HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

LUOVA
DOCTORAL PROGRAMME IN WILDLIFE BIOLOGY RESEARCH

LUOMUS
FINNISH MUSEUM OF NATURAL HISTORY

Programme and Abstract Book

Infokeskus, Viikki Campus, University of Helsinki
4th – 6th March, 2024

Acknowledgements

Organizing Committee

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Acknowledgements

The 2023 Spring Symposium Organizing Committee
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Mark Christie (Keynote speaker)
Doctoral Programme in Wildlife Biology (LUOVA)
The Finnish Museum of Natural History (LUOMUS)
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Logo designer

A big thanks to **Michelle García Arroyo**, who designed the logo for the 33rd Spring Symposium and won 1st place in the logo competition. We are also grateful to all the other competitors who submitted their beautiful logo designs.

Welcome!

Welcome to the 33rd LUOVA Spring Symposium!

With its roots in 1990, and officially named in 1992, the Spring Symposium is an esteemed tradition of the University of Helsinki; a high-profile seminar for PhD and Master's students of ecology, evolution, conservation and systematics to present their work. This is the first conference experience for many students (including for us organisers over the past few years!), representing a safe and supportive environment to practise giving talks and poster presentations, as well as to learn the conventions and etiquette of conferences in the grown-up academic world we are entering.

We believe that this year's program perfectly represents the rich diversity within the LUOVA doctoral program (and more generally in environmental science research at the University of Helsinki), not only in terms of research topics and study environments ranging from land to water to sky, but also with regard to the varied backgrounds and perspectives that make up our academic community.

We hope that you enjoy attending this year's symposium as much as we enjoyed organising it!

The Organizing Committee,
Eetu, Ella, Magnus, Patrick, Raphael, Sonja & Zowi

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33rd LUOVA Spring Symposium

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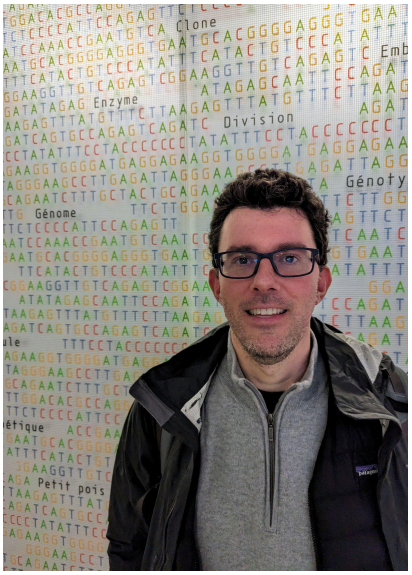
Keynote speakers

Andy Gardner

Andy Gardner is a Professor of Biology at the School of Biology, University of St Andrews, Scotland, working on Darwinian adaptation. He graduated with his PhD in 2004 at the University of Edinburgh, working on theoretical population genetics. He develops general theory on the topics of inclusive fitness and multilevel selection, and also tailors general theory to the biology of particular species to facilitate empirical testing. Andy works on a wide range of biological systems, including viruses, bacteria, protozoa, crustaceans, insects, arachnids, fish, mice and humans.

Gerlien Verhaegen

Gerlien Verhaegen is a postdoctoral researcher working on the ecology and evolution of deep-sea and/or polar jellyfish at the University of Greifswald and the Alfred Wegener Institute, in Germany. She graduated her PhD in 2018 at the University of Greifswald, working on the adaptation and phenotypic plasticity of a worldwide invasive freshwater snail. She then transitioned her focus to deeper and saltier waters for her first postdoc, discovering a passion for midwater jellyfish at the Japan Agency for Marine- Earth Science and Technology. Her current project focuses on studying the diversity, distribution, ecology, and genetic connectivity of Southern Ocean gelatinous zooplankton. For this she is applying a broad range of techniques, from ecological niche modelling, population genetics, to environmental DNA.



Mark Christie

Mark Christie is an Associate Professor at Purdue University in the Department of Biological Sciences and the Department of Forestry and Natural Resources. He completed his BS at Boston University, and PhD at Oregon State University titled “Larval dispersal in marine fishes: Novel methods reveal patterns of self-recruitment and population connectivity”. Following postdocs in genetic effects of salmon hatcheries (Oregon State University) and agent-based modeling, habitat corridors, riverscapes (University of Michigan), he started as an Assistant Professor at Purdue University in 2014. Mark’s lab's research integrates rapidly-advancing molecular and analytical tools to ask a broad array of ecological and evolutionary questions. Using these tools, they answer questions in both basic and applied ecology and evolution, often focusing on successful conservation and management outcomes.

Abstracts

Day 1 (Monday, 4th March)

Keynote talk: Andy Gardner

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Twitter (X): *@drandygardner*

The inclusive-fitness revolution

I work on Darwinian adaptation. Natural selection explains the appearance of design in the living world, but at what level is this design expected to manifest—gene, individual, society—and what is its function? Social evolution provides a window on this problem, by pitting the interests of genes, individuals and societies against each other. I will discuss the foundations, motivations and applications of the theory of inclusive fitness in order to assess recent calls for a complete rethink of evolutionary theory.

Session 1 (Morning)

Inari Nousiainen (LUOVA)

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Population demographics of European passerines: role of survival and productivity

According to the European Red List of Birds 2021, in Europe one out of five bird species are threatened or Near Threatened by extinction. Among breeding birds, decline in Europe from 1980's is estimated to be 17-19%, which counts for 560-620 million individuals. Main drivers behind the current bird population declines in Europe are generally anthropogenic origin. Especially important drivers are land-use change and climate change. However, responses to these drivers may vary between species, habitats, or latitudes, which in turn makes conservation efforts harder to target. Therefore, importance to understand the European bird population trends is needed now more than before and the need is rising. To understand population trends, it is first important to study demography of birds, especially productivity and survival, and factors affecting them. Particularly survival of birds in Europe has been less studied demographic parameter, as studies considering it has been mainly focusing only certain species or countries, with some exceptions. However, there is still need for a European wide study about interactions between bird population trends and survival. In this presentation, we are going to look at European birds' survival, productivity and how they are explaining changes in population trends. Data behind the analyses is bird ringing data from Euring's European Constant Effort Scheme (CES) sites, from ten different countries, 12 schemes, and with 36 different species, during years 2000-2021. Data is concentrated on passerines as they are the largest bird order in Europe, with highly diverse species and many different population trends, which makes them an excellent model group for studying survivals' effect on demography. Hypothesis is, that changes in survival, more than changes in productivity, explains population trends in European passerines.

