Abstract Book

III. Fledglings' Meeting of the European Ornithologist Union

Debrecen, Hungary

11-13, August, 2022

Plenaries

IGF-1 at the crossroads of life-history trade-offs

Ádám Z. Lendvai
University of Debrecen, Debrecen, Hungary

Insulin-like growth factor type 1 (IGF-1) is a pleiotropic hormone that regulates several life-history traits and has been suggested as a key physiological mechanism regulating ageing, somatic growth, and reproduction. In a series of experiments, we tested how IGF-1 affects feather growth and the expression of plumage ornaments during the natural moult, which is a critical, yet often overlooked somatic growth period in adult birds. We also addressed the physiological and survival costs of elevated IGF-1 levels. These experiments were carried out on bearded reedlings (Panurus biarmicus), a common Eurasian songbird with conspicuous sexual dimorphism. We manipulated circulating IGF-1 levels using a novel experimental procedure using polymer-based microparticles that provide a sustained release of IGF-1. Experimentally increased IGF-1 levels do not affect the feather growth rate but speed up the moult and positively affect the quality of the feathers (measured by the number of fault bars). Also, birds with experimentally elevated IGF-1 levels develop sexually selected ornaments sooner and with more intense colouration. On the other hand, IGF-1 treatment affects oxidative stress in a sex-specific manner, where males seem more sensitive to oxidative damage driven by high circulating IGF-1 levels. These results suggest that IGF-1 plays a role in moult and ornament development, and males may be more susceptible to the costs of IGF-1-induced oxidative stress than females. IGF-1 levels evolve under opposing selection forces, and natural variation in this hormone's level may reflect the outcome of individual optimization.

The significance of evolutionary research for biodiversity conservation

Tamás Székely
Milner Centre for Evolution, University of Bath, Bath, UK

The Planet is heading toward a crisis which is largely caused by humans. To secure the future of the Planet, evolutionary understanding of animals, plants and microbes is essential. I will illustrate how my research on breeding ecology of birds lead into new insights about natural selection, sexual selection and social behaviour. Importantly, these works fed into understanding biodiversity, and lead to conservation actions that benefit wildlife. The take home message is that researching fundamental evolutionary topics can make direct and measurable impact on nature by saving species, habitats and ecosystems by involving local communities.

Harnessing the data revolution to help slow down the extinction rates: from basic science towards influencing global policies

Dalia A. Conde
Species360 - https://www.species360.org/
Department of Biology, University of Southern Denmark, Odense, DK

The escalating power of machine learning, big data and exascale computing provides biologists and conservation practitioners with essential tools to address one of humanity's greatest challenges as identified by the World Economic Forum 2021: biodiversity loss. The design and implementation of species conservation strategies directly rely on accessing a high variety and volumes of information on species' genetics, habitat, threats and human use. Despite promising advances in digital infrastructure and open data, we are still struggling to provide essential analytics for effective decision-making. In this talk, I will show examples of the results of a global initiative aiming to map, quantify and disseminate species open information to conservation policymakers globally. While addressing how this heavily rely on the development of basic science within a network of collaborators working on key evolutionary questions on birds and other vertebrates.

The importance of prenatal soundscapes for avian development

Mylene M. Mariette
Doñana Biological Station EBD-CSIC, Seville, Spain
Centre for Integrative Ecology, Deakin University, Geelong, Australia

Sound is an unrivalled source of information, in humans, but also in animals, including birds. Sound may be particularly crucial when visual communication is not possible, such as for embryos developing inside an opaque egg or in the womb. Surprisingly however, until recently, we knew very little about how embryos use sound information to direct their development. In this seminar, I will present the fascinating ways in which prenatal soundscapes affect development, in both adaptive and maladaptive ways, in a range of avian taxa. I will show that, in addition to its immediate effects, prenatal sound can inform embryos of upcoming environmental conditions postnatally, and affect a wide range of offspring traits, from morphology and behaviour to physiology and cellular functions, including until adulthood. I will also demonstrate how in the desert-adapted Australian zebra finch, a prenatal acoustic signal of heat from the incubating parent, prepares offspring development for high temperatures. This talk will therefore reveal a novel heat-adaptation strategy in birds, and the importance of prenatal sounds in shaping development.

Oral Presentations

Live long but don't prosper: the population-scale consequences of city life

Catrin Eden[1,*], Davide Dominoni[2], Claire Branston[2], Sarah Cubaynes[3]

[1]*Lancaster University, United Kingdom*
[2] *Institute of Biology, Animal Health and Medicine, University of Glasgow*
[3] *CEFE, University of Montpellier*

**Corresponding author:* c.eden1@lancaster.ac.uk

Cities are associated with costly reductions in blue tits' (Cyanistes caeruleus) reproductive performance, yet high breeding densities are commonly found in urban areas. How these urban populations are sustained is unclear, as little research has investigated their demographic dynamics. Here, we tested two potential mechanisms for the persistence of urban populations by comparing one urban and one forest population of blue tits: (1) urban birds have higher annual survival than forest birds, (2) urban populations rely on immigration. First, using multi-state survival models we found that urban adults had higher apparent survival than forest adults. Second, using integrated population models we found that despite higher survival, immigration may be the strongest driving factor of growth rate in the urban population, and thus that the urban population is likely a sink. Our results suggest that urbanisation creates an ecological trap for bird populations with reduced productivity in urban areas.

What's on the Menu: Is a City Diet Detrimental to Blue Tit Reproductive Success?

