Abstract booklet
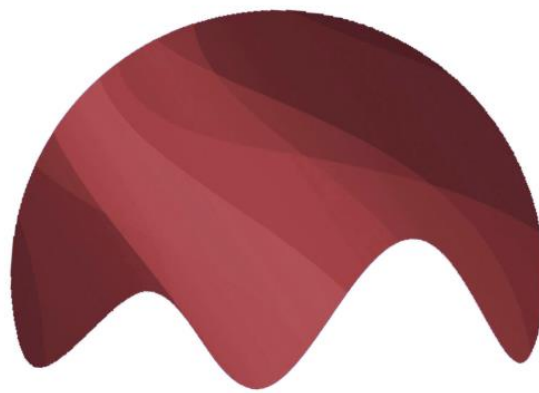
27th Kaamos symposium

30th November – 01st December 2023

University of Oulu

Finland

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FACULTY OF SCIENCE

UNIVERSITY OF OULU

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Session 1: Multidisciplinarity in Environmental Research

All sessions are hybrid and available in Zoom: https://oulu.zoom.us/j/68325959466

Keynote

Co-creating sustainable futures together

ANN EILEEN LENNERT

The Arctic University of Norway, Tromsø, Norway
The Arctic Sustainability Lab

The Arctic Sustainability Lab collates sustainable research initiatives that aim to innovatively contribute, share and build knowledge for sustainable transitions in the Arctic. In this speak we wish to explore ways in which we can address the sustainability challenges arising in today's world. By focusing on creative ways to engage and co-create solutions and possibilities together, we will explore how a diverse knowledge of ecosystems and human-nature interactions can secure sustainable nature-based solutions for the future.

Talks

Stable isotopes and ancient DNA: multidisciplinary journey to goose domestication

JOHANNA HONKA

University of Oulu, Finland

Studying goose domestication using archaeological finds has been challenging due to similar skeletal morphology of European domestic goose and its wild progenitor species, the greylag goose (*Anser anser*). Ancient DNA (aDNA) and sequencing of a short region of mitochondrial DNA (mtDNA) can discriminate wild greylag and its domestic form, but some specimens show atypical haplotypes or haplotypes belonging to other wild *Anser*-species. Here, we analysed stable isotopes of carbon (δ^{13}C) and nitrogen (δ^{15}N), informative about the diet of animals, and three loci affecting plumage colour in domestic geese using aDNA, to infer the domestic or wild status of Russian archaeological domestic geese finds. We also verified the chronological age of the bones by performing radiocarbon dating, with datings ranging from Medieval to Post-Medieval periods. We revealed that some Russian domestic geese were supplementary fed with fodder fertilised with animal manure, while some domestic geese were probably allowed to free-roam. We found evidence of white colouration or autosexing with white male and saddleback female. Further, we discovered that European domestic geese had introgression from the Chinese domestic goose, derived from the swan goose (*A. cygnoid*).

Sex Estimation from osteological human remains: Using artificial intelligence to characterize sexual dimorphism in human mandibular bone

ANNIINA KUHA

University of Helsinki, Finland

In biological anthropology, sex estimation is one of the main questions when skeletal human remains are examined for the purpose to identify deceased individuals. Bones in the pelvic area exhibit the most significantly sexually dimorphic traits in human skeletons. However, the bones from the crucial area are usually absent in archaeological human remains. Also, interobserver errors have posed challenges for accurate sex estimation at biological aspect. The present study explores the potential of artificial intelligence (AI) in enhancing sex estimation from human mandibles. A dataset of 193 mandible images, including 129 males and 64 females local to Southern Africa was sourced from the Human Osteological Research Collection at Sefako Makgatho University, South Africa. Deep learning algorithms were trained and validated to distinguish between males and females using the AIDeveloper software version 0.1.2. The dataset was divided into training (64.8%), validation (21.8%), and test sets (13.5%). Seventeen neural network architectures were examined, resulting in training accuracies ranging from 0.48 to 1.00, validation accuracies between 0.50 and 0.94, and testing accuracies spanning 0.42 to 0.88. The highest testing accuracy was reached by a model based on the LeNet5 network family (LeNet5_bn_do_skipcon). In the test set images, the best algorithm classified all male mandibles (13/13, 100%) and most female mandibles (10/13, 76.9%) correctly. Three female mandibles were incorrectly classified as males (23.1%). This preliminary study shows the efficiency of artificial intelligence to classify skeletal elements into sexes. In further studies, it will be necessary to use more diversity in datasets to enhance the efficiency of deep learning algorithms. Additionally, consideration should be given to the number of bones in each set. Increasing the number of mandibles should result in improved accuracy for each algorithm. The present study establishes the validity of artificial intelligence for classification in anthropological research.