Joséphine Couet (LUOVA) she/her

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Altitudinal distributions and shifts of European mountain birds differ between slopes

Climate change is driving species towards higher elevations. While local shifts in altitude are well-documented, patterns across entire mountain ranges are less understood. Abiotic factors, such as topography and solar radiation can affect the speed of these shifts on mountain slopes. Solar radiation's impact on biodiversity is evident, but studies have mostly focused on plants, invertebrates, and amphibians, and only at a very fine scale. In our study, we adopted a cross-scale community approach to quantify the impact of solar radiation on the mean altitude and altitudinal shifts of bird species across European mountain ranges of the Alps, Pyrenees, Scandinavia and UK over an 18-year period. We found that bird communities tend to inhabit higher altitudes on slopes receiving more solar radiation. Specifically, the mean altitude of birds was, on average, 43 meters lower on slopes with low solar radiation and 68 meters lower on slopes with medium solar radiation compared the mean altitude of birds on high solar radiation. Over time, altitudinal shifts were faster on medium solar radiation slopes, which was particularly evident in the continental analysis, the UK uplands, and the Alps. Our findings underscore the significant influence of abiotic factors on the bird altitudinal shifts. Identifying areas with accelerated shifts is crucial for tailoring local conservation strategies effectively.

Basile Marteau (LUOVA)

https://www.youtube.com/watch?v=EmbfgcAMaOs

Vernal pools, temporary wetlands which may enhance duckling success

Vernal pools are small temporary wetlands occurring in shallow depressions usually filled with precipitation in autumn and winter. They will dry seasonally, which makes them fishless ponds devoid of large aquatic predators. These habitats have been largely understudied and are not protected in Finland, thus they have been and are still degraded for forestry activities or other purposes. The study aims to compare the weight intake and survival rate of farmed mallard (*Anas platyrhynchos*) ducklings reared in lakes as compared to ducklings reared in vernal pools. Each day, ducklings are brought to the study sites (vernal pools or lakes) for 4 hours to feed. They are weighed before and after the release into the sites, which reveal how well they can find invertebrates in their environment. Food availability in the different sites was controlled through aquatic invertebrate trapping and emergent insect trapping. Our analysis showed that ducklings feeding in the vernal pools had higher weight and had higher survival rate than the ones from the lakes. These results suggest that vernal pools are an attractive and important habitat for the breeding success of duck populations.

Session 2 (Afternoon)

Gloria Murari (LUOVA)

Resolving parental conflict over care: coordination, compensation or character?

The emergence of parental care represents a major evolutionary transition and is thought to give rise to more complex forms of social structures. In species where parents both provide care, conflicts of interest arise and understanding how sexual conflicts like these are resolved has long been a major focus of behavioural ecology. The most tested model predicts that sexual conflict leads to less care than is optimal for the young to avoid exploitation. While many studies support the prediction that parents negotiate, in other individuals match their partners' investment or do not respond. A second theory introduces a "conditional cooperation" strategy in which parents monitor each other's efforts by turn-taking to gather complete information and maximize care. A major gap in our knowledge is that most tests have focused on only one aspect of care (provisioning) but parental care comprises many activities that could be used by parents to gain information. Similarly, little is known about the role of individuals' personality in resolving sexual conflict. A parent's personality can correlate with care and pairs with similar personalities may have greater reproductive success. Therefore, understanding how sexual conflict over care is resolved requires integrating knowledge on individual-level differences across parental care tasks. During my PhD, I will tackle this problem by testing the common redstart (*Phoenicurus phoenicurus*): first I will describe coordination between partners and assess reproductive success – I expect strong coordination to result in improved survival of the brood. During the second field season I will assess compensation for the loss of a partner, and I expect different responses based on the type of task. While the individuals are held captive, I will examine their personality and assess whether it covaries with either coordination or compensation. I expect higher level of coordination and of compensation in pairs with more similar personalities.

Theo Brown (LUOVA)

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Testing Flash Coloration in Wild Avian Predators: Delayed Detection of Conspicuous Prey in Motion.

Colouration serves diverse functions in the natural world, from extravagant mating displays to camouflage. While protective colouration has been extensively studied across taxa, empirical testing of colour's function in moving prey presents inherent challenges. Here, we employ a novel Touchscreen Operant Chamber (TOC) to investigate how wild avian predators respond to prey exhibiting flash colouration, in which conspicuous colours are only visible when in motion; this 'flashing' is thought to bewilder pursuing predators. Our research reveals a significant delay in the detection of prey displaying conspicuous colours during evasion, supporting the classic tenets of flash colouration theory. While previous research has centered on anatomy-based ecological predictions and experiments using humans, our study provides pioneering empirical support for flash colouration in the context of wild predators. This sheds new light on the complex interplay between prey colouration and predator behaviour.

Deryk Tolman (LUOVA) he/him

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Can social interactions rescue "lost" behavioural defences in an allopatric host of cuckoos?

Social information use by cuckoo-hosts provides an excellent example of how social interactions within species can influence selection on another. Neighbours observe each other's mobbing behaviour towards cuckoos, and then adjust costly defences back at their own nest in response. However, if the 'cultural memory' of cuckoos is lost, can this plasticity in defences be rescued? This is fundamental for cuckoo-host coevolution, as the rates at which host defences are lost, gained, or retained determines evolutionary dynamics. Using populations of reed warblers at the northern- and southernmost extents of their range, we designed a field experiment to test whether populations allopatric to cuckoos (i) still recognise cuckoos as a threat, (ii) respond to social cues to upregulate defences, and (iii) vary in their strength of social responsiveness. We found defences and social responsiveness to be weaker in the south, where there is a much longer history of allopatry. In the north, only birds that retained recognition of cuckoos showed social responsiveness: social information about cuckoos did not increase hosts' propensity to attack (whereas it doubled in the range core), but it did increase the strength of mobbing in the 30% of birds that recognised the cuckoo at the northern range front. Most importantly, however, experimental cuckoo eggs remained in the nest, whereas in previous experiments elsewhere the same social information increased egg rejection ten-fold. This suggests that social responsiveness is more limited at the range edges, under relaxed selection, and this would incur little immediate cost to cuckoos' fitness if they (re)invade. Our study provides a rare example of geographic variation in social information use and highlights how current range expansions may influence the outcome of future species interactions.

Session 3 (Afternoon)

Linnea Kivelä (LUOVA)

Color-sensitive phototaxis in male common glow-worms

Light pollution is a severe threat to nocturnal species, especially insects. The attraction of moths and other insects to short-wavelength (blue and UV) light is a well-known phenomenon with often harsh, even fatal consequences. Adjusting the spectra of outdoor lights towards longer wavelengths has been proposed as a mitigation measure, but the effectiveness of this approach is likely to vary between species. In this study, we assessed the color sensitive phototaxis of male common glow-worms, a species of nocturnal beetle known to be negatively affected by artificial light at night, with especially white light interfering with mate finding. We quantified light attraction using an experimental arena illuminated from one end with either white, yellow, red, or no artificial light. Male glow-worms displayed attraction towards yellow and red light, but repulsion and reduced activity in white light. The results indicate that outdoor lights with long-wavelength spectra could result in an evolutionary trap for male glow-worms through light attraction, and thus recommendations of spectral tuning for the benefit or glow-worms or other nocturnal insects should be made with caution.