Rachel McConnell[1,*], Dr Andreanna Welch[1], Dr Davide Dominoni[2]
[1]*Durham University, United Kingdom*
[2]*Glasgow University, United Kingdom*

**Corresponding author:* rachel.mcconnell@durham.ac.uk

Urbanisation has drastically transformed habitats across the world, altering environmental conditions, the composition of biodiversity, and food available to wildlife. Understanding what factors impact species' success in these ubiquitous settings is becoming increasingly crucial to sustaining biodiversity in a rapidly urbanising world. For birds, urban habitats may represent "ecological traps" as many adults are drawn to supplemental food and higher temperatures in cities throughout the winter but have lower reproductive success in the spring. This contradiction is exemplified by the blue tit (Cyanistes caeruleus) as urban birds appear to prosper in the winter but often have a lower fledging success than rural birds. Caterpillars provide nutrients essential for the rapid growth of blue tit nestlings and the well-being of breeding birds. Changes in reproductive success are thus likely driven by a shift in diet, as while caterpillars are scarce in cities, anthropogenic food provided as a replacement is plentiful and potentially lacking in key nutrients. The impacts of food availability on the reproductive success of urban species have largely been unexplored as traditional techniques to study animal diet often provide low resolution. Recently developed DNA metabarcoding (which involves simultaneously sequencing prey DNA found in the complex diets of hundreds of individuals), on the other hand, can identify prey to the species level. Using this approach, I aim to examine the poorly understood diet of blue tits in rural oak woodland and urban parkland in Glasgow city center to investigate the relationship between urbanisation driven changes in diet and reproductive success.

Migration direction in willow warblers follows dominant inheritance mode

Kristaps Sokolovskis[1,*], Max Lundberg[1], Mikkel Willemoes[1], Tianhao Zhao[1], Susanne Åkesson[1], Violeta Cabalero-Lopez[1], Staffan Bensch[1]

[1]*Department of Biology, Lund University, Sweden*

**Corresponding author: kristaps.sokolovskis@biol.lu.se*

Migratory routes in birds are often species and even population specific. It has been established for decades that in songbirds that migrate solitarily and do not rely on social ques, the direction is genetically controlled. Yet, the underlying genetic mechanisms remain unknown. To investigate genetic basis of migration we deployed 466 geolocators across Sweden on willow warblers. In central Sweden two subspecies that migrates SE meets and freely interbreeds with subspecies that migrates SW forming a migratory divide. We identified two genetic markers, and inversion polymorphism on chromosome 1 and a 12 mb large repeat block, that together explain 74% of variation in autumn migration direction. Our data strongly suggest that migration direction follows dominant inheritance pattern. Moreover our data suggests that there is an epistatic interaction between them.

Genetic background of risk-taking toward humans in great tits (*Parus major*)

Eszter Aletta Vig[1,*], Ivett Pipoly[1], Ágh Nóra Czikkelyné[1], Bendegúz Mihalik[1], Boglárka Bukor[1], Bálint Kovács[1], Krisztina Sándor[1], Gábor Seress[1], Ernő Vincze[1], Zsolt Rónai[2], András Liker[1]

[1]*Pannon Egyetem, Természettudományi Központ*
[2]*Semmelweis Egyetem, Molekuláris Biológiai Tanszék.*

**Corresponding author: eszter.aletta.vig@gmail.com*

Urban areas are expanding continuously, and animals living in cities should adapt to this altered novel environment. Higher risk-taking behaviour of urban-dwelling birds towards humans is widely reported, but the genetic or physiological backgrounds of tolerance towards humans are mostly undiscovered. By identifying genes that can play a role in regulating risk-taking towards humans, we can get a more complete knowledge of how urbanisation affects wildlife. Polymorphisms in the dopamine receptor D4 (DRD4) gene is related to various behavioural traits in several taxa, so in our study we tested the relationship between DRD4 polymorphism and the risk-taking behavior of great tit (*Parus major*) towards humans. We studied breeding parents along two urbanisation gradients, and recorded (1) whether females stay on their nest during incubation when an observer approaches the nest, and (2) the responses of parents after a standardized, short human disturbance during the brood rearing period. We genotyped 192 individuals from 128 breeding events at five previously studied sequences of the DRD4 gene, and investigated whether variation in risk-taking behaviour is related to DRD4 genotypes and the degree of urbanisation of the breeding site. We found that the behaviours shown after human disturbance were associated with some of the DRD4 polymorphisms, and genotype frequencies were also related to the degree of urbanisation. These results suggest that the DRD4 gene may be involved in adaptations to human disturbance in urban birds. Furthermore, our study provides useful protocols for measuring risk-taking behaviour toward humans in the field.

Avalanches create unique habitats for birds in the European Alps

Riccardo Alba[1,*] Ludovica Oddi[1], Domenico Rosselli[2], Dan Chamberlain[1]

[1] *Dipartimento di Scienze della Vita e Biologia dei Sistemi, Università degli Studi di Torino, Italia*
[2] *Ente di Gestione delle Aree Protette delle Alpi Cozie, Salbertrand (TO), Italia*

**Corresponding author: rickyalba26@gmail.com*

Mountain regions contain dynamic ecosystems that have been historically shaped by interactions between natural abiotic processes and human activities, but nowadays they are threatened by climate change. Avalanches are one of the main sources of natural disturbance in mountain areas, creating habitat mosaics with a high vegetation heterogeneity that can be exploited by a suite of animal species. Since snow precipitation regimes in mountain regions will be altered by climate change, it is fundamental to study the interactions between avalanches and biodiversity. We carried out surveys on 240 points to study birds and habitats across horizontal and vertical transects in the Alps to assess the differences in habitat and bird assemblages between avalanche tracks and control points. Differences in both habitat and in bird assemblages were more pronounced at lower elevations and became less obvious towards alpine grasslands. Avalanche tracks were characterized by a higher structural vegetation diversity with a greater cover of rocks, shrubs and a higher number of small trees. Bird assemblages differed between avalanche tracks and adjacent control points, being characterized by a mixture of species normally found at higher elevation in the treeline and species of semi-opened habitats. Importantly, the avalanche track bird assemblage differed from both forest and treeline ecotone assemblages, showing that these areas harbor unique groups of bird species. Future environmental change that may affect the frequency of avalanches thus has the potential to effect broader scale diversity in mountains, and hence should be a priority for alpine ecological research.

