such distribution pattern was evident in all groups except the millipedes, which were the least abundant in the forest. Oppositely, the richest and the most diverse assemblages were sampled by traps placed in shrubs. Detritophages significantly thrived within these stands, but arachnids and centipedes also preferred this environment. Forest as well as non-forest species found refuges within this vegetation. The trends found in the shrub stands were similar to those from forest edges and the econote effect may be playing a role in this phenomenon.

THE EFFECTS OF STAND DENSITY, STANDARDS AND SPECIES COMPOSITION ON BIOMASS PRODUCTION IN COPPICES

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In last decades, there has been a renewed interest in traditional coppicing for nature conservation and most often, for rapid woody biomass production. However, there is little information on biomass productivity of traditional coppices and what affects it. Here, we focused on the effects of stand density, standards and tree species composition on sprout biomass production in newly restored coppices in the Czech Republic. We measured sprouts and calculated sprout biomass 7 years after the harvest from 2013 resprouting stumps in two 4 ha experimental plots. Each plot was divided into 64 subplots with different densities of standards and sprouting stumps. Total sprout biomass declined with increasing density of standards, but the effect of standards differed significantly among studied species. Whereas increasing density of standards decreased sprout biomass in *Quercus petraea* and *Carpinus betulus*, it did not affect sprout biomass productivity in *Acer campestre* and *Tilia cordata*. Sprout biomass on stand level increased linearly with increasing number of sprouting stumps and we observed no levelling of this relationship even in the highest densities of stumps. We also found significant shift in tree species composition with steeply declining relative abundance of *Quercus* in favor of other studied tree species.

LANDSCAPE AND LOCAL FACTORS AFFECT INCORPORATION OF AGROCHEMICALS IN LOCAL FOOD WEBS.

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Agrochemicals spread across agricultural landscapes and negatively affect biodiversity. However, the relative influence of local and landscape factors on the incorporation of agrochemicals in local food-webs is unknown. We studied how landscape composition (proportion of forests, shrublands, grasslands, and overall non-crop habitats) and local management (IPM, organic) influence the overall concentration and spectrum of agrochemicals in local perennial agroecosystems. We studied four components of food webs: soil, non-crop plants, herbivorous rodents, and spiders. We also investigated the effect of composition of spider hunting strategies. The concentration and spectrum of agrochemicals in soil and herbivorous rodents were lower in agroecosystems under organic management than IPM. In contrast, the concentration and spectrum of agrochemicals in plants decreased with increasing proportion of forests and shrublands. The concentration and spectrum of pesticides in spiders increased with decreasing proportion of non-crop habitats and increasing dominance of web-building spiders. The wider spectrum of agrochemicals in web-building spiders is likely because they capture highly mobile prey. Both, local and landscape, factors affected the incorporation of agrochemicals in local food webs, but their relative importance differed among groups. The impact of local and landscape factors is direct but can be also indirect through the effects on the trait composition of local communities.

CAN CONSTRUCTION OF POOLS IN WETLANDS BE THE CAUSE OF HABITAT DEGRADATION AND NEGATIVE CHANGES OF VEGETATION?

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The construction of small shallow pools in wetlands is perceived as positive by the lay public and experts. In some cases, however, pools can have a negative effect. In the past, the main problem when building pools was a poorly chosen location, which resulted in the destruction of the habitat of endangered plant species. This problem occurred despite conducting preliminary surveys of the vegetation, which unfortunately were not of sufficient quality. Nowadays, the biggest problem is the relocation of excavated soil directly in the locality to the area of the dam of pool. Thanks to picking up the material above the level of the original terrain, the substrate dries out and nutrients are subsequently released. In response to released nutrients and drier soil, vegetation degrades to ruderal types with higher productivity without the presence of endangered species. The deposited soil may also contain higher concentrations of heavy metals, which are bioaccumulative and may further be released into the environment.