Camila Souza Beraldo (LUOVA) she/her

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The bacterial community composition of an insect community is predominantly explained by among-species rather than within-species variation

Microbial communities associated with wild host species are susceptible to environmental changes. Evidence for this have been provided in a diversity of species that rarely, or never, share the same habitat. To better evaluate the relative effect of host species versus environment changes on the composition of the microbial communities associated with species, we need to compare the bacterial microbiota among and within species communities. Here, we sampled insects associated with the ribwort plantain, *Plantago lanceolata* from 30 sites across the Åland Islands, Finland. Each site evolves under different anthropogenic pressures. We first amplified the mitochondrial cytochrome oxidase I (COI) genes to characterize local host species richness, and then amplified the bacterial 16S rR from eight common species. We found slight variation in the microbiota within species, with time of the collection inducing a shift in the microbial composition in two species. We also found high variation among insect species, regardless of the site where the insect host was collected, linked to changes in the local insect community diversity. We suggested that seasonality affects the insect community and the microbial pool present at the site. Additionally, a deeper analysis of the haplotype of some common symbiotic bacteria (i.e., *Wolbachia* and *Rickettsia*) provided evidence for the horizontal transfer of these microbes between their interacting host species. In this insect community, host species, host diversity, ecological interactions, and seasonality appear as significant players in the composition of the species microbiota, while habitat degradation has little impact.

Linyang Sun (LUOVA)

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The community structure of the Bacterial microbiota of a butterfly responds to long-term climate change: A 30 years survey

Global warming and other anthropogenic activities have been identified as the causes for the erosion of species communities at all taxonomic levels, including microbial communities. For example, studies suggest that rising temperatures have led to a reduction of 30-40% in microbial populations of soil material, and of microbial communities associated with diverse marine and terrestrial organisms. However, these conclusions have often if not only been tested in laboratory settings, while natural environments offer more complex environmental stressors. To investigate how wild symbiotic microbial communities vary through time, I will use 30 years of sampling data from the long-term monitoring project of the *Melitaea cinxia* butterfly metapopulation, and will characterize the microbiota associated with the specimens by amplifying and sequencing the 16S rR bacterial gene. Through microbial community comparisons and community ecology analyses, I will analyze differences in overall diversity, changes in microbial community composition through the 30 years, and identify the effect of rising temperatures, and other local environment factors on these host-symbiont interactions.

Session 4 (Afternoon)

Zowi Oudendijk (LUOVA)

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De novo synthesized pyrazines in tiger moths: ecology, evolution and prevalence

Predation is one of the most potent and pervasive forces driving the evolutionary trajectory of prey species, shaping their characteristics, behaviours, and adaptations. Among the diverse array of antipredatory defence strategies, the utilization of defensive toxins has become a pervasive tactic adopted by animals, plants, and microorganisms to deter their natural enemies. While traditionally believed to be acquired from the diet, recent discoveries have revealed some species' ability to synthesize complex compounds de novo, internally. This ability raises intriguing questions about the prevalence and mechanisms of de novo synthesis, removing the need for resource-intensive searches for external sources. Pyrazines, volatile nitrogen-containing compounds, serve as odour signals to repel predators and are widely found in plants, insects, fungi, and bacteria. Herbivorous insects have been believed to acquire methoxypyrazines (MPs) primarily through sequestration from their host plants, while the exploration of de novo synthesis of MPs remained largely unexplored. We examined 56 Arctiinae species, that are known to have complex chemical defences across their phylogeny from diverse geographic regions to investigate reflex bleeding as a defensive strategy, the presence of pyrazines in their defensive fluids, and the occurrence of methoxypyrazine de novo synthesis. Our findings suggest that reflex bleeding is widespread in this group, but pyrazine production is limited to the *Arctia* and *Spilosoma* genera and exclusively to the Holarctic species. We discuss the ecological drivers that may have shaped the evolution of these defensive strategies in this group.

Lola Fernández Multigner (LUOVA) she/her

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Genetic diversity in range shifting butterflies

Species responses to climate change include adapting in place or tracking suitable conditions in space or time. Range shifts can, however, greatly impact species at the genetic level, causing lower genetic diversity in the expanding than in the core populations due to colonization events, lower densities, and selection pressures. These processes are also shaped by the landscape characteristics along the range, due to habitat availability and spatial distribution impacting population connectivity and gene flow, further influencing genetic diversity. While selection may allow species to adapt, rapid genetic diversity loss, may limit long-term adaptive potential for species coping with climate change through range shifts. Alternatively, successfully expanding species could be avoiding genetic diversity loss by maintaining enough gene flow between populations, for which habitat connectivity is determinant, and positive population trends given that they are dispersive enough. In Finland, numerous butterfly species have expanded northwards in response to climate change, prompting a study on how landscape, climate, and range shifts affect their genetic diversity. For my PhD, I aim to first analyse genetic diversity patterns and selection pressure across northern distribution ranges of expanding and non-expanding butterfly populations, by sampling and sequencing populations from the northern border and the core of the distribution area in Finland. Next, I will develop spatial models to define how landscape and climate influence species distribution and genetic patterns at a finer scale. Finally, I will simulate potential genetic diversity changes under various climatic scenarios, considering habitat restoration and individual translocation. The findings will be used to suggest conservation measures that consider the interplay between genetic diversity, range shifts, and landscape factors.

Ulla Riihimäki (LUOVA)

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Impacts of landscape structure on butterfly flight ability

Land use is one of the key drivers in the current biodiversity change with agricultural intensification impacting natural habitats worldwide. Intensified land use can impact both within and outside of species habitats. Dispersal influences species ability to survive and adapt to changes in their surrounding landscape and studies assessing among species variation in dispersal suggest that species with better dispersal abilities are more likely to survive these changes resulting from intensified land use. Less is known about whether landscape structures affect intra-specific variation in dispersal ability and whether this differs between species. In this study we used three grassland butterfly species; meadow brown (*Maniola jurtina*), green-veined white (*Pieris napi*) and essex skipper (*Thymelicus lineola*) to assess the impact of landscape structure on intra-specific variation in dispersal ability. More specifically, we assessed Flight Metabolic Rate (FMR), shown to be a good proxy for flight ability in butterflies, from wild-caught female butterflies originating from two different types of landscape types; habitats surrounded by agricultural fields and more natural or semi-natural meadow landscapes in the Åland archipelago, South-West Finland. Even though in all species considerable intra-specific variation in FMR was evident, only in *M. jurtina* butterflies originating from agricultural landscapes had a higher peak FMR compared with butterflies originating from more natural landscapes. Among specie, differences in dispersal proxies (e.g. FMR, mass and wing size) did not provide coherent patterns. Overall, our results thus suggest that land use, at least in some species, can impact within species variation in dispersal. We are currently aiming to understand whether the difference in flight ability observed in *M. jurtina* between the landscape types is evident also via population genetic analyses.