Effect of environmental conditions on the nest site selection and nestling growth of a high-elevation bird species

Carole Niffenegger[1,*], Sebastian Dirren[1], Christian Schano[1], Sabine Hille[2], Fränzi Korner-Nievergelt[1]

[1]*Swiss Ornithological Institute, Switzerland*
[2]*Institute of Wildlife Biology and Game Management, University of Natural Resources and Life Sciences, Vienna*

**Corresponding author: carole.niffenegger@vogelwarte.ch*

The reproductive period is an energetically demanding time in the annual cycle of most animals. In altricial birds, the energy budget of parents and their offspring is directly and indirectly linked to nest location. As such, microhabitat directly affects the energy expenditure for heating or cooling the nest. On the other hand, the distance from the nest to foraging sites affects energetic costs of the adults. Nest site suitability therefore ultimately influences adult and nestling fitness. However, habitat composition and prevailing weather conditions can alter the nest site suitability. Habitat composition may influence the abundance and accessibility of prey. On the other hand, weather conditions may pose direct physiological costs for parents and offspring due to their mutual influence on chick growth through the nest microclimate and the effects on foraging performance of adults. Here, we aim to disentangle the effects of nest microclimate, habitat composition and weather conditions on the nestling growth rate in harsh environmental conditions at high elevation in the white-winged snowfinch, Montifringilla nivalis. Our results will help understand the nest site selection of this high elevation bird species living in a temporally and spatially heterogeneous habitat that is currently subject to drastic changes due to global warming.

Sex-dependent feeding and nest visit behaviour in a climate sensitive high-alpine bird specialist

Christian Schano[1,*], Carole Niffenegger[1], Fränzi Korner-Nievergelt[1]

[1]*Swiss Ornithological Institute, Seerose 1, 6204 Sempach, Switzerland*

**Corresponding author:* christian.schano@vogelwarte.ch

Biparental care promotes offspring survival but, at the same time, implies costs for caring adults. As such, parental care behaviour reflects two aspects, namely a conflict about the proportion of care to share with a partner, and the individual ability to provide care. Because offspring fitness in birds highly depends on adult foraging performance, offspring demand and environmental conditions may have sex-specific consequences on parental foraging behaviour. We therefore investigated aspects of conditional cooperation (i.e., turn taking and synchronisation at the nest) and the sex-specific foraging behaviour in a nest box population of a high-alpine bird specialist, the white-winged snowfinch, Montifringilla nivalis. Preliminary results indicate turn taking to occur slightly more frequently than expected by chance even after correcting for differences in individual feeding rates. We further found weak but consistent sex-specific differences in the provisioning behaviour of male and female snowfinches in terms of feeding rate and prey composition. These differences were strongest on rainy days and when snow patch margins were scarce i.e., just after snow melt onset and after snow melt offset. Given that the impact of climate change is specifically severe in arctic and alpine environments, we discuss potential implications of climate change on sex-specific parental foraging behaviour, especially under the light of previous studies on the apparent survival of snowfinches.

Caught red-handed: systematic occurrence of kleptoparasitism by red-footed falcon (*Falco vespertinius*) on lesser kestrel (*Falco naumanni*)

Alessandro Berlusconi[1,2]*, Diego Rubolini[2,3], Giordano Brambilla[3], Jacopo G. Cecere[4], Adriano Martinoli[1], Damiano Preatoni[1], Lucas A. Wauters[1], Alessio Martinoli[1], Michelangelo Morganti[2]

[1]Environment Analysis and Management Unit - Guido Tosi Research Group - Department of Theoretical and Applied Sciences, Università degli Studi dell'Insubria, Via J. H. Dunant 3, 21100 Varese, Italy.
[2]NR-IRSA National Research Council – Water Research Institute, Via del Mulino 19, 20861 Brugherio (MB), Italy.
[3]Department of Environmental Science and Policy, Università degli Studi di Milano, via Celoria 26, 20122 Milan, Italy.
[4]Area Avifauna Migratrice, Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), Via Ca' Fornacetta 9, 40064 Ozzano dell' Emilia (BO), Italy.

**Corresponding author: aberlusconi@uninsubria.it*

Co-occurrence of ecologically similar species may lead to intra-guild competition, such as kleptoparasitism: a foraging strategy where an individual from one species steals food items caught by individuals of another species. Both lesser kestrel (Falco naumanni) and red-footed falcon (Falco vespertinus) have recently expanded their breeding range in Northern Italy. Currently, the Po Plain is the only known area in Europe where these two species breed sympatrically, potentially exploiting similar foraging habitats and trophic sources. Through scan animal sampling, realised over three years (2020-22), we focused on foraging groups of lesser kestrels to determine the frequency of red-footed falcons attacks, accounting for a set of environmental and biological variables. When foraging together, red-footed falcons attacked lesser kestrels with almost 50% of probability, successfully stealing the prey in 33% of the attacks. Most (74%) of the attacks were carried out by male red-footed falcons, and male lesser kestrels were attacked more frequently (71% of attacks). The probability of occurrence of red-footed falcon was unrelated to the size of lesser kestrel foraging groups. The likelihood of an attack increased proportionally with the lesser kestrels' prey capture rate. Red-footed falcon attacked despite of the size of the prey carried by lesser kestrels, but the likelihood of success was higher for larger prey. Noteworthily, red-footed falcons sometimes (40%) behaved group attacks, significantly increasing the stealing success probability. To our knowledge, this work described for the first time the systematic occurrence of red-footed falcon kleptoparasitism on lesser kestrel, possibly representing a specific foraging strategy.