SPREAD OF ALIEN PLANTS ALONG THE TRANS-SIBERIAN RAILWAY: THE EFFECT OF BIOGEOGRAPHICAL ZONES

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We present results of the field inventory made in railway areas along the Trans-Siberian railway (Trassib). The uniqueness of Transsib as a model system for studying the alien plant species diversity is due to isolation from the road network and crossing two disconnected parts of the world.

We aim at making an inventory of plant species at a large part of Russia along the Transsib (the Trans-Siberian railway) in relation to the biogeographic regions of occurrence and the native ranges. Our data allow to analyse if there are differences in the composition and features of flora accompanying Transsib along the west-east longitudinal gradient. We focus on the analysis at spatial pattern of the distribution a west-east gradient.

We used vegetation sampling in areas of the railway stops. We analysed the origin of the found species in Russia and in the global in relation to the area where they occur. Sampling was done in several habitat types along the railway ranging from rails to neighbouring vegetation. The ordination methods were used to assess the role of habitat.

We found in total 579 species in the 239 study plots. In European part there was 61 plots, 111 in Siberia and 67 in Far East. In European releves, 264 species were found, 388 in Siberia, and 201 in Far East. 98 species were unique to the European part of Russia, 208 to Siberia and 81 to the Far East.

Proportion of alien species (alien to each region) was significantly different between the regions, but there were no differences in the identity of habitat or urbanity. Vegetation data on species composition analysed by multivariate methods (RDA) on habitats and urbanity showed significant differences. Species occurring in studied habitats created clear groups growing in the railway neighbourhood (rails) and the adjacent areas.

LIFE FOR INSECTS. CONSERVATION OF SELECTED NATURA 2000 INSECT SPECIES OF WESTERN CARPATHIAN MTS.

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Open woodlands, extensive meadows and pastures are one of the most valuable habitats for insect biodiversity in Europe. The project objective is conservation of selected insect species of European importance (*Lucanus cervus*, *Parnassius mnemosyne*, *Phengaris arion*, *P. nausithous*, *P. teleius*) and enhancing their populations through restoration of their habitats in the transboundary area (CZ-SK) of the Western Carpathians and interconnection of species metapopulations in this area. Main activities are: (i) revision of the state of target species and habitats and their intensive monitoring; (ii) negotiation with land owners, and key stakeholders; (iii) conservation measures on 550 ha of project sites. Extensive pastures and meadows (303) and open canopy woodlands (247) have been restored so far. Majority of project sites will be maintained by grazing and mowing. Some of the sites will be kept as a non intervention woodlands. Populations of target species have been detected and their expansion on newly created habitats is probable in the future. Host ants (*Myrmica* sp.) of blue butterflies (*Phengaris* sp.) were confirmed on majority of restored habitats. 720 species of beetles and 330 species of butterflies and moths have been also identified on 400 ha of newly created habitats. Out of that 200 species of beetles are endangered in EU. Created and restored habitats thus represent valuable biotops for not only target species but plenty of other endangered insect species too.

BROADLEAF OR CONIFEROUS? LANDSCAPE SCALE VEGETATION RECONSTRUCTION FROM FOSSIL POLLEN, TŘEBOŇSKO

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Fossil pollen is the main proxy contributing to the idea of "natural" vegetation, i.e., the state of the landscape before anthropogenic intensification. This idea is, among others, an important target state for nature conservation. Using an example of the Třeboň region, I will show the contradiction between the concepts of nature conservation on the one hand and ideas of forestry (forest typology) and some models of reconstructed vegetation on the other hand. The first generally adheres to vegetation such as oak forests at lower altitudes and beech forests at higher altitudes, both with a possible admixture of fir. While previous pollen-based vegetation reconstructions as well as forestry plans also assume a significant presence of spruce and pine, in addition to the mentioned tree species. A possible solution comes from a model "extended downscaling approach" (Theuerkauf 2017), which includes a map of categorized environments (e.g., soil) that are filled with vegetation iteratively and quantifies the agreement with known fossil pollen records.