Combining forces to disentangle anaerobic microbial processes in peat – outcomes of a UniOGS practical course

KATHARINA KUJALA

University of Oulu/WE3, Finland

Microbes are key players in climate change: microbial processes such as methanogenesis can contribute to greenhouse gas production, while other processes such as methanotrophy consume greenhouse gases and thus have the potential to help us mitigate climate change induced effects. In peatlands, microbes are crucial for the anaerobic degradation of organic matter, which via fermentations in the end might lead to methane production and emission. However, the presence of alternative electron acceptors such as nitrate or sulfate might lead to processes like denitrification or sulfate reduction to be active in the peat, which in turn might lower methane emissions.

In an attempt to directly combine research and teaching, we held a UniOGS-funded field course at Oulanka research station in September 2023. The main goal of the course was to demonstrate techniques that are widely used in research to assess biogeochemical processes in soils and characterize soil microbial communities. Experiments for the students were designed in a way, that the successful completion would not only give them a good learning experience, but moreover lead to knowledge gain concerning biogeochemical processes in the studied Puukkosuo fen. During the course, students analyzed depth-resolved peat and porewater profiles from the fen. These profiles give a good indication of in situ concentrations and depth distribution of major ions (including potential electron acceptors such as nitrate, iron or sulfate), dissolved gases (including the greenhouse gases CH_4, CO_2 and N_2O) and fermentation products. They moreover studied several functional groups that are likely involved in organic matter turnover in the peat, namely nitrifiers, denitrifiers, iron reducers, sulfate reducers, fermenters and methanogens, by determining process potentials in short-term incubation studies as well as most probable number counts for each functional group. In addition, the microbial community composition in different depths was assessed through Nanopore amplicon sequencing of Bacteria and Archaea.

Whilst the results have not yet been extensively evaluated, it has already transpired that the obtained data is of very good quality, and we are even considering to compile them into a joint publication in which all course participants would be included. I would be happy if I got the chance to give you a short overview of our course and a first glimpse of our results during this year's Kaamos Synposium.

Citizen Science, Fungi, and Nazi Ruins: A Mushroom Archaeology

ANATOLIJS VENOVCEVS

University of Oulu, Finland

In this talk I will present preliminary research on a new project in "mushroom archaeology" which looks at what sorts of fungal ecologies are enabled by human ruins. For this, I will draw upon recent fieldwork alongside Miraculix, Sør-Varanger Sopp- og Nyttevekstforening, ("Sør-Varanger Mushroom and Useful Plant Society") in northeastern Norway. During the fall of 2023, Miraculix members and I made 791 observations of 178 unique fungal species growing within German and Austrian World War II ruins within Sør-Varanger municipality. I will explore the implications of this collaboration between myself as an archaeologist and Miraculix as a local citizen science group and present several questions posed by exploring human material remains from a fungal perspective. What kind of unique fungal ecologies are created by human ruins? How do mushrooms "remember" the past? And what future possibilities are there for ongoing mushroom archaeology research in Norway and potential work in Finland?

Session 2: Genetics & Taxonomy

All sessions are hybrid and available in Zoom: https://oulu.zoom.us/j/68325959466

Keynote

The evolutionary history of Lepidoptera: where are we?

NIKLAS WAHLBERG

Lund University, Sweden

Lepidoptera are one of the big 4 orders of insects, with some 160,000 described species, and probably a similar number awaiting discovery. Yet, compared to the other diverse orders of insects, it appears to be relatively young, with a fossil record starting some 200 million years ago. In my presentation, I will be reviewing our knowledge of the evolutionary history of Lepidoptera, and highlighting the conflicts in information from molecular data compared to the fossil record. Because we are still unsure about the timing of diversification of Lepidoptera in general, many conclusions that are found in the literature regarding the evolutionary history of Lepidoptera can be questioned.

Talks

Metal tolerant fungal endophytes of the floating-hook moss *Warnstorfia fluitans* growing in mining wastewater.