Prey availability and its influence on habitat selection during the non-breeding period in a sedentary bird of prey

Roman Bühler[1,2]*, Kim Schalcher[2], Robin Sechaud[2], Alexandre Roulin[2], Bettina Almasi[1]

[1]*Swiss Ornithological Institute, Seerose 1, CH-6204, Sempach, Switzerland.*
[2]*Department of Ecology and Evolution, University of Lausanne, Building Biophore, CH-1015, Lausanne, Switzerland.*

**Corresponding author: roman.buehler@vogelwarte.ch*

For sedentary birds of prey inhabiting temperate regions, the colder non-breeding season can have large impacts on fitness with implications on population dynamics. The non-breeding season should thus receive the same amount of attention as other parts of the annual life cycle. Birds of prey in intensively managed agricultural areas are repeatedly confronted with unpredictable, rapid changes to their habitat (mowing, harvesting, ploughing). Such a dynamic landscape is likely to influence prey distribution and availability over the annual cycle resulting in changes in habitat selection of the predator. In the present study we combined GPS, with a large-scale small mammal monitoring, and habitat mapping data to investigate habitat selection of a bird of prey, the barn owl (Tyto alba), during the non-breeding period. The largest proportion of area in the non-breeding home ranges were crop rotation fields, a structure that offered little prey in winter. Consequently, we saw a strong preference for grassland, a structure with high prey availability during the non-breeding season. Presence of biodiversity structures (hedges, trees, wildflower areas) did further increase the selection for this habitat type. Biodiversity structures, generally have a high prey abundance but often the vegetation is too dense for raptors, making prey accessible only when it moves to the adjacent grassland. Hedges and trees on the other hand, give perching opportunity to birds of prey which could increase hunting success. These results indicate the importance of a structured landscape with dense undisturbed vegetation, perching opportunities and areas with lower vegetation to hunt.

Birds in Power-line Corridors: Effects of Vegetation Mowing on Avian Diversity and Abundance

Jakub Hrouda[1,*], *Vojtěch Brlík*[1,2]

[1]*Department of Ecology, Charles University, Prague, Czech Republic*
[2]*Institute of Vertebrate Biology of the Czech Academy of Sciences, Brno, Czech Republic.*

**Corresponding author: jakub.hrouda@gmail.com*

Human activities have tremendous impact on the environment but the extent of this influence on animals is frequently unknown. Here we focus on a ubiquitous man-made landscape element, power line corridors in forested areas where vegetation is regularly mowed, and its effects on avian species richness and abundance. We surveyed bird communities at 35 sites in southern Czech republic and found power line corridors hosted on average three more bird species and eight more individuals than transects in the surrounding forests. The Lesser Whitethroat (Sylvia curruca) and the Tree Sparrow (Passer montanus) were the most frequently detected species under power lines, suggesting the importance of these habitats for open-habitat specialists. Overall, we found positive effects on this human-altered landscape element on avian communities but future studies could focus on communities of other animals in this habitat with an emphasis on the presence of endangered species.

Linking dietary restriction and fitness components through IGF-1/mTOR signaling pathway

Gebrehaweria Kidane Reda[1,3]*, Sawadi Francisco Ndnguru[1,3], Ádám Zoltán Lendvai[2], Levente Czeglédi[1]

[1]*Department of Animal Science, Faculty of Agricultural and Food Sciences and Environmental Management, University of Debrecen, 4032, Debrecen, Hungary*

[2]*Department of Evolutionary Zoology and Human Biology, University of Debrecen, Debrecen, Hungary*

[3] *Doctoral School of Animal Science, University of Debrecen, 4032, Debrecen, Hungary*

**Corresponding author: gebrek2000@gmail.com*

Dietary restriction is defined as a reduction of total nutrient intake without causing malnutrition. However, the specific dietary regimens and how they interact with IGF-1/mTOR remain poorly understood in birds. We evaluated body mass, egg mass and egg number, plasma IGF-1, and muscle mTOR under four dietary restriction regimens of Japanese quails. The experiment was applied on 32 female and 32 male quails randomly grouped into four dietary regimens (ad libitum, 20%, 30% and 40% restriction) as experimental treatments. The experiment lasted for 14 days. We measured body mass and took blood samples on day 0, day 7, and day 14. We daily counted the number of eggs and measured egg mass. We collected tissue samples from all birds on day 14. Though dietary restriction has a significant effect on body mass, egg mass and egg number, the effect of circulating IGF-1 was not significant. Males showed lower IGF-1 levels than females in every treatment. We also observed high level of individual difference in IGF-1 levels. The nonparametric analysis indicated that the 40% restriction group showed the lowest mTOR concentration. The result suggested that the egg mass, egg number, and mTOR showed significant reduction at the severe restriction regimens. Whereas, body mass showed significant change starting from the lowest restriction regimen and keeps no significant difference among the regimens. There is no significant difference between 30% and 40% restriction regimens. Therefore, the 30% restriction regimen seems appropriate regimen to test morphological and physiological traits without causing hunger stress.