Day 2 (Tuesday, 5th March)

Keynote talk: Gerlien Verhaegen

Helmholtz Young Investigator Group ARJEL & Functional Ecology, The Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Bremerhaven, Germany

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Deep-sea jellyfish studied from your living room

The ocean's midwater (between the euphotic zone and seafloor) is the largest continuous biome on our planet and is drastically under-sampled. As pelagic ecosystems are being widely acknowledged for their relevance in ecosystem services, our knowledge gap of the midwater is becoming an increasing problem as it hampers our ability to predict how it will be affected by global change and anthropogenic pressures. Gelatinous zooplankton dominate the midwater trophic web, playing important roles, for instance, as filter feeders and predators. One way to test hypotheses regarding their ecology, distribution, diversity, and even differentiation processes is through ecological niche modelling in three dimensions. With the increasing availability of online deep-sea biogeographic, imagery and videography databases, studying this hard-to-reach vast ecosystem has become possible even from your living room.

Session 5 (Morning)

Oliver Andersson (LUOVA)

Unexpected opsin expression as a clue to the mystery of visual adaption in the opossum shrimp *Mysis relicta*

Here we present candidate opsin genes identified in the crustacean *Mysis relict*a, which potentially could explain spectral adaptation observed in the species. The *Mysis* genus of opossum shrimps has been used as a model for spectral adaptation to differences in aquatic light conditions for almost 40 years in the Baltic. The wavelength of maximal absorption (λmax) of single rhabdoms and spectral sensitivity at the level of the whole eye of different populations has been shown to correlate with the wavelength of maximal transmission of light in their habitats. Based on these two parameters, populations of the *Mysis relicta* species group cluster into two spectral groups, broadly corresponding to brackish-water (sea) and fresh-water (lake) habitats, indicating a reaction norm of opsin expression. Spectral tuning of visual pigments (changing λmax) is probably achieved by variations in the expression of at least two opsin genes. However, previous studies have been able to identify only one opsin gene with no polymorphisms in the populations of interest. Our results however indicate that this opsin gene is not at all expressed in eye tissue of *M. relicta*, suggesting that its function is elsewhere than in vision. To exclude methodological inadequacies present in earlier studies, we performed whole-genome NGS. By this method, we were able to identify several candidate opsin genes, the exact number and sequences currently being confirmed by full-length R-sequencing. Tissue-specific gene expression will be profiled to identify the opsins related to vision. Differential expression of these genes could explain spectral adaptation on a physiological time scale in *M. relicta*, although the controlling environmental factor remains unknown.

Emmi Olkkonen (LUOVA) she/her

Effect of low population size on genetic and phenotypic variation: A case study on Saimaa ringed seals

The survival of populations is commonly thought to benefit from high genetic and phenotypic diversity, both of which are considered to decrease with smaller population sizes. However, the connection between population size and the amount of genetic variation, but also between genetic and phenotypic diversity, remains elusive. Saimaa ringed seals, an endangered species of freshwater seals endemic to Finland, are an excellent model species to address the longstanding question. The population went through a drastic human-inflicted bottleneck in the previous century (less than 200 individuals in the 1980s). Despite the recent recovery of the population (480 seals in 2023), this bottleneck, together with their geographical isolation since the last ice age has led to low genetic diversity within the population. We assess the link between population size, genetic variation and phenotypic variation by analysing almost 300 sequenced genomes from four ringed seal populations differing in size, focusing specifically on Saimaa ringed seals. Dental variation, divided to anomalous and non-anomalous, is used as a proxy for phenotypic variation. Through phenotype-genotype association mapping, we have identified a candidate region associated with anomalous dental variation, a phenotype more common in Saimaa than larger subspecies of ringed seals. Through additional analysis, structural variation was located within this region. In summary, our results indicate a genetic component for the anomalous dental phenotype, which might link to the accumulation of harmful genetic variation in the severely bottlenecked Saimaa seal population.

Pauli Putkiranta (DENVI) he/him/any

Phenological monitoring of emergent aquatic vegetation with remote sensing data fusion

Lakes make up some 6% of Arctic land surface area, and are typically small, shallow, and thus relatively high in proportional vegetation coverage. Emergent freshwater vegetation increases methane emissions but exhibits significant interannual and spatial variability. This interannual variability and a potential climate-driven increase in emergent vegetation cover imply a climate feedback mechanism. However, understanding of emergent vegetation dynamics on landscape scales under global change is lacking, a problem that remotely sensed time series data could address. Presenting a work in progress, I will explore the potential of remote sensing tools – in particular active satellite imaging and radar constellations, employed in a machine learning data fusion state-space modelling approach – to track the phenological cycle of emergent aquatic vegetation in the context of small northern lakes. I will also address the use of these methods in real-time monitoring and backward projection as tools to answer variable ecological and environmental-change-related research questions.

Session 6 (Afternoon)

Sini Bäckroos (LUOVA)

Impact of light pollution on reproduction in the threespine stickleback

The use of artificial light at night is rapidly growing around the world. Research has so far focused on effects on terrestrial ecosystems, but aquatic ecosystems - and especially coastal ecosystems – are also increasingly affected. The purpose of this project is to assess the effects that artificial light at night, ALAN, has on the reproductive success of a key species of the Baltic Sea, the threespine stickleback (*Gasterosteus aculeatus*). The species regulates the abundance of a range of other species, through its consumption of herbivores (which in turn influences the biomass of algae) and by serving as prey for piscivorous fishes and birds. Thus, changes in the population dynamics and distribution of the stickleback could have far reaching consequences for the ecosystem. By altering light conditions during the night, using LEDs of different colours, we are investigating the impact that ALAN has on reproductive maturation and reproductive behaviour in the stickleback, including courtship behaviour, mate choice and parental care. We are further assessing how changes in these behaviours and physiological states influence reproductive success, as well as the consequences ALAN has for the viability of the offspring. The initial results from the experiments will be presented.

Tawfiqur Rahman (LUOVA) he/him

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Warming alters the top–down effect of a common mesopredator in an aquatic food web

Global warming is altering the composition and functioning of both terrestrial and aquatic ecosystems. Most research has focussed on direct effects of warming on species and their population dynamics, while less is known about indirect effects through species interactions. Trophic cascades are especially likely to influence the effects of warming given that trophic levels differ in their response to warming because of differences in metabolism and vital rates such as growth and reproduction. We investigated if the top–down effect of a common mesopredator, the threespine stickleback, alters the impact of warming on a Baltic Sea food web. We manipulated both temperature and the presence of stickleback in mesocosms, and found the stickleback to alter the impact of warming on lower trophic levels. This was through increased consumption of herbivores that exceeded the rate at which the herbivore population could grow under higher temperature, which in turn increased algae biomass compared to a scenario without stickleback, but not compared to conditions under normal temperature. Thus, the mesopredator increased the transfer of biomass to higher trophic levels of the food web when temperature was increased. This stresses the importance of considering the impact of warming on multiple trophic levels and their interactions. Failing to consider differences in responses among trophic levels and the impact this has on their interactions can result in faulty conclusions about the impact of warming on ecosystems.