UROOJ RASHID

University of Oulu, Finland

Plant-associated microbes from aquatic floating hook-moss can be used efficiently to tailor water purification systems for enhanced bioremediation. Endophytic bacteria including Bacillus and Pseudomonas spp. are the predominant species found earlier with tolerance for metals in phytoremediation, but there are no reports on endophytic fungi. Endophytic fungi are important for the purification of metal-contaminated water and can be efficiently used for water purification systems for enhanced bioremediation. After isolation, pH test, metal tolerance test, and Bioaccumulation test were performed to screen the most promising endophytic fungal isolates that can tolerate the metals at their maximum six Isolates were tested against two extreme concentrations of Copper, Nickel, and Arsenic. These isolates were identified using the molecular identification method and their homology with other plant-associated fungi was studied by creating the phylogenetic tree.

The genus *Portulaca* L. (Portulacaceae) in the Balkan flora

MYKYTA PEREGRYM

Luhansk Taras Shevchenko National University, Ukraine
University of Oulu, Finland

This study addresses the complex taxonomy and distribution of the genus *Portulaca* L. (Portulacaceae) within the Balkans, focusing on the often-debated species composition and distribution patterns in the *P. oleracea* aggregate. Floristic publications in the Balkan countries provided inconsistent information about *Portulaca*, often simplifying it to just one or a few species. Therefore, our research aims to resolve this ambiguity by addressing two key questions: 1) Which *Portulaca* taxa are present in the Balkans, and 2) What is the current distribution of these taxa in the region?

We conducted a comprehensive study involving literature reviews, seed collection, identification using micromorphological characteristics, and distribution analysis. Our findings reveal the presence of three distinct species in the Balkans, including *P. oleracea* aggr., *P. grandiflora*, and *P. umbraticola*. Additionally, within the *P. oleracea* complex, nine microspecies/morphotypes have been identified, primarily differentiated based on seed micromorphology. Two species, *P. daninii* and *P. sardoa*, have been documented in the Balkans for the first time. Furthermore, five species, namely *P. daninii*, *P. granulato-stellulata*, *P. rausii*, *P. sardoa*, and *P. trituberculata*, have been newly identified in Montenegro, and one species, *P. nitida*, has been newly documented in the Slovenian flora. This study provides a valuable contribution to the botanical knowledge of the Balkan Peninsula, offering an updated taxonomic framework and distribution data for Portulaca. As well, the offered recommendations for future studies of the *P. oleracea* complex looks like a clear plan for the solution of the taxonomic puzzle in this aggregate.

Why we need large scale genetic assessments – a case of the Eurasian wolverine.

DOMINIKA BUJNAKOVA

University of Oulu, Finland

Large carnivores, including the wolverine (*Gulo gulo*), tend to have or have had wide distributions. Although formerly widespread throughout the Holarctic, the wolverine range has become smaller and more fragmented in both Eurasia and North America due to anthropogenic disturbances and persecution. This highlights the need for a geographically wide genetic assessment of wolverines, especially in regions where research and monitoring efforts have been lacking. Therefore, in our study we aimed to assess population structure, genetic diversity, and demographic history of the wolverine throughout its entire Eurasian range. We also aimed to put into perspective the status of the endangered Fennoscandian population by emphasizing its connectivity to other Eurasian populations. This was done using a variety of population genetic analyses on an extensive dataset with samples from across the whole range of the Eurasian wolverine.

Positive selection has shaped the evolution of Argentine ant immune genes both in native and introduced supercolonies

IDA HOLMBERG

University of Oulu, Finland

The highly invasive Argentine ant (*Linepithema humile*) started its colonisation from the species' native range in South America approximately 150 years ago and has since become one of the major pests in the world. We investigated how the shifts into new ranges have affected the evolution of Argentine ants' immune genes. To the best of our knowledge, this is the first broadscale population genetic study focusing on ants' immune genes. We analysed comprehensive targeted-seq data of immune and non-immune genes containing 174 genes from 18 Argentine ant supercolonies covering the species' native and introduced ranges. We predicted that the immune gene evolution of introduced supercolonies differs from that of the native supercolonies and proposed two different, non-mutually exclusive hypotheses for this: 1) the enemy release hypothesis and 2) the higher pathogen pressure hypothesis – both of which seem to explain the observed evolutionary patterns on their behalf. Our results show that the introduced supercolonies were targeted by weaker selection than natives, but positive selection was evident among supercolonies of both ranges. Moreover, in some cases, such as the antiviral RNAi genes, introduced range supercolonies harboured a higher proportion of positively selected genes than natives. This observation was striking, knowing the recent demographic history and the detected generally lower selection efficacy of introduced supercolonies. In conclusion, it is evident that pathogen pressure is ubiquitous and strongly affects the immune gene evolution in Argentine ants.