Effects of learning mistakes, immigration and conformism on complex birdsong cultures

Karola Anna Barta[1,*], László-Zsolt Garamszegi[2], Sándor Zsebők[2], István Scheuring[3]

[1]*Eötvös Loránd University*
[2]*Institute of Ecology and Botany, Centre for Ecological Research, Vácrátót, Hungary*
[3]*Institute of Evolution, Centre for Ecological Research, Budapest, Hungary*

**Corresponding author: bartakarla@student.elte.hu*

Cultural diversity and stability of a population affect the adaptiveness and survival of individuals. Cultural diversity is generated by mechanisms that increase the proportion of new elements in the population, for example by immigration or erroneous learning. Conformism, one of the most commonly observed forms of social learning, has a rather opposite effect: while it helps in maintaining cultural stability by favoring the spread of common elements, it also decreases cultural diversity. We investigated whether these three basic, conflicting mechanisms are sufficient together to create a complex, polymorphic song culture and to maintain its diversity and stability. To test this prediction, we developed an individual-based model mimicking song learning in birds in which the extent of immigration, the frequency of learning mistakes and the strength of conformism were included as variable parameters. From the model, we obtained information on the composition and temporal changes in the individual and populational repertoires. A comparison with long-term field data on a model species with moderate song complexity, the collared flycatcher (Ficedula albicollis), was also performed. Our results confirmed that certain combinations of the three investigated mechanisms were indeed able to create patterns that gave a close fit with the observational data and that showed certain aspects of polymorphic cultures. On the other hand, we found a higher turn-over of cultural elements in the simulations than in the field data indicating that other, stability-ensuring mechanisms also have a role in shaping the song culture of collared flycatchers.

Preliminary data on DNA Metabarcoding Assessment of the Grey Plover's (Pluvialis squatarola) Diet During Spring and Autumn Migration on the Western Black Sea Coast, Bulgaria

Liliana V. Vassileva[1,*], Stefania L. Klayn[1], Lyudmila Lozanova[1], Martin P. Marinov[1], Boyko Neov[1]

[1]*Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 2 Gagarin Street, 1113 Sofia, Bulgaria*

**Corresponding author: lilianavassileva@gmail.com*

The Grey Plover (Pluvialis squatarola) is a long-distance migratory species that can be observed along the Bulgarian Black Sea coast during stopover and wintering periods. However, its stopover foraging ecology in the region is still poorly known. We analysed grey plover diet at migration stopover sites along the Bulgarian Black Sea coast through DNA metabarcoding of fecal samples. Samples were collected in 2020-2021, and CO1 marker was used to determine prey items. Prey availability samples were also collected from the mediolittoral (surf zone) and the supralittoral sandy shore in the area, where plovers were observed to feed. 429 prey taxa were identified by metabarcoding, of which 157 to species level. Insects (67 %) predominated in the diet, with orders Diptera (50%), Hymenoptera (20%) and Lepidoptera(18%) taking the highest proportions. Surprisingly, marine invertebrates (Bivalvia - 14%, Malacostraca - 4% and Polychaeta - 2%) were present in lower proportions, even though previous studies suggested that they are a major component of the plover diet. Preliminary results from prey availability in the samples show that Bivalves and Amphipods predominated in quantity compared to other invertebrate taxa. We are working on the hypothesis that Grey plovers along the Bulgarian Black Sea coast are likely generalists, feeding opportunistically on the most abundant and readily available prey. These results contribute to our knowledge of coastal ecosystem food webs and functioning, and will help in designing conservation strategies for this protected bird species.

Haemosporidian infections are more common in breeding shorebirds than migrating shorebirds

William Jones[1,*], Zsófia Tóth[1], Viacheslav Khursanov[2], Anastasia Kisliakova[2], Oliver Krüger[3], Tamás Székely[1,4], Natalia Karlionova[2], Pavel Pinchuk[5], Nayden Chakarov[3]

[1]*Department of Evolutionary Zoology and Human Biology, University of Debrecen, Debrecen, Hungary.*
[2]*Scientific and Practical Centre for Biological Resources, National Academy of Sciences of Belarus, Minsk, Belarus.*
[3]*Faculty of Biology, Bielefeld University, P.O. Box 100131, D-33501 Bielefeld, Germany.*
[4]*Milner Centre for Evolution, Department of Biology and Biochemistry, University of Bath, Bath, UK.*
[5]*Pripyatsky National Park, Turov, Belarus*

**Corresponding author: wjonesdebrecen@gmail.com*

Shorebirds (sandpipers, plovers, and allies) are traditionally perceived as relatively free from malaria parasites (haemosporidians). Although low prevalence fits several theories, such as effective immune responses, low exposure to vectors and migratory behaviour, only few studies have been carried out in freshwater inland sites, with a mixture of actively migrating and breeding hosts, where the vectors of haemosporidians (eg, mosquitoes) are abundant. Here we report the results of malaria screening of 214 shorebirds from 15 species from a freshwater marshland in southern Belarus for the presence of Haemoproteus, Leucocytozoon and Plasmodium parasites. Contrary to most previous studies, we find that avian malaria parasites are frequent, with an overall prevalence in the community of 16.36%, including the locally breeding species (23.13%, 10 species) and migratory species (0.05%, 5 species). We suggest that blood parasite infections are more common in shorebirds than currently acknowledged, although the parasites are suppressed during migration, leading to lower prevalence or even apparent absence in some species. Taken together, we theorise that a combination of sampling biases has driven our understanding of haemosporidian prevalence in shorebirds and future studies should take migratory status into account when reporting prevalence.