THE PAST AND THE PRESENT OF EUROPEAN LARCH IN CENTRAL EUROPE

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Larixutor is a multi-institutional project focusing on European larch (*Larix decidua*), connecting ecological research and forestry practice. It seeks answers to a broad range of questions from the Holocene history of larch, through its ecological impacts in recent forests, to testing possibilities of future larch cultivation under climate change. Here we present three subtopics on the alleged non-nativity of larch in most Czechia and its presumed degrading effect on native communities. First, we aim to describe the genetic structure of larch populations from the assumed native range in the Nizky Jeseník mountains and, more importantly, from other localities with potential long-term Holocene survival of larch in the region, as suggested by paleoecology and historical written resources. Analyzing the genetic structure of the populations helps distinguish artificial admixtures from potential native populations and contributes to the practical protection of the sites. Second, we use climatic niche modeling approaches based on the current distribution of larch to explore its niche and the changes in distribution range during the Holocene. Third, we study the effect of larch on understorey vegetation in recent forests. We use a high number of vegetation relevés from across the Czechia (provided by ÚHÚL) to test which plant species, or their functional groups are positively or negatively affected by both the presence and estimated canopy cover of larch.

COMMUNITY ECOLOGY PARAMETER CALCULATOR IN R

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Quantitative analysis of ecological data is substantial for recent ecological research. Despite various analytical software being available (free or proprietary) on websites, there is a significant increase of R language and software popularity. On the other hand, the analyses in R software are often considered as difficult and time-consuming for beginners. We developed a package Community Ecology Parameter Calculator in R (ComEcoPaCR) with a focus on basic taxocoenosis parameters. In total, the package ComEcoPaCR includes 11 functions which offer more user-friendly settings and provide both tabular and graphical outputs. These functions calculate and visualize species richness and abundance of samples, structure of species in the sample (dominance and frequency), species richness indices (Margalef and Menhinick index), species diversity indices and evenness for the indices (Shannon index, Simpson and Brillouin index), and calculate similarity of samples (Jaccard and Renkonen index, Sørensen coefficient and Bray-Curtis index). The package will be extended in the future for species accumulation curves and other popular analyses.

IMPACT OF THE GLAZE ICE ON SAPROXYLIC BEETLES IN PODYJÍ NATIONAL PARK 5 YEARS AFTER THE DISTURBANCE.

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Lowland forests in Central Europe have been subject to direct human impact since the beginning of landscape settlement. As a consequence, the natural dynamics of their development are practically unknown today. In 2014 a glaze disturbed some parts of the forest stands in Podyjí and Thayatal National Parks. In unmanaged zones of both parks, the disturbed areas were left to natural development. Six study plots 0.75 – 1 ha in size were established for entomologic survey. Communities of saproxylic beetles were compared in disturbed plots and in nearby undisturbed forest stands using window traps. In total 12,599 individuals belonging to 352 species were captured. Of those, 78 are listed in the national red list of threatened species, 4 species are protected by law and 8 species are considered indicators of primeval forests. The studied sites represent a rare habitat which is very important from the nature conservation point of view. Sun-exposed decaying logs on disturbed plots host many rare and threatened saproxylic species, in particular from the families Buprestidae, Cerambycidae and Scarabaeidae.