Session 3: Ecology

All sessions are hybrid and available in Zoom: https://oulu.zoom.us/j/68325959466

Keynote

Sex roles in coucals – a unique model system to answer Tinbergen's four questions

WOLFGANG GOYMANN

Max Planck Institute for Biological Intelligence, Germany

Female-biased investment into zygote formation (anisogamy) often leads to 'Darwinian sex roles' with stronger male competition and larger female choice. Often, this also comes with larger female investment into parental care. In some species, however, these sex roles are 'reversed' with females competing more strongly, and males providing more care. In birds, this occurs in about 1% of all species, most of which are precocial, that is the young are covered with feathers at hatching and leave the nest, immediately. So far, the only known group of altricial birds (where young hatch naked and need to be warmed and fed in the nest) in which sex roles are reversed are coucals (Centropodinae). At least one species – the black coucal (*Centropus grillii*) – has evolved a classical polyandrous mating system with large females competing for access to small males. A female forms a 'harem' with up to five males, each of which tends his own nest and young without help from the female. In south-western Tanzania, black coucals share their habitat with white-browed coucals (*C. superciliosus*), which are socially and genetically monogamous and provide biparental care, allowing me to study close relatives with different mating systems in the same habitat. I ask how and why sex roles in coucals evolved, attempting to explore the phenomenon from all four angles of Tinbergen's questions. Specifically, I ask which mechanisms drive sex roles, how do sex roles develop during ontogeny, what are the benefits of reversed sex roles, and which life-history and ecological factors led to their evolution?

Talks

Onthogenetic and vitality structure of *Asarum europaeum* in terms of forest management in Göttingen forest, Lower Saxony, Germany

NATALIIA YAROSHENKO

Sumy National Agrarian University, Ukraine

A detailed study of the herb layer species of forest ecosystems that are anthropogenically affected makes it possible to predict the successive changes and model the development of plant communities in particular areas. The study results of grassland species populations contribute to the restoration and preservation of unique groups that are part of forest ecosystems. Our research deals with understanding the mechanisms of adaptations that exist at the population level of the organization against the background of forestry impacts. With the comprehensive population analysis approach, the critical point is to observe the consequences after the transformation of the living conditions of plants.

The research aim is to establish features and regularities of structural changes in the population typical for beech forests in Lower Saxony, Germany, in terms of forestry use.

Our research is based on the classical geobotanical and population analysis methods. We used morphometric, vital, gradient analyses, and mathematical statistics methods to process field research materials. It is curtained that the vitality determining features for *A. europeaum* were W - complete plant phytomass, Wl - leaves phytomass, and A – total foliage surface area. It was found that a significant part of the early generative ontogenetic stage of the *Asarum europaeum* population is represented in the unmanaged forest. In contrast, in the young forest plots of 40 and 70 years old tree species, the central part is devoted to the middle-aged and old generative ontogenetic stages, 31,25% and 34,33%, respectively. The vitality structure analysis investigated that herb layer species' vitality is remarkably higher in unmanaged forest.

Downstream impacts of peatland drainage on headwater stream biodiversity and ecosystem functioning