Sulfur isotopes revealed spatial segregation and climate variability in Eurasian Reed Warblers: a new tool for animal tracing

Vojtěch Brlík[1,2]*, Petr Procházka[2], Bengt Hansson[3], Craig A. Stricker[4], Elizabeth Yohannes[5], Rebecca L. Powell[6]*, Michael B. Wunder[7]*

[1]*Department of Ecology, Charles University and Institute of Vertebrate Biology, Czech Academy of Sciences*
[2]*Czech Academy of Sciences, Institute of Vertebrate Biology, Brno, Czech Republic*
[3]*Department of Biology, Lund University, Lund, Sweden*
[4]*United States Geological Survey, Fort Collins Science Center, Denver, USA*
[5]*University of Konstanz, Institute of Limnology, Konstanz, Germany*
[6]*University of Denver, Department of Geography and the Environment, Denver, USA*
[7]*University of Colorado Denver, Department of Integrative Biology, Denver, USA*

**these authors contributed equally*

**Corresponding author: vojtech.brlik@gmail.com*

Climatic conditions affect animals but range-wide impacts at the population level remain largely unknown, especially in migratory species. We developed a stable sulfur (δ34S) isotopic map to trace animal origins in sub-Saharan Africa by coupling known-origin samples from tracked migratory birds with continental remotely-sensed environmental data building on environment -δ34S relationships using machine learning technique. The predicted δ34S isotopic map features east-west and coast-to inland isotopic gradients, which was applied to predict non-breeding grounds of three breeding populations of Eurasian Reed Warblers (Acrocephalus scirpaceus) showing two distinct migratory phenotypes. Breeding populations as well as migratory phenotypes showed large-scale segregation within the African non-breeding range and these regions differed substantially in the interannual climatic variation, with higher interannual variability in the eastern part of the range during 2001-2012. Over the same period, the eastern European breeding population experienced a more steep decline in population size. Link between migratory patterns and large-scale climatic variability appears essential to better understand population trajectories in many declining migratory animals. We believe animal tracing using sulfur isotopes facilitates these efforts and offers manifold ecological and forensic applications in the biodiversity hotspot of sub-Saharan Africa.

Rush or Relax: Migration Tactics of a Nocturnal Insectivore in Response to Ecological Barriers

Michiel Lathouwers[1,2,*] Tom Artois[1], Nicolas Dendoncker[2], Natalie Beenaerts[1], Greg Conway[3], Ian Henderson[3], Céline Kowalczyk[1], Batmunkh Davaasuren[4], Soddelgerekh Bayrgur[5], Mike Shewring[6,7], Tony Cross[8], Eddy Ulenaers[9], Felix Liechti[10], Ruben Evens[11]

[1]*Hasselt University, Centre for Environmental Sciences, Research Group: Zoology, Biodiversity and Toxicology, Campus Diepenbeek, Agoralaan, Gebouw D, 3590 Diepenbeek, Belgium.*
[2]*University of Namur, Department of Geography, Institute of Life, Earth and Environment (ILEE), Rue de Bruxelles 61, 5000 Namur, Belgium.*
[3]*British Trust for Ornithology, The Nunnery, Thetford, Norfolk IP24 2PU, UK.*
[4]*Wildlife Science and Conservation Centre, Ulaanbaatar, Mongolia.*
[5]*Department of Biology, Mongolian National University of Education, Ulaanbaatar, Mongolia.*
[6]*Cardiff University, School of Biosciences, Cardiff, UK.*
[7]*MPS Ecology, Heol y Cyw, Bridgend, UK.*
[8]*Consultant Ornithologist, Llandrindod Wells, Wales, UK.*
[9]*Agentschap Natuur en Bos, Regio Noord-Limburg, Herman Teirlinck Havenlaan 88 bus 75, 1000 Brussels, Belgium.*
[10]*Swiss Ornithological Institute, Seerose 1, 6204 Sempach, Switzerland.*
[11]*University of Antwerp, Department of Biology, Behavioural Ecology and Ecophysiology, Universiteitsplein 1, 2610 Wilrijk, Belgium*

**Corresponding author: michiel.lathouwers@uhasselt.be*

During their annual migration, avian migrants alternate stopover periods, for refueling, with migratory flight bouts. We hypothesize that European Nightjars (Caprimulgus europaeus) adapt their daily migration tactics in association with biomes. We tracked the autumn migration of 24 European Nightjars, from breeding populations in Mongolia, Belgium and UK, using GPS-loggers and multisensor data loggers. We quantified crepuscular and nocturnal migration and foraging probabilities, as well as daily travel speed and flight altitude during active migration in response to biomes. Nightjars adopt a rush tactic, reflected in high daily travel speed, flight altitude and high migration probabilities at dusk and at night, when traveling through ecological barriers. Migration is slower in semi-open, hospitable biomes. This is reflected in high foraging probabilities at dusk, lower daily travel speed and lower migration probabilities at dusk. Our study shows how nightjars switch migration tactics during autumn migration, and suggest nightjars alternate between feeding and short migratory flight bouts within the same night when traveling through suitable habitats. How this may affect individuals' fuel stores and whether different biomes provide refueling opportunities en route remains to be investigated, to understand how future land-use change may affect migration patterns and survival probabilities.

The breeding biology of the European blackbird (*Turdus merula*) in an urbanized world

Noémi Pallás[1,*], Iván Alejandro Andazola González[1], Judit Szabados[1], Bianka Kocsis[1], Zoltán Németh[1]

[1]*Department of Evolutionary Zoology and Human Biology, University of Debrecen*

**Corresponding author: noemipallas97@gmail.com*

In recent decades, the number of cities and the number of people settling in them have increased immensly. The expansion of the anthropogenic environment not only effects humankind but also organisms around us. Despite the several types of disturbances organisms must face in an urbanized area, quite a few species seem to be well adapted to the altered habitat. The urban phenotype often differs from the phenotype found in the natural habitat in several ways. Our aim was to assess whether the breeding biology of European blackbirds (*Turdus merula*) living in urban environments differs from their forest counterparts. The research was carried out in Debrecen in 2 urban and 2 forested areas. We have found that at the beginning of the season, blackbirds started breeding mainly on evergreen shrubs, - and trees, as well as on buildings. These substrates play a significat role in early breeding, as they provide cover before leaf-out. The birds nested on anthropogenic substrates more often at sites where the number of trees and shrubs suitable for nesting are the lowest. Contrary to the literature, we have found that blackbirds built their nests lower in the more urbanized habitat. Examining parental investment and reproductive success, we found no differences between the habitats. However, the rate of nest predation was significantly higher at forested sites than in the urban areas. It is important to study the breeding biology of urban organisms to better understand the opportunities and constraints organisms face as a result of anthropogenic change.