ALIEN PLANTS OF THE CZECH REPUBLIC: CHECKLIST UPDATE, INTRODUCTION DYNAMICS AND IMPACT ASSESSMENT

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The Czech Republic is one of the countries in Europe and globally with a comprehensive, specialized catalogue of its complete alien flora, including not only naturalized and invasive but also casual species and providing information on the introduction history and ecology of the taxa on the list. The first edition (Pyšek et al. 2002) included 1378 alien taxa and was updated ten years later, with the number in the second edition increasing to 1454 (Pyšek et al. 2012). The two papers together represented an up-to-date account of the taxonomic diversity, dynamics of introductions, regional abundance, habitats, and source regions of the Czech alien flora. The data were included into continental (DAISIE), global (GloNAF), and national databases (Pladias; Chytrý et al. 2021) and used in analyses addressing the ecology of plant invasions. Here we report the third edition of the Catalogue that contains additions of newly introduced species and deletions due to improved taxonomic and ecological knowledge. All taxa were carefully revisited and information on their residence time (archaeophyte vs neophyte), invasion status (casual, naturalized, invasive), and time of introduction to the country was updated. This resulted in an increase to ~1560 alien taxa, of which ~70 are invasive. The work is completed with the first thorough assessment of invasive plant species in the Czech Republic using the IUCN EICAT scheme to classify the environmental impacts of biological invasions.

POSSIBILITIES AND LIMITATIONS OF HIERARCHICAL MODELING OF SPECIES COMMUNITIES WITH LARGE DATASETS

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ABSTRACT

Methods for studying the biodiversity of tropical ecosystems are continually evolving for both species' distribution modeling and the types of data available while the limits of each have yet to be explored. We investigated the potential of the recently developed hierarchical modeling of species communities (HMSC) framework to infer species environmental associations when applied on herbarium data. We applied HMSC to a dataset of 2,963 records comprising of 50 tree species from western Central Africa (6°S-6°N, 10°E-15°E), subdivided in 167 (0.5°×0.5°) grid cells. The herbarium data was extracted from the RAINBIO database and six environmental variables from the WorldClim database were used as predictors. An additional fixed effect was added to account for variability in sampling effort and a spatially explicit random effect was used to account for spatial structure. The full model with real data had reasonable explanatory power (AUC = 0.84) and suggested that minimum annual temperature was largely responsible for the variation in tree species distribution. However, further investigation revealed that model fit between models run with shifted environmental data and real data do not differ greatly suggesting possible over-fitting due to spatial autocorrelation. Furthermore, simulations with artificial species distribution data with known environmental associations confirm that the method generates an excess of false positives, which is only partially compensated when accounting for sampling effort information and spatial effects. Therefore, we conclude that using HMSC on RAINBIO-type data may produce inaccurate results which is a problem that should be investigated in other species distribution modeling methods.

IMPACT OF CONSERVATION THINNING IN OAK WOODLANDS OF NNM KUKLE ON EPIGEIC SPIDERS (ARANEAE)

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The aim of the study was to investigate the impact of active logging interventions on spiders in formerly coppiced oak woodlands in the Kukle National Nature Monument, which were conserved for overall 80 years without any active conservation management. Ten study plots were selected for the research, which were subsequently divided into five unmanaged plots (control) and five, where active conservation thinning took place in the last 2–3 years. The spiders were collected using pitfall traps during vegetation season of 2018. We used three pitfall traps per plot, placed five meters from each other across the diagonal of each research plot. A total of 5,445 adult spiders belonging to 17 families, 47 genera and 82 species were captured. Of the 82 species found, 72 were on the plots with conservation thinning and 49 on the unmanaged plots. The species richness, conservation value and presence of rare and endangered species was significantly higher in areas under active conservation thinning. The results show that the forest opening and restoration of the management by conservation thinning in the form of a transfer to the coppiced forest with standards had a positive effect on the overall diversity of epigeic spiders in oak woodlands. However, the logging activities should not be applied by large scale clearings.

CHANGES IN OCCURRENCE AND ABUNDANCE OF ALIEN PLANT SPECIES OVER EIGHT YEARS ALONG THE LABE RIVER

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Riparian corridors belong to the most invaded habitats worldwide, but long-term studies that could enlighten changes in the abundance of aliens over time are rather scarce. We focused on changes in alien plant species occurrence and abundance between 2012 and 2019 at seasonally emerged gravelly river beds along the Labe river in the north-western part of the Czech Republic.

We selected 10 sites located along a 35 km long segment of the Labe river, of which seven represented natural habitats and three human-made habitats. All vascular plant species were determined, and their covers were estimated in 4 × 4m plots during regular monitoring performed each year of the period by the Povodí Labe service.