IINA KOIVUNEN

University of Oulu, Finland

Intensive peatland drainage alters the physico-chemical status of the recipient streams, potentially leading to the loss of biodiversity and impaired ecosystem functioning. However, the extent of these changes, and particularly their impacts on downstream ecosystems, remain poorly understood. We studied the downstream effects of peatland drainage on stream biodiversity (aquatic bryophytes and macroinvertebrates) and key ecosystem processes (primary productivity, organic matter (OM) decomposition and OM standing stock). Our survey design comprised upstream (directly below drainage network) and downstream (∼300 m downstream) locations in 18 boreal headwater streams encompassing an extensive gradient of peatland drainage intensity (0–48 %). Drainage modified environmental conditions, with nutrient (TP, TN) and dissolved organic carbon (DOC) concentrations and inorganic sediment cover increasing with intensifying drainage, in both upstream and downstream sites. Species richness of both benthic macroinvertebrates and bryophytes was strongly reduced with increasing drainage intensity. Upstream and downstream sites responded in a similar manner, suggesting wide-ranging impacts of drainage on stream biodiversity. Regardless of site location, ecosystem processes were unrelated to drainage intensity. Our results confirm that intense peatland drainage not only modifies environmental conditions and biodiversity in adjoining streams, but these impacts propagate further downstream in the stream network. To prevent further degradation of drainage-impacted freshwater ecosystems, large-scale peatland restoration is needed, with prioritization of sites with the greatest potential (least drainage-induced damage) for biodiversity recovery.

Impacts of large herbivore on understory CO_2 exchange in a boreal forest

NOORA KANTOLA

University of Oulu, Finland

Boreal forests store approximately one third of Earth's carbon (C) and thus are globally important sinks for atmospheric carbon dioxide (CO_2). Trees are the main C stocks in these ecosystems, but understory vegetation can contribute significantly to the net CO_2 balance at the forest level. In boreal pine forests, the understory vegetation consists of patches of sunlit (i.e., lichen-like) and shaded (i.e., dwarf shrub-like) habitats. These habitats are influenced by ungulate grazers that may affect understory CO_2 exchange, and consequently, the forest CO_2 balance via several mechanisms. Grazing affects differently the biomass of slow growing lichens compared to the faster growing dwarf shrubs and mosses, and therefore the effects of grazing on CO_2 exchange in the patchy understory vegetation could vary temporally.

We studied how excluding large grazers for short and long periods affects the CO_2 exchange and vegetation biomass in the understory of an oligotrophic pine forest in northeastern Finland. By using different aged grazer exclosures (0–1 and 25–26 yrs.) and the adjacent grazed area, we measured growing season CO_2 fluxes with automated and manual chamber methods across sunlit and shaded habitats over the growing seasons of 2019 and 2020. In addition, we measured the height of understory vegetation.

The results showed that understory CO_2 source fluxes increased when grazing was removed for short period and this response occurred only in the shaded habitats. However, when grazing was removed for longer period, understory CO_2 net release decreased regardless of the habitat type. Furthermore, the moss depth increased after one year of excluding grazers and that coincided with an abrupt intensification of CO_2 net release. Our results suggest that the effects of ceased grazing on boreal pine forest understory CO_2 exchange may vary over time, and the short-term effects seem to depend on the habitat type. Consideration of these temporal grazing-induced shifts in understory CO_2 exchange can help to estimate the ecosystem C balance under varying grazing scenarios.

Aha! moment in Bumblebees

AKSHAYE BHAMBORE

University of Oulu, Finland

Understanding the cognitive abilities of non-human organisms has long been a subject of scientific interest. Insight is a cognitive process defined as the ability to solve complex problems using novel solutions, without trial-and-error or associative learning. In this study, we aimed to investigate whether Bumblebees (*Bombus terrestris*) exhibit insight learning, a sudden comprehension of a novel task. Bees are known for their remarkable learning abilities, particularly when it comes to foraging and recognizing specific cues. We sought to determine whether bees could adapt their learned behaviours in response to a novel context and solve complex problems through insight learning. In our study, three groups of bees underwent distinct training protocols and were subsequently tested in a novel context. The first group was trained to associate a blue ring on the arena floor with a reward, along with manipulating a ball covering the blue ring. In the novel context, the blue ring was dislocated to the arena's roof, requiring the bees to move the ball underneath it and climb onto the ball to reach the ring. The second group received similar training but encountered a green dislocated ring in the novel context, while the third group was exclusively trained to associate the blue ring on the floor with a reward, lacking prior information about the ball. Our findings revealed that the first group of bees successfully solved the task in the novel setting. In contrast, the second group exhibited significantly lower success rates, and the third group had only one out of twenty-one bees accomplishing the task. Intriguingly, the first group of individuals were more likely to attempt to obtain the reward, even among those who didn't solve the task, when compared to the other groups.