Session 7 (Afternoon)

Iris Orizar (LUOVA)

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Traits and trade-offs: The quest of phytoplankton to overcome the challenges of salinity fluctuations

As the aquatic ecosystem continues to undergo unprecedented changes due to climate change and anthropogenic activities, the quest of the phytoplankton community to remain one of the sentinels maintaining life on this planet continues. The phytoplankton community is the primary food source of the aquatic organisms, consuming carbon dioxide and producing oxygen in the process. One of the challenges that the phytoplankton community faces is salinity fluctuations, affecting their growth, ecosystem functions, and services. My study aims to advance our knowledge of how the phytoplankton community is affected by salinity fluctuations by analyzing their trait response in mono- and polyculture conditions. The trait-based analysis links species response to environmental changes and ecosystem functioning. My results showed intra- and interspecific trait variation along the salinity gradient among different phytoplankton species. The intraspecific variations broaden the salinity range in which phytoplankton species can thrive, but freshwater conditions proved problematic, as demonstrated by reduced growth rate and lower particulate carbon concentration. The polyculture under limited light and nutrient conditions suffers the most under freshwater conditions, wherein a number of the species showed poor growth, resulting in low resource use efficiency and low particulate carbon concentration. In conclusion, my study showed system freshening can present sublethal to lethal conditions to many phytoplankton species, affecting their growth and ecosystem functioning, warranting further research as salinity conditions are predicted to shift to more extreme conditions as an effect of climate change.

Catharina Uth (LUOVA) she/her

Phytoplankton community composition is a key driver of autochthonous organic carbon dynamics (in coastal environment)

The seasonal change in environmental conditions favors different groups of phytoplankton species resulting in community shifts and varying carbon dynamics. However, anthropogenic effects on the seasonal cycle alter the composition and diversity of phytoplankton communities, which can have a cascading impact on carbon flows and storages in coastal ecosystems. Our study focuses on the effect of phytoplankton community seasonal change on the carbon cycle in the Baltic Sea. We collected samples roughly every other week, for one year, from two stations in the coastal Gulf of Finland to follow the changes in phytoplankton composition and evenness and estimate the pelagic carbon stock. In addition, we deployed sediment traps every season to assess carbon export to the seafloor. The spring phytoplankton community was dominated by diatom species (95%), which potentially results in higher carbon transport to the seafloor due to their high sinking velocity. The summer and autumn communities consisted mainly of cyanobacteria (63%) which can form high biomass, but have low sinking potential allowing for higher carbon emission to the atmosphere. The highest POC/PON ratio occured during February (9.6 mol/mol) and lowest values were measured in November (2.1 mol/mol), suggesting the highest carbon accumulation in the water column in spring. Overall, our study emphasizes the importance of phytoplankton community composition to the carbon cycle dynamics and highlights the need for seasonal monitoring to fully understand the carbon transport from pelagic communities in coastal areas.

Tjardo Stoffers (LUOVA) he/him

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Effects of climate change induced dominance shifts in zooplankton community composition on the carbon cycle

Anthropogenically induced climate change has affected the marine environment by ocean warming, acidification, changed nutrient loads and changed salinities. Due to its long water exchange time, shallow depth and low salinity, the effects in the Baltic Sea happen earlier and stronger than in other seas. For instance, the Baltic Sea has already faced temperature and salinity fluctuations that most other seas will only experience in the future. These changes alter zooplankton communities in terms of community composition or functional diversity with a reported shift towards smaller organisms and a loss of zooplankton biomass. Ultimately, changes in zooplankton community composition can alter the functioning of the biological carbon pump in terms of carbon uptake, transport and export as the potential decrease in zooplankton size could weaken the transport of organic material to the seafloor. In this study, zooplankton data from the long-term monitoring site Tvärminne Storfjärden in the Gulf of Finland, northern Baltic Sea, spanning 55 years, are analysed to identify changes in zooplankton community composition and model future developments. The results show a decline in the abundance of larger zooplankton species and a concurrent increase of smaller zooplankton species due to rising temperatures and decreasing salinity. Based on these results experiments will be conducted to identify direct (e.g. respiration rates, carbon export in form of excretion and CH4) as well as indirect effects (e.g. grazing pressure) of the changed community structure on the carbon cycle.

Session 8 (Afternoon)

Janina Pykäri (LUOVA) she/her

Carbon stocks of several trophic levels in shallow coastal ecosystems

The carbon cycle is a hot topic due to climate change. Coastal ecosystems, although only covering a small area of the global ocean, can sequester notable amounts of carbon. However, the carbon cycle in the very shallow zone, at ~1 m depth, hasn't been studied extensively. In addition, many carbon stock quantifications have focused only on a single trophic level. In this talk, I will present results from a study quantifying the carbon stocks of four pools (vegetation, epifauna, infauna, and fish) at relatively exposed, shallow beaches and bays in the Northern Baltic Sea. We found out that vegetation was the biggest biotic carbon pool, followed by infauna, whereas the carbon stocks of epifauna and fish were smaller. Filamentous algae were the biggest contributor to vegetation carbon stock, representing a transient storage of carbon, whereas the role of long-living bivalve, *M. balthica*, was important for infauna carbon stock. Variation in the C stocks of the different biotic components were governed by different environmental and diversity-related factors; the most important being fine sediment and sediment organic matter occurrence.

Roel Lammerant (LUOVA)

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A functional perspective on the factors underpinning carbon storage in macrophyte communities

To date, studies on carbon storage in seagrass and other aquatic plant communities have mainly focused on mono-specific stands, typically ignoring that coastal areas can be heterogeneous, where multiple species with a range of trait characteristics may influence carbon storage differently across seasons and spatial scales. With few studies having assessed how functional traits link to carbon storage in aquatic plant communities, we sought to explore (i) the relationship between functional community composition and biomass-bound carbon stocks, (ii) the role of spatial context and (iii) how functional traits shape seasonal fluctuations of non-structural carbohydrates. We conducted multiple field surveys in the Baltic Sea, Finland, where we sampled plant communities and measured nine traits that capture the key variation in plant life-history strategies. We found that functional composition was associated with plant carbon stocks and this relationship was mediated by spatial heterogeneity. Non-structural carbohydrates varied significantly through time, with the amount stored in leaf tissue throughout winter being tied to leaf functional characteristics. Our results indicate that the underlying biological mechanisms influencing carbon storage are affected by community trait composition, underlining the importance of using functional traits as a tool to assess the role of aquatic plant biodiversity for ecosystem functioning.