No place for ground-dwellers in cities: a meta-analysis on bird functional traits

Tamás Lakatos[1,2]*, Dan Chamberlain[3], László Zsolt Garamszegi[4,5], Péter Batáry[1]

[1]"Lendület" Landscape and Conservation Ecology, Institute of Ecology and Botany, Centre for Ecological Research, 2163 Vácrátót, Alkotmány u. 2-4, Hungary.
[2]Doctoral School of Biology, Institute of Biology, Eötvös Loránd University, Pázmány Péter sétány 1/C, 1117 Budapest, Hungary.
[3]Department of Life Sciences and Systems Biology, University of Turin, Via Accademia Albertina 13, Turin 10123, Italy.
[4]Evolutionary Ecology, Institute of Ecology and Botany, Centre for Ecological Research, 2163 Vácrátót, Alkotmány u. 2-4, Hungary.
[5]MTA-ELTE Theoretical Biology and Evolutionary Ecology Research Group, Institute of Physics, ELTE Eötvös Loránd University, Budapest, Hungary.

*Corresponding author: lakatos.tamas@ecolres.hu

Urbanization changes the environment in unprecedented ways, in which increasing human settlement cause the loss of natural areas, thereby threatening global biodiversity and ecosystem functions. Consequently, this evidence base needs to be strengthened in order to understand how the man-made alteration influences urban biodiversity, and hence develop appropriate conservation measures. We expect that urbanization influence the abundance of passerine birds through functional traits. Within a systematic review using phylogenetically controlled meta-analyses, we tested the following predictions: (i) Based on migration strategy, tropical migrants will be the least numerous in urban areas; (ii) Birds nesting at ground level will be at a disadvantage compared to birds nesting at higher levels; (iii) In terms of foraging technique, ground probers will be negatively; and (iv) birds with insectivorous diet will be the most disadvantaged in cities. We studied bird species (N = 53) along urbanization gradients that ranged from highly urbanized areas to adjacent natural areas. Our findings showed that the impact of urbanization on the abundance of bird species is modulated by certain functional traits. Partial or short distance migrants, ground nesters, ground gleaners and granivores were the most negatively influenced by urbanization. The species most vulnerable to urbanization were those that are linked in some way to open grassland areas. This result indicates that cities need more intact and extensively managed grasslands to sustain bird communities, which provide valuable ecosystem services in urban areas.

The relationship between mating systems and spermatoza charactristics in shorebirds

Zsófia Tóth[1] , Szabolcs Tamás Nagy[2], Michael Lierz[3], Péter I. Fábián[1], Natalia Karlionova[4], Pavel Pinchuk[5,6], Nastassia Kisliakova[4], Viacheslav Khursanov[4], Tamás Székely[7]

[1]University of Debrecen, Department of Evolutionary Zoology and Human Biology, Hungary
[2]Hungarian University of Agriculture and Life Sciences, Institute of Animal Sciences, Georgikon Faculty, Hungary
[3]Justus-Liebig University Giessen, Clinic for Birds, Reptiles, Amphibians and Fisch, Germany
[4]National Academy of Sciences, Institute of Zoology, Belarus
[5]APB - Birdlife Belarus, Belarus
[6]Pripyatsky National Park, Belarus
[7]University of Bath, Milner Centre for Evolution, Department of Biology and Biochemistry, United Kingdom

**Corresponding author:* hylidae91@gmail.com

To investigate this proposition, we compare spermatozoa characteristics between monogamous and non-monogamous shorebirds. Shorebirds (sandpipers, plovers, and allies) exhibit unusually diverse mating systems that include monogamy, polygamy, polyandry, and lek polygamy. We collected spermatozoa in the field from 6 species and augmented our data with one previously published paper on shorebirds (n = 16 species) with one common species the ruff (n=21). We captured shorebirds with walking traps, and we collected ejaculates by cloacal massage. Afterward, we fixed the ejaculates in 300µl 5% formalin and we created air-dried smears from all samples. We stained the smears with Feulgen procedure, then took photos from smears at 1000X magnification and measured the characteristics of spermatozoa with ImageJ. Consistently with expectations, we found that the spermatozoa and the different part of the spermatozoa is longer in non-monogamous species (n = 8 species) than in monogamous ones (n = 13 species). However, further samples are needed to control for various potential sources of variation (eg. timing in the breeding season, sperm extraction differences).

Poster Presentations

Conservation of Collared Pratincoles in Hungary: a success story

Ádám Kiss[1], Zsolt Végvári[2], Vojtěch Kubelka[3], Ákos Monoki[4], István Kapocsi[4], Szilvia Gőri[4] & Tamás Székely[1]

[1]Department of Evolutionary Zoology and Human Biology, University of Debrecen, , Hungary
[2]Centre for Ecological Research, Budapest, Hungary
[3]Department of Zoology and Centre for Polar Ecology, University of South Bohemia, České Budějovice, Czech Republic
[4]Hortobágy National Park, Debrecen, Hungary

**Corresponding author: kissadam@hnp.hu*

Habitat loss and intense agriculture has lead to decline of several ground-nesting birds across Europe. The Collared Pratincole (Glareola pratincola) was a common shorebird in Hungary before 1960ies that breed on alkaline grasslands called „puszta". More recently, however, pratincoles changed nesting habitat to cultivated areas where they suffered high nest loss due to agricultural machinery and increased predator pressure by foxes, badgers and crows. Here we report the results of a conservation project jointly carred out by Hortobágy National Park and University of Debrecen. Conservation measures include nest protection from agriculture machinery, creation of safe nesting sites and removal of nest predators. Here we report the nest survival rates of 315 pratincole nests between 2012 and 2021 and show that nest success was different between breeding habitats since pairs which bred in spring-cover crops or fallow lands had higher nest-success and hatched more chicks compared pairs bred in row crops. Importantly, nest survival increased from 11% to 83%, during the study period. By applying direct nest protection, nests that would have been destroyed by agricultural machinery achieved a similar survival probability as those that were not threatened by the actual agricultural practice. As a result of direct conservation actions, the breeding population of pratincoles has increased from 13 pairs to 65 pairs in the Hortobágy region.