In conclusion, this study provides compelling evidence that bumblebees are capable of insight learning, as demonstrated by the first group's success in adapting to a novel context. The differing performance across groups highlights the importance of prior training and cognitive flexibility in problem-solving. The findings also underscore the potential for bumblebees to exhibit different cognitive strategies, showcasing the complexity of their learning and problem-solving abilities. These results open up avenues for further exploration into the mechanisms underlying complex cognition.

Colony merging in socially polymorphic ant

ANU HALONEN

University of Oulu, Finland

In the ant *Formica exsecta*, colonies can take the form of monodomous single nests, as well as the form of supercolonies made up of multiple interconnected nests. While supercolonies are often assumed to be fully interconnected, many show a mosaic structure of aggression between workers within. The development of supercolonies is not well understood, for example, if large supercolonies can be formed by multiple merging supercolonies.

In this experiment I aimed to find if pairs of supercolonial nest are more likely to merge with each other than pairs of monodomous single nests. I set up experimental pairs of supercolonial nests, monodomous nests, and control nests originating from the same supercolonies. I measured initial aggression between colonies, queen survival, and the final composition of colonies after a month of contact.

The results show that monodomous single nest pairs and supercolonial nest pairs did not differ in their behaviour, and were both distinct from the control pairs originating from the same supercolony.

Session 4: Application & Outreach

All sessions are hybrid and available in Zoom: https://oulu.zoom.us/j/68325959466

Talks

Conservation in Finnish forests – a practical approach

EIJA HURME

Metsähallitus, Finland

Situation with many forest dwelling species in Finnish forests is difficult. Based on legislation, protected species or otherwise important species and their habitats must be considered in forest planning. Nature Conservation Act protects many species, including those having protection based on European Union's Habitats Directive or Bird Directive. Legislation for nature conservation is valid everywhere: in Finland, local ELY Centres (Centre for Economic Development, Transport and the Environment) are responsible of giving advice and implementing it in practise. Regarding managed forests, Metsähallitus is responsible on state-owned multiple-used forests, and outside them we have over 630 000 private forest owners.

Guidance for taking species and other nature values into account in forest planning is increasing, but often there are two kinds of practical problems related to species. First, there is not enough knowledge where important species live. Second, location of a species may be known but it is not known how to save its living conditions effectively.

Usually there is not enough knowledge to carry out species inventories by forest practitioners or by forest owners. Nature conservation authorities use a LajiGIS system, which gives data to forest owners who can see observations on their estate (metsään.fi). In addition, there is an open species data base Laji.fi. Still, observations of species in data systems should be used as signs and more thorough inventories should be considered according to the situation.

Sometimes combining nature conservation with other values of forest owners can be a challenging task. In a large Flying Squirrel LIFE project, flying squirrel friendly forest management was planned to actual example sites. It may be possible to maintain functional habitat networks for arboreal species when baseline inventories are accurate and careful management is applied.

For all species, it is highly recommendable to aim for better knowledge and clear guidance on how to take important species into account in practice: living conditions for species should be maintained by anyone making decisions on forest use.

From Nakkulanperä to Montreal: How systematic field observations inform global biodiversity policy

ARI PEKKA AUVINEN

SYKE, Finland

The Kunming-Montreal Global Biodiversity Framework (KMGBF) sets out an ambitious plan for humanity to reverse the biological deterioration of our planet. A crucial part of the KMGBF is its monitoring framework. For the first time in the history of the Convention on Biological Diversity commonly agreed indicators will be used to track progress towards the Goals and Targets set in the KMGBF. How do the bramblings and common greenshanks observed in the standard line transect route in Nakkulanperä, Liminka, relate to the global targets and our common efforts to achieve them?

Exploring dark taxa with citizen scientists – Malaise trapping Cecidomyiidae with high-school students

NIINA KILJUNEN

University of Oulu, Finland

The Multidisciplinary Fellow Feelings project combines biology, education and bio-art, and utilizes citizen science to discover new species and explore feelings about biodiversity. Unlike the majority of biodiversity education where focus is on the decline of species, the approach of Fellow Feelings is the discovery of still unknown species. The vast majority of species living on earth remain unknown to us. As young citizen scientists, high school students have voluntarily joined in the project and together with researchers, they participate in different stages of scientific research and collect gall midges (Cecidomyiidae) for DNA barcoding studies in order to demonstrate new ways to study the unknown diversity, often referred to as 'dark' taxa.