Yuhan He (LUOVA)

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Carry-over effect of artificial light at night on daytime mating activity in an ecologically important detritivore, the amphipod *Gammarus pulex*

Artificial light at night (ALAN) is a growing environmental problem influencing the fitness of individuals through effects on their physiology and behaviour. Research on animals has primarily focused on effects on behaviour during the night, while less is known about effects transferred to daytime. Here, we investigated in the lab the impact of ALAN on the mating behaviour of an ecologically important freshwater amphipod, *Gammarus pulex*, during both days and nights. We manipulated the presence of ALAN and the intensity of male-male competition for access to females. We found the impact of ALAN on mating activity to be stronger during the day than during the night independent of male-male competition; while ALAN only reduced the probability of precopula pair formation during nights, it both decreased general activity and increased the probability of pair separation after pair formation during the day. Thus, ALAN reduces mating success in *G. pulex* not only directly, through effects on mating behaviour during nights, but also indirectly through a carry-over effect on daytime activity and the ability to remain in precopula. These results emphasise the importance of considering delayed effects of ALAN on organisms, including daytime activities, especially as these can be more important fitness determinants than nightly activities.

Day 3 (Wednesday, 6th March)

Keynote talk: Mark Christie

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Rapid Evolution in a Changing World

Understanding how and when species can genetically adapt to changing environmental questions remains a fundamental question in ecology and evolution. If such rapid evolution can occur on contemporary timescales, then some species may be able to persist in the face of climate change, novel infectious diseases, and other anthropogenic threats. To develop a predictive framework, our lab combines genomic and transcriptomic approaches to identify signals of recent responses to selection. I will discuss empirical examples of rapid evolution in three systems: 1. Invasive sea lamprey (*Petromyzon marinus*) in the Laurentian Great Lakes that may be in the incipient stages of evolving resistance to a commonly used lampricide, 2. Pink salmon (*Oncorhynchus gorbuscha*) that were introduced to the Great Lakes in 1956 and rapidly adapted to entirely novel environmental conditions; in particular the introduced pink salmon now treat the entirely freshwater environment of the Great Lakes as a surrogate ocean, and 3. Kellet's Whelks (*Kelletia kelletii*) from California, which have expanded their range hundreds of kilometers northward in response to changing ocean conditions. I will conclude with some suggestions on how best to facilitate adaptive responses in changing environments and what genetic information we still need to best conserve biodiversity in a rapidly changing world.

Session 9 (Morning)

Sarella Arkkila (LUOVA)

The effect of agriculture and climate change on farmland biodiversity indicators.

Demand for cheap, readily available food has increased, pressuring agriculture to increase productivity. Yet, intensive agriculture has led to biodiversity declines, impacting ecosystems and their functions necessary for food production. The EU and other nations have recognised this threat to food security, and farming strategies, like organic farming, have arisen as potential solutions. Still, we have failed to stop farmland biodiversity loss. On top of this, agriculture, as well as the entire planet, face challenges with the changing climate, where adverse weather conditions compromise crop production. A dire need for solutions regarding fair transformation towards ecological farming are needed. My talk summarises the aims of my PhD, which are to determine the direct and indirect effects of anthropogenic and climatic pressures on farmland biodiversity. I will determine whether local farmland bird abundance changes are impacted stronger by local farming practices or climate change, allowing us to understand immediate threats and target conservation measures locally. Secondly, I aim to determine if farmland indicator species (birds and butterflies) experience similar pressures in similar areas, indicating that the changes are driven by shared factors. Lastly, I will explore how farmers perceive biodiversity changes in their lands and what they consider just transformations within the agricultural field. Therefore, the findings of my interdisciplinary project aim to provide guidelines and solutions for ecological food production, securing food demand and a sustainable future, as a whole.

Megha Khanduri (LUOVA) [pronoun indifferent]

Light pollution: potential consequences for threatened species of the Ganga River Basin, India

The Ganga River Basin (GRB), India, is home to rich biodiversity in diverse habitats. As one of the world's most densely populated river basins, these habitats and their associated species face multiple threats in the form of overexploitation, habitat degradation, climate change and various forms of pollution. The gharial *Gavialis gangeticus* and freshwater turtles *Batagur kachuga* and *Batagur dhongoka* represent some of GRB's most threatened species, with most populations restricted to certain rivers and protected areas. Various measures have been taken by policymakers to mitigate the threats to these species, many of which are proving to be successful. However, light pollution is still overlooked as a potential threat to GRB's biodiversity despite evidence of the importance of light as a cue for many biological and behavioural processes. At present, there exist substantial knowledge gaps regarding the responses of freshwater, and particularly Gangetic, species to light pollution, and its potential consequences for their survival. Considering these knowledge gaps and the growing population, urbanization and light pollution within their habitats, the present study aims to understand the influence of artificial light on the nesting site selection of the above species in the wild, as well as the role of light in regulating the thermoregulatory behaviour of the gharial in captivity. Artificial light does not appear to influence nesting site selection in any of the study species. However, light illuminance has a significant effect on the thermoregulatory behaviour of the gharial. A potential implication of the latter is a variation in thermoregulatory efficiency of the animal in response to light pollution, with potential consequences for its health. Given these findings, future research must focus on both- the mechanisms by which light pollution may affect threatened freshwater species, and the ways by which these effects can be mitigated.

Michelle García Arroyo (LUOVA) she/her

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Litter buffet: On the use of trash bins by birds in six boreal urban settlements

Unintentional food resources in urban areas (street litter, food leftovers, overflowing trash bins) are dietary components of some urban-exploiter bird species. In this study, 13 bird species in six southern Finnish cities were recorded using urban trash bins and differences in their activity when provided with food resources (i.e., bait) in different bin types were described. Generalized linear models (GLM) and classification and regression trees (CART) were used to test for associations between environmental variables and bird activity at the binscapes. Bird activity at the binscapes significantly differed among all cities and among types of bins and was significantly higher after placing bait in all cases. Bins with the largest opening had more activity as opposed to those with smaller openings or lids. Corvids and gulls had the highest activity, with corvids usually being present before the bait was placed and gulls increasing their activity thereafter. These differences show that trash bin foraging is highly malleable and thus susceptible to management preventing its occurrence. Suitable waste management measures could aid in reducing the number of species close to bins and their surroundings, benefiting both bird and human health.

Geethanjali Mariaselvam (AGFOREE)

Intrinsic and extrinsic motivations for wildlife conservation - a case of black bucks and Bishnoi community in Punjab, India.