Variability in size and shape of Eurasian Coot eggs (Fulica atra Linnaeus, 1758) between 2018 and 2022 in the local conditions of Campenesti wetlands (NW Romania).

Valentin Adrian Kiss[1,*], Liviu Razvan Pripon[2], Sergiu Megisan[2]

[1]*Romanian Institute of Science and Technology, Cluj-Napoca, Romania*
[2]*Independent Reseacher, Cluj-Napoca, Romania*

**Corresponding author: kissvalentinadrian@gmail.com*

In this study, we examine the temporal variations in the length and width of Eurasian coot (Fulica atra Linnaeus, 1748) eggs as well as their shapes under the same local conditions of Câmpenești fishing complex in Cluj County, NW Romania. Our goal is to determine if egg measurements are constant or changing over time, highlighting the significance of ecological characteristics (such as food availability or weather conditions) and the potential impact that population stability or instability may have on these parameters. The results may be applicable to other research that compare data from smaller-scale and wider study areas. In order to conduct this study we measured 136 eggs in three different years as follows: 58 eggs in 2018, 19 eggs in 2020 and 59 eggs in 2022. Using an electronic calliper, the eggs were measured, and the egg shape index (W/L*100) was used to determine the shape of the eggs. The results indicate some changes between the three years, more evident in the case of width and a more attenuated difference in the case of length and nearly identical results in the case of egg shape. The higher variance was noted in 2020 and the smallest measurements were recorded in 2018. In conclusion, we can say that egg size and egg shape show variation in the local conditions throughout the investigation period, but the values indicate a tendency of shrinkage and roundness of eggs in the present compared with data from the past.

Studying shorebird nest survival in Turov, Belarus

Nastassia Kisliakova[1]*, Vojtěch Kubelka[2], Natalia Karlionova[3], Viacheslav Khursanov[4], Zsófia Tóth[5], Tamás Székely[5,6]

[1]*State Institution of Education "Researchers Training Institute of the National Academy of Sciences of Belarus", Republic of Belarus*
[2]*Department of Zoology and Centre for Polar Ecology, University of South Bohemia, České Budějovice, Czech Republic*
[3]*National Academy of Sciences, Institute of Zoology, Belarus*
[4]*Independent Researcher*
[5]*University of Debrecen, Department of Evolutionary Zoology and Human Biology, Hungary*
[6]*University of Bath, Milner Centre for Evolution, Department of Biology and Biochemistry, United Kingdom*

**Corresponding author: anastasia.bio.by@gmail.com*

Climate change and human impacts are changing wetland environments across the globe, threatening wetland biodiversity and highlighting the importance of improved management of wetland habitats. Altered trophic interactions, e.g. increased predation pressure, have been repeatedly observed, however the responsible drivers, crucial for suitable management establishment and effective conservation, remain obscured. Here, we investigated trophic interactions – avian nest predation rates alongside two main possible drivers: ground water level, and number of predators. We monitored nest survival of 2300 nests of six shorebird species in 16 years during 2003–2021 in Turov meadow at Pripjat river, Belarus. We recorded significant increase in nest predation rates of shorebirds was mostly influenced by general decrease of water levels during the focal period. There was no influence of number of avian predators (crows) on observed nest predation rates. Higher water level acts as natural barrier against mammalian predators and more aggregated associations of breeding birds probably more easily repel avian predators under those circumstances. Our result shows that reproductive failure via nest predation levels is increasing during last decades in line with decreasing water levels in a natural wetland complex. Recently pronounced droughts and lowered water levels across Europe thus represent important increasing threat not only for human communities, but also for breeding productivity of wetland birds at continental scale.

Are personality differences among individuals related to immunity in free-living Eurasian tree sparrows (Passer montanus)?

Péter Imre Fábián[1], Attila Fülöp[1], Dóra Lukács[1], Bianka Kocsis[1], Gabriella Csöppü[1], Zoltán Barta[1]

[1]ELTH-DE Behavioural Ecology Research Group, Department of Evolutionary Zoology and Human Biology, University of Debrecen, Egyetem tér 1, Debrecen 4032, Hungary

Corresponding author: fabianpeterimre@gmail.com

Behavioural traits which are consistent across time and contexts are called animal personalities. Personality of individuals can be related to their physiological state (e.g. immunity). The relationship between personality and immunity can be explained by two evolutionary hypotheses. First, the risk-of-parasitism hypothesis predicts that individuals with a proactive personality (i.e. more active, exploratory, bold) should have a stronger immune defence because of the higher exposure to parasites. Second, the pace-of-life syndrome (POLS) hypotheses predicts that proactive individuals should have a weaker immunity due to their life history allocation strategy (i.e. live fast, die young). In our study, we tested these two hypotheses in free-living Eurasian tree sparrows (Passer montanus) during the non-breeding season. We quantified cellular innate immunity (total leucocyte counts) and chronic physiological stress levels (ratio of heterophils to lymphocytes) of individuals at capture. Also, at the same time, we measured individual personality (activity in a novel environment). Surprisingly, we found no significant correlation between activity and total leucocyte counts or ratio of heterophils to lyphocytes, in any of the two sexes. Our findings therefore do not support any of the two hypotheses proposed on the relationship between individual personality and immunity.