Almost 200 plant species were recorded, of which 69 were aliens, including eight casuals, 39 naturalized and 22 invasive species. The number and cover of alien species increased over time, with a minimum in 2014 (24 alien species and 7.5% of the total cover) and a maximum in 2017 (42 and 30.5%, respectively). The most common alien species, found in 70% of plots, was *Eragrostis albensis*, a casual neophyte grass of unclear origin. The cover of some neophyte species, such as *Ambrosia artemisiifolia*, *Amaranthus albus*, and *Xanthium albinum*, increased over time while others like *Acer negundo*, and *Juncus tenuis* decreased in plots. Our results indicate a rapid increase of alien species on gravel river beds over eight years, which could have a negative impact on native plant communities.

DOES SNOWMAKING AFFECT SOIL AND EPIGEIC FAUNA ON SKI RUNS IN THE GIANT MOUNTAINS (KRKONOŠE, CZECHIA)?

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Snowmaking has been an increasing practice in ski resorts, extending the season and improving conditions for skiing. Water extraction, construction of reservoirs, fertilization of grasslands by artificial snow made of eutrophic water and with snowmaking additives, and changes in the soil temperature regime are among the environmental risks. In 2018–2020, we conducted field research on its effect on soil invertebrates (including the epigeon) in the submontane tier of the Giant Mountains (Krkonoše). We studied 6 pairs of sites on pistes – with and without snowmaking – at 650–750 m a.s.l., using extraction from soil, sampled in spring and autumn, and pitfall trapping. We analysed most groups of macrofauna (earthworms, millipedes, centipedes, woodlice, spiders, harvestment, earwigs, ants, two beetle families – carabids and elaterids) and microannelids (mostly enchytraeids) as representatives of mesofauna. For some groups we found a significant effect of snow-making. Significantly higher abundances and species richness on the sites with artificial snow were found for earthworms, carabid and elaterid beetles. The same trend was observed for microannelids. An opposite trend was found for millipedes and woodlice (in the latter statistically significant for abundance). For many groups there was a significant effect on the species composition of their assemblages. However, these effects (probably due to moisture) were minor; the assemblages were predominantly shaped by other factors.

PLANT-POLLINATOR INTERACTIONS ALONG AN ELEVATIONAL GRADIENT IN FORESTS OF THE KRKONOŠE MTS.

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Elevation affects pollination interactions via biotic and abiotic factors responsible for species interaction turnover and changes in the structure of interaction networks. It has been commonly hypothesised that species niche breadths increase towards elevation and thus, species become less specialised.

We studied plant-pollinator interactions in understorey of forests along an elevational gradient in the Krkonoše Mts., Central Europe. We constructed quantitative pollination networks at each elevation, based on standardised video recording of floral visitors of all plant species flowering in the studied communities during our sampling.

We asked how species richness, interaction specialisation and structure of the pollination networks were affected along the changing environmental conditions of the gradient.

We expected higher species richness and specialisation of interactions at the lower elevations because of the more favourable environmental conditions and higher interspecific competition.

We found a unimodal pattern of species richness of plants and visitors. Contrary to our expectations, we found higher specialisation of interactions at the higher elevations, i.e. negatively correlated to the interaction frequency.