Abohar Wildlife Sanctuary (WLS) in Punjab, India is a unique protected area, which has blackbuck (*Antilope cervicapra* L.) as the flagship species. The history of blackbuck conservation is entwined with the culture and ethos of the local Bishnoi community. Most of the area in WLS is farmland owned by local people. When the area was declared a sanctuary in 2001, there were a lot of sand dunes with wild vegetation, which were habitats of the blackbucks and other animals such as the nilgai (*Boselaphus tragocamelus* Pall.) and golden jackal (*Canis aureus indicus* L.). The peaceful coexistence of the local people with the blackbucks, along with sustainable farming practices, are now a tale of the past. An increase in agricultural area by flattening sand dunes, due to the availability of irrigation facilities through canals, and the introduction of horticultural crops like kinnow (a citrus species/mandarin hybrid), are reducing the natural habitat of the blackbucks. This has been supplemented by habitat fragmentation due to crop field fencing. Hybrid cattle and stray dogs also threaten the existence of wildlife. In this study, we explore ways to restore the coexistence of local people with wildlife. We explore the conflicts and ways to reconcile them. Results of the study show that local people in the case study area hold conservation values and motivation to save the blackbucks in the wild due to their cultural and religious values but are concurrently struggling to do this due to the existing challenges. It appears that these intrinsic motivations supplemented by extrinsic motivation in the form of compensations/payments could bring about sustainable solutions and land uses suitable to wildlife.

Session 10 (Morning)

Sara Leino (LUOVA)

Bilberry and the fungi within – Does human-imposed disturbance affect disease in natural plant communities

Microbial diversity is a vital element of overall biodiversity. The plant microbiome contributes to multiple ecosystem functions and services through its interactions with a complex environment and other organisms. The microbes residing in or on plant leaves are considered important determinants of the productivity and adaptability of the host plant, supporting not only plant resistance to biotic and abiotic stresses but also its growth and nutrient acquisition. It is possible that impacts of natural and anthropogenic stressors on ecosystems may cause cascading effects on microbial communities, leading to unpredictable outcomes such as disease outbreaks or changes in mutualistic interactions. The composition of leaf microbiota has been associated with the occurrence and abundance of pathogenic microbes, indicating the critical role of microbiota in disease occurrence. In my presentation, I will introduce my aims and plans on how to start unraveling these interactions between the plant community and its microbiota. I aim to investigate whether phyllosphere microbial community compositions are influenced by the contrasting disturbance histories of forest sites and what role surrounding plant communities play in shaping these microbial community structures. Furthermore, I hope to explore whether pathogenic microbes are affected by host plant community composition and disturbance history, and whether disease risk and pathogen aggressiveness are impacted by disturbances. On this research journey, I am accompanied by my focal plant species, *Vaccinium myrtillus*, also known as bilberry or European blueberry.

Brittni Crosier (LUOVA)

Reintroduction of threatened wood-inhabiting fungi through inoculation and translocation

In Nordic countries, wood-inhabiting fungi are one of the most threatened species groups, and some are in danger to vanish from southern Finland and Sweden. Since the traditional methods (protection of forest areas and leaving dead wood in managed forests) do not seem to work alone, complementary methods are needed to preserve these species. Inoculation and translocation of fungi is still rare, but an interesting method to include in the conservation toolbox, especially in areas where other methods do not seem to be efficient enough. I investigate novel methods to make reintroduction more successful and able to implement in real conservation projects beyond basic research.

Susanna Koivusaari (LUOVA) she/her

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Land use and climate change effects on the persistence of the forest specialist species *Calypso bulbosa* in Finland

Climate change is altering the environmental conditions across the globe, forcing species to either disperse or adjust. However, the loss, fragmentation, and degradation of habitats induced by land use change may limit their ability to do so. Understanding how species persistence is affected by compound changes in climate and land use change is critical to inform effective conservation strategies, as these drivers may exacerbate, alleviate, or have additive effects on species. Here, we investigate the impacts of climate and land use change on the persistence of a threatened forest specialist plant species *Calypso bulbosa* in Finland. We obtained occurrence data from the databases of the Finnish Environmental Institute and Metsähallitus Parks & Wildlife Finland of 1856 extant and 65 extinct occurrence sites. To estimate the climatic trends across time, we calculated Sen's slope for each of the *C. bulbosa* occurrence sites separately starting from the year 1961 to the year of disappearance (if extinct) or last observation (if extant). Land use change was measured as change in forest management and urbanization level. Our preliminary results suggest that an increase in growing degree days (°C) is connected to a higher likelihood of an occurrence site to be extant, whereas a decrease in the occurrence of spring frost (days) is connected to a higher likelihood of an occurrence site to be extinct. Furthermore, the occurrences of *C. bulbosa* appeared to better persist in older forests and in locations with less urban area in their surroundings. These results thus point that climate change has both positive and negative impacts on *C. bulbosa* presence, whereas the impact of land use change is negative. Our study underscores the need to address both climate and land use change in conservation strategies, as they may both contribute to the persistence and extinction patterns of populations.

Anirban Ganguly (LUOVA)

Research plan: Light pollution’s effects on freshwater ecosystems

Light pollution in terms of artificial light at night (ALAN) is an emerging human-induced environmental problem caused by direct illumination from streetlights, buildings etc. and by skyglow from urban areas. While there is abundant evidence of the effect of light pollution on terrestrial communities, where research on terrestrial ecosystems shows that light can influence the composition of species communities, our knowledge about their effects on aquatic organisms is incomplete, especially on freshwater communities. This becomes relevant, as there is a historical relationship between humans and water bodies, with nearly half of the population living close to fresh water, exposing aquatic communities to increasing light at night. Light conditions regulate daily, lunar, and seasonal cycles of activities, such as migration and when to reproduce, and can consequently influence population dynamics and the spatiotemporal distribution of species. The light can also alter interactions among species, such as competition for resources and predator-prey interactions. Thus, changes in light conditions can alter the structure and functioning of ecosystems, and thereby the services the systems provide. Lammi Biological Station, where the bulk of this project will be conducted, is in Finland's Lake District and is surrounded by streams and ravines. Considering that freshwaters are biodiversity hotspots and essential for human well-being, more research should be directed to light pollution's effects on freshwater ecosystems. This would improve both our understanding of the impacts of artificial light on the systems and our ability to predict and alleviate larger perturbations of freshwater ecosystems.

Session 11 (Afternoon)

Federica Manca (LUOVA) she/her

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Exploring ecological networks of marine macrophytes and associated fauna in the Baltic Sea

Understanding how ecological interactions affect biodiversity and ecosystem functioning has become a central issue in ecology and conservation. Ecological network analysis provides powerful analytical tools to look at ecosystems from a novel, holistic perspective accounting for species and interactions altogether. Although the interest for ecological networks has steadily grown, some systems remain unexplored. Among these are macrophyte-animal associations in coastal habitats. Marine macrophytes (macroalgae and vascular plants) deliver important ecosystem services and are a primary source of nutrition and critical habitat to a variety of associated species. Macrophyte communities are however facing extensive shifts due to climate change and anthropogenic pressure, with potential effects on their associated fauna and coastal biodiversity at large. This is particularly true for the Baltic Sea, where eutrophication, rising temperatures and decreasing salinity are projected to drive profound changes in macrophyte-dominated communities. Despite their key ecological role, the mechanisms through which marine macrophytes support their associated species are still unclear, hindering our ability to predict how these systems will change in future decades. In this study, we use data on macrophyte-epifauna associations in the Baltic Sea to illustrate how network analysis can help unveil the complexity of these systems and understand how they will respond to on-going and future threats, hence broadening our understanding of coastal ecosystems functioning.