The participation of young citizens serves a twofold function: i) They assist in the collection of gall midges according to a set protocol and ii) they engage in the more creative and philosophical discussions around this ecological core study. These discussions explore diverse other ways of knowing and feeling the available beyond natural scientific research. The wider objective of the project is to develop new forms of science education in which natural scientific knowledge is combined with creative means to explore how affect and care are related to environmentally sustainable future. Combining the methodology and the knowledge about peoples' biodiversity related experiences, this project aims to create knowledge and practices that foster feelings of responsibility and care, and thus aid in combatting biodiversity loss.

Involvement of young citizen scientists can bring novel perspective to a scientific research project beyond the set protocols. A multidisciplinary research initiative demands comprehensive planning of all steps of the project, effective approaches to engage the young to participate in the project, and well-operating communication between collaborating participants, but also a great deal of flexibility and creativity to adapt to participation needs and individual experiences of the young participants. In this presentation, I elucidate challenges we have faced, and share experiences and insights gained during the first year of the Fellow Feelings project.

Adding a human dimension to research and communication

ANN EILEEN LENNERT

The Arctic University of Norway, Tromsø, Norway
The Arctic Sustainability Lab

Communicating science with the broad range of audiences is a science of its own. How can keeping things simple be the strongest tool?

I emphasize a lot on the responsibility of making science applicable to all through outreach, and seeing involvement of local communities as a recourse. I have been highly engaged in communication of research, as a lecturer, through publications, mini documentaries, popular science, as well as teaching, organizing field courses, exhibitions and writing children books.

Playing with several medias and visual skills, I have moved research for being an important tool to engage, educate, inspire and kindle society. With a popularization twist, here is how to create positive knowledge feedback loops between science, visual communication and education.

Panel Discussion

Bridging Research, Practice, and Outreach in Conservation

With

EIJA HURME

Metsähallitus, Finland

ARI-PEKKA AUVINEN

SYKE, Finland

NIINA KILJUNEN

University of Oulu, Finland

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Workshops

<u>**Thursday, 30.11.2023**</u>

An introduction to machine learning

Time: **16:00 – 17:30**

Room: **YL 124**

online in Zoom: **https://oulu.zoom.us/j/68325959466**

Instructor: **Anne Aulsebrook, Max Planck Institute for Biological Intelligence, Germany**

Machine learning is an increasingly popular and useful tool for research. But what's going on beneath the surface of these models? This workshop will provide an overview of how the most common machine learning algorithms work, what types of problems they can be applied to, and the steps required to train and evaluate these models. We will also discuss some common problems that you may encounter, as well as mistakes to avoid.

Museomics: Genetic Exploration for the Past and Future

Time: **16:00 – 17:30**

Room: **B 235**

<u>In Person Only</u>

Instructor: **Niklas Wahlberg, Lund University, Sweden**

Museomics is a valuable approach that utilizes the diverse biobanks that are natural history museums. The ability to sequence genomes from old specimens has expanded not only the variety of interesting taxa available to study but also the scope of questions that can be investigated in order to further knowledge about biodiversity. Niklas Wahlberg is one the pioneers in museomics and in this workshop he will help us explore the world of museomics by sharing his expertise in extracting and analyzing genetic material from historical specimens. Participants will gain insights into the cutting-edge techniques and challenges involved in this interdisciplinary field, fostering a deeper understanding of biodiversity and its conservation implications.

Poster Session

Scientific posters will be displayed at the botanical garden 'Science Garden' from 17:30 and during the After Party.

Aino Erkinaro, *The potential of non-native pink salmon to boost Arctic ecosystems – a threat or an opportunity?*

Lena Huovinen, *Ecological Processes in Metacommunities*

Noora Kantola, *Impacts of large herbivore grazing and changing snow on C cycle in boreal forests*

Angelika Kiebler, *Genetic monitoring of the Siberian flying squirrel (*Pteromys volans*)*

Inkeri Markkula, *Winter cultures: changing snow and its meanings for Sámi reindeer herders*

Clément Massé, *Long-term dietary shifts in a generalist predator, the wolverine (*Gulo gulo*)*

Shreya Pandey, *Distribution and disturbances of small carnivores in India*

Stefan Prost, *The potential of applied genomics for the conservation of Asiatic and African cheetah (*Acynonyx

juabtus*)*