LONG-TERM CHANGE IN UNDERSTOREY OF NON-MANAGED TEMPERATE DECIDUOUS FOREST: INDIRECT EFFECT OF FOREST MANAGEMENT

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Resurvey of forest understorey vegetation of 108 research plots in non-managed forests in Vihorlat Mts. was conducted in beech and oak forests after 45–48 years. Despite the larger species pool of resurvey, diversity parameters did not differ in the beech forests at all, while diversity increased in the oak forests. The majority of the species turnover is concerned with rare and non-native plant species, while the dominant species remained the same. The comparison of vegetation points to the impact of management-related disturbances. The most obvious change in vegetation of both forest types is increasing of non-native, nutrient-demanding and monocarpic species that need disturbances. We assume that large forest patches in largely intact surroundings lost fewer native species and experienced slower rates of homogenization than did smaller patches. And also that surrounding forest cover is even more strongly correlated with native species losses than is patch size alone. We hypothesized about natural changes that are connected with the ageing and fine-scale cyclic changes of forest stands, but we did not observe the impact of this factor which should influence indicator species. We hypothesized that the main factor driving changes in species composition of resurveyed vegetation is forest management. And surprisingly, even in the case of a non-managed forest. Thus, our results provide strong evidence that forest management in surrounding stands affects forest understorey in non-managed forests and could lead to the increasing frequency of non-native species influencing species diversity and composition in the future. These results could have important implications for conserving temperate forest diversity.

HEMIPARASITIC PLANTS VS. INVASIVE ASTERACEAE: EFFECTS OF SPECIES IDENTITY AND GENOTYPE SELECTION.

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Hemiparasitic plants were recently suggested as biocontrol agents for plant invasions; however, the experimental evidence is still scarce. We conducted a pot experiment combining two annual species – *Melampyrum arvense* and *Rhinanthus alectorolophus* with two invasive species *Solidago gigantea* and *Symphytotrichum lanceolatum*. We tested the effect of host and hemiparasite species identity on the outcome of the interaction. In addition, we used seeds of different origins to test the adaptation of different genotypes to particular host species.

Both hemiparasitic species suppressed both invasive species. Of the combinations, *M. arvense* inflicted the strongest growth reduction to *S. gigantea*, reducing *S. gigantea* biomass by 75%. We also observed some significant effects of different seed origins of the hemiparasites; e.g. *R. alectorolophus* grew significantly better with *S. lanceolatum* if its seeds were sourced from mother plants grown in *S. lanceolatum* monostands.

Native hemiparasitic plants can significantly suppress non-native invaders, but the extent of the suppression is species-specific. In some cases, the interaction may be further modified by genotype adaptation to the host.

INFLUENCE OF MANAGEMENT PRACTICES ON ARTHROPOD COMMUNITIES IN DRY SPECIES-RICH GRASSLANDS IN THE WESTERN CARPATHIANS

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Semi-natural grasslands are very important for maintaining arthropod biodiversity in Central Europe, but their condition depends on the type and intensity of grassland management. In a small-scale field experiment at two sites in the White Carpathians and Vsetínské vrchy Mountains, the response of six arthropod taxa (Arachnida, Auchenorrhyncha, Heteroptera, Orthoptera, Chrysomelidae and Curculionoidea) to four different management methods (mowing, sheep grazing, sheep grazing combined with burning, and abandonment of use) was studied. Arthropods were collected in forty experimental plots (5 × 5 m) with standardized suction sampling four times per season for three consecutive years. The highest abundances and species richness of arachnids and predatory true bugs and the highest abundances of Auchenorrhyncha and Curculionoidea were found in the abandoned plots. On the other hand, many arthropod species, including a number of threatened taxa, preferred regularly managed plots. Grazing increased the species richness of Auchenorrhyncha and Chrysomelidae. Burning in combination with grazing was not beneficial for maintaining high species richness in any arthropod group. Both changes in spatial structure and species composition of vegetation and direct effects of management were likely responsible for significant differences in species composition of all arthropod groups studied between differently managed plots.