Somayeh Alikhani (DENVI)

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Understanding Threats to Helsinki's Urban Wetland Over Time: An Environmental History Analysis

Urban wetlands are indispensable for city sustainability, providing vital services such as flood mitigation, water purification, biodiversity support, and recreational opportunities. Unfortunately, human activities and environmental factors are threatening the existence of these invaluable ecosystems. To better understand the main factors threatening urban wetlands, we conducted a comprehensive study of the environmental history of wetlands in Helsinki from the 19th century to the present time. Analysis of historical data reveals that negligence, coupled with population growth, land-use changes, and climate change, poses substantial threats, leading to the destruction and loss of these urban ecosystems. We emphasize the importance of policy and decision-makers in rehabilitating and maintaining wetlands. Our goal is to promote a sustainable and resilient future for urban water bodies, ensuring they continue to contribute to biodiversity and the overall well-being of urban communities. Our study highlights the significance of integrating environmental conservation efforts into urban policymaking, advocating for a comprehensive approach that benefits both ecosystems and the people who depend on them.

Eszter Megyeri (LUOVA)

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Aquatic – terrestrial coupling in a boreal landscape: Effect of beaver presence on reproduction of nesting birds

The importance of the connection between different habitats has been increasingly recognised, especially the pulsed resources provided by aquatic invertebrates to land-based communities. However, the relative significance of aquatic invertebrate fluxes to terrestrial consumer fitness has remained understudied. The main objective of this PhD project is to understand how beaver can influence cross-habitat ecological linkages, i.e., aquatic-terrestrial coupling via the emerging aquatic insects on a passerine bird, the European pied flycatcher nesting performance at riparian areas of boreal lakes. The study is carried out in Evo area, southern Finland where beaver has been present for decades and long-term data are available regarding its habitat occupancy. In the project, the prey availability in terms of quantity and quality as well as prey selection of pied flycatchers is studied at beaver influenced, and lakes without beaver, and their forested control areas. The relative importance of aquatic and terrestrial diet proportions is investigated to identify food preference using two methods: compound specific stable isotopes and metabarcoding of faeces. The prey quality of pied flycatchers is examined via fatty acid and total mercury analyses of invertebrates and bird's blood samples. Investigation of biomolecular components of blood and invertebrates allows determination of quality of pied flycatcher's diet. Insect abundance was higher at beaver-influenced site compared to non-beaver area in 2022 and 2023. During the first sampling year, pied flycatchers' mean clutch size, number of hatchlings and fledglings at beaver-influenced lake site were higher than at non-beaver lake, while in the second sampling year, measures of breeding performance were similar. Hence, cross-habitat linkages can be an important part of understanding local interactions, especially the significance of beaver promoting riparian passerines and potentially wider communities.

Mikael Englund (LUOVA)

Imaging internal structures of dried and pinned insect specimens using micro-CT scanning and virtual dissection

Museum collections contain irreplaceable and unique insect samples such as type specimens or specimens of extinct species, which may not be dissected or otherwise studied using invasive or destructive research protocols. The rapidly advancing global loss of biodiversity is likely to render the acquisition of new sample material more often beyond the reach even for research purposes. Micro-CT x-ray scanning, combined with modern processing and image enhancing protocols, provide a non-destructive means to produce high-quality images from a wide range of inner structures and organs portrayed at any desired point of view. The development and standardisation of scanning and rendering protocols is opening new avenues for research, preserving the irreplaceable samples for future generations. We present various unpublished 2D images and 3D footage of insect wing venation, tympanal organs and genitalia rendered from high resolution micro-CT scans on dried and pinned museum specimens and demonstrate how we use these images in our research. While the cost of micro-CT scanning followed by relevant image enhancing is today high in terms of hard- and software investment and expert labour, it may in some cases be the sole remaining option to acquire the desired diagnostic images from specimens not available for invasive scrutiny. The rapidly advancing software development is likely to bring this technique within the reach for integrated taxonomy, and other subdisciplines of entomology.

Poster Presentations

Day 1

1 Leenise Blair she/her

The effect of soil modifications and yellow rattle on the soil properties of a lawn to meadow conversion

2 Lucas Bogaert

Impact of a warming climate on Wood Ant nest temperatures and foraging activity: designing an experimental field protocol

3 Adrián Colino Barea he/him

Implications of changes in distribution of bamboo in critically endangered bamboo lemurs

4 Ruby Fries she/her/hers

Impacts of climate change on carbon cycling of *Fucus vesiculosus*

5 Ariadne Kibbelaar

Changes in attitudes and practices over 26 years on commercial and group rangelands in Laikipia County, Kenya

6 Elli Koukkari she/they

The missing piece in 4-hydroxy-5-methylcoumarin biosynthesis in Gerbera

7 Rebekka Kukowski she/they

Effects of rodenticides on rat parasites and pathogens

8 Juho Kökkö he/him

Two generations and habitats: How seasonal timing and land use affect dispersal ability in the green-veined white butterfly

9 Heta Lehtonen

Wind turbine blade colour combinations and their efficacy in reducing avian collision risk

10 Ema Marmara she/her

Promoting indoor kale cultivation: An assessment of plant defense

11 Kasper Mickos he/him they/them

Collapse in abundance and changes in species composition and seasonal dynamics of littoral fish on the SW Finland coast, Baltic Sea

12 Wilma Munter

The Community Temperature Index in different forest habitat types

13 Michail Pipinis Troupakis he/him

Using marine long-term data to assess the effectiveness of Marine Protected Areas in Finland

14 Julian Schach

Phylogeny of the Cotesia species complex parasitizing Melitaeini butterflies and the possible role of Wolbachia endosymbionts

15 Outi Stén

Behavioral experiments on the noble crayfish (*Astacus astacus* L.)

16 Yunus Vilkkavaara Cankocak

Capturing Epistasis

17 Anita Bognomini

Reflect Respect - Zoo visitors as influencers of animal welfare.

Day 2

1 Lea Ala-Ilomäki she/her

Can a biodiverse urban meadow be established?

2 Anna Elpida Karellou

Dead wood insects: Finding the key to a successful long-term monitoring

3 Murat Ersalman
State-Space Modeling of Ringed Seal Population Dynamics in the Bothnian Bay

4 Karl Fetsch

Making it rain: An experimental approach to test the fog-catching functionality of cloud forests

5 Aleksi Hippi

Comparative analyses of the gut microbial communities associated across Atlantic Salmon Populations, and the relation to performance and genomic signatures of adaptation.

6 Jenna Hölttä she/her

The aquatic plant carbon stocks across an exposure gradient in a heterogeneous archipelago area

7 Annika Kantokari

Movement patterns in Helsinki urban rats

8 Maiju Kupiainen

Prey preferences of lions in small, fenced reserves – the role of management interventions

9 Viivi Lindholm she/her

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