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Abstract book



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ORAL PRESENTATIONS

Are bird community responses to the urbanization gradient consistent across seasons?

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Urbanization is one of the major drivers of the ongoing global decline in biodiversity. Cities typically evolve along a spectrum from areas with high human population density and a high cover of artificial surfaces in the centre to lower-density areas with more green space in the suburbs, with different effects on the species-composition of their animal communities. While other studies have primarily focused on the breeding season, variations in the composition of urban bird assemblages between seasons along the urban gradient remain insufficiently investigated. In this study, we aimed to analyse how bird assemblages vary between seasons along the urban gradient and to identify the “winners” and “losers” within this framework. We carried out bird surveys on 220 point counts across 6 Italian cities during both breeding and wintering seasons. We also sampled small-scale habitat variables and collected species-specific ecological traits for our analyses. Preliminary results revealed that there were overall similar responses to the gradient between seasons. However, when we defined the species according to functional groups, the response to the urban gradient varied between seasons, in particular for forest species and short-distance migrants that managed to enter the urban matrix outside the breeding season, as long as green spaces were sufficiently present. These results show that urban planning decisions based on only one season may not address impacts of urbanization on species across the whole of their annual cycle. The study of seasonal impacts of urbanization thus provides valuable insights into strategies for a more sustainable future in urban planning.

Can you just fly away from all your problems? – Breeding dispersal in southern dunlins (*Calidris alpina schinzii*)

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The global decline of shorebird species results from the combined impacts of human activities and climate change. The key factor contributing to the observed adverse trend is the deterioration of essential breeding and staging grounds for long-distance migratory waders, attributed to agricultural practices and land abandonment. Coastal grasslands along the Baltic Sea coast provide vital habitats for shorebirds during