DRIVERS OF WIND MORTALITY ASSOCIATED WITH SEVERE WINDSTORMS IN PRIMEVAL MOUNTAIN FOREST

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Global increase in frequency of forest disturbances has arisen the question what are the driving forces of tree mortality following severe windstorms in mountain mixed European temperate forests. Hence, our multidisciplinary study aimed to elucidate the key factors of tree resistance to historical severe disturbance events in the Boubínský Primeval forest (Šumava Mts., CZE), by using tree census, dendrochronological and soil data. The tendency of trees toward fall is primarily driven edaphically, limiting severe events non-randomly to previously disturbed sites, promoting the existence of a spatially-explicit mixed disturbance regime. The results demonstrate that tree stability is also related to previous tree growth and disturbance history in the vicinity. While trees disturbed by Herwart storm (2017) had usually recruited in open canopy gaps and experienced only one severe release event, surviving trees had characteristically regenerated under the canopy and were repeatedly released. Slow growth with several suppression periods emerged as the most effective tree strategy for withstanding severe windstorms, dying of senescence in overaged life stage. We conclude that the presence of such ancient, high-density wood trees contributes significantly to the resistance of an entire stand to severe storms.

IMPACT OF ACTIVE CONSERVATION MANAGEMENT ON SPIDERS AND CARABID BEETLES IN A PROTECTED OAK FOREST

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Central European lowland oak forests have been managed by diverse traditional silviculture practices for millennia which created mosaics of heterogeneous conditions for a variety of arthropods. However, the conservation and introduction of a non-intervention regime in lowland oak forests during the 20th century has led to an overall homogenization of these ecosystems. Recently, active interventions have been reintroduced in some protected localities in the Czech Republic.

The aim of the present study was to investigate the impact of active logging interventions on spiders and ground beetles in formerly coppiced oak forests in the Podyjí National Park. These forests were conserved for a total of 70–80 years without any active management. We studied the effect of management on species richness, abundance and conservation value. Sampling took place within 18 plots distributed equally among three types of management.

We discovered a substantially diversified spider and ground beetle assemblage with a large presence of rare species characteristic of endangered open habitats. Higher species richness of spiders and ground beetles was found in habitats under active interventions and/or naturally open and sparse forest. Species of conservation concern prevailed in open and sparse habitats under active interventions.

The study was financially supported by the Specific University Research Fund of the FFWT Mendel University in Brno (Reg.Number:LDF_TP_2020006)

BARK AND AMBROSIA BEETLES ON NATIVE AND TRANSPLANTED DEAD WOOD ALONG AN ALTITUDINAL TROPICAL FOREST GRADIENT

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Global warming is projected to shift latitudinal and altitudinal distributions of species. Against this background, the communities of bark and ambrosia beetles were sampled along an altitudinal gradient at 200, 700, 1200 and 1700 metres in a tropical forest on the slopes of Mt. Wilhelm, Papua New Guinea. Both groups form an important part of the diverse saproxylic fauna in forest habitats.

Beetles were reared from wood baits cut from five of the dominant *Ficus* species in the forest. Beforehand, baits of three species were also “transplanted” one altitude level below their natural distribution. Beetle species richness showed a mid-elevation peak with a distinct community turnover along the altitudinal gradient. Differences in beetle community were significantly affected by altitude, tree species and transplant status of the bait. Ambrosia beetle communities differed more strongly along altitudes while those of bark beetles differed more strongly between tree species. Beetle communities on transplanted baits were more similar to those on their current altitude level than those on their native altitude.

These results give further support to the notion that saproxylic beetles are less specialized in tropical forests than in temperate ones. Therefore, the beetles might find suitable hosts even after climate change induced altitudinal range shifts. However, the distinct community composition along the gradient also means a likelihood of species extinction in such a scenario.

MARINE PROTECTED AREAS OF SRI LANKA: STRENGTHS, SHORTCOMINGS AND SUGGESTIONS FOR IMPROVEMENT

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The number of Marine Protected Areas (MPAs) in Sri Lanka is increasing. However, there is a rising concern that they are just “paper parks”—areas declared as legally protected with no actual effective conservation. Decision in this matter is difficult as there is very little available biodiversity data to evaluate its evolution in time and therefore success of the MPAs. We thus chose a different approach—a review of available resources about protective measures, their enforcement, and MPAs planning and management to identify strengths and shortcomings of their factual protection. This was done by identifying their actual level and stage of protection, checking the criteria of effective protection, and identifying gaps in this data. Several patterns were recognised showing differences in factual protection between multiple categories of the MPAs. On the other hand, some of the indicators were surprisingly stable across MPA categories. Problematic enforcement of regulations, little respect towards the MPAs from local communities and lack of measurable goals and objectives were identified as the biggest shortcomings leading to harmful activities such as unsustainable fishing and tourism. Overall, focus on work with public and socio-economic issues during implementation of MPAs, and planning using goals, objectives and iterative evaluation with monitoring would be beneficial. We hope our findings can contribute to more effective planning and management of MPAs in Sri Lanka.

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RUBRIKA K VÝUCE PRO UČITELE I STUDENTY

VYDÁVÁ NAKLADATELSTVÍ ACADEMIA ZA PODPORY AKADEMIE VĚD ČR



RÉVA RAKVICE

Réva Rakvice s.r.o. je vinařská společnost, která sídlí v tradiční vinařské obci Rakvice. Historie vzniku firmy se začala psát v již roce 1995. Réva Rakvice hospodaří na vinicích vinařských obcí Rakvice a Hustopeče o rozloze 120 ha. Ve výsadbách jsou rovnoměrně zastoupeny zejména tradiční moravské odrůdy, které splňují předpoklad kvalitního vyzrávání hroznů pro výrobu výjimečných přívlastkových vín.

Ve vinařství Réva Rakvice se snažíme tvořit vína s prvky jisté dynamičnosti a s neodmyslitelným moravským temperamentem. S víny z Révy Rakvice je možné se setkat v nejširší škále prodejních míst.

V roce 2013 jsme vybudovali moštárnu, kde zpracováváme hrozny a ovoce z jižní Moravy, které dodáváme na trh pod názvem „Tekuté ovoce“ jako 100% čisté ovocné mošty s uchovaným obsahem vitamínů a minerálů.





Hospodaříme v malebné oblasti Chřibských vrchů, v Litenčicích na Kroměřížsku, ve Zlínském kraji. **Zabýváme se výrobou školkařských výpěstků** zejména běžně dostupných druhů. Nadmořská výška kolísající kolem 500 metrů, těžká jílovitá půda a drsnější podnebí vedou ke zrodu **velmi odolných ovocných dřevin**. Základem je dobrá půda, proto **hnojíme organickou hmotou**, a dále zdravý množitelství materiál. Používáme tedy certifikovaný a viruprostý výchozí materiál (rouby, podnože). Doplněním portfolia firmy jsou **sady slivoní, višní, jabloní, hrušní a meruněk v režimu SISPO, který je v souladu s přírodou, chemií šetříme a primárně využíváme bioagens a biologickou ochranu**. V extenzivních sadech krajinného rázu máme staré a krajové odrůdy typické pro naši oblast. V sadech chováme včely linie Singer a Vigor, které nám pomáhají s opylením doplňují je linie českého čmeláka ze ZVT. **Nově nabízíme také ubytování ve dvoulůžkových pokojích a také pronájem školícího sálu**. V budoucnu bychom rádi pořádali vzdělávací akce s možností praktické ukázky v sadech i ve školkách.

Abychom zajistili našim zákazníkům co nejlepší kvalitu výpěstků během vegetačního období, prostokořenné výpěstky jsou uloženy v chladící klimatizované hale a ve stínovišti probíhá celoroční prodej kontejnerovaných ovocných výpěstků. Naše školky se nachází v oblasti s ochranou spodních vod a proto využíváme mechanizaci před chemií.

Jsme členy Ovocnářské unie České republiky, Školkařského svazu OUMS ČR, ZUČM, VSČR a SISPO. V rámci výzkumu spolupracujeme s Mendelou Brno, Vukoz Průhonice, VŠÚO Holovousy.



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BIO A TRVALÁ UDRŽITELNOST

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Dalí jsme si za úkol, aby hospodářský růst a udržitelnost mohli jít ruku v ruce. A podařilo se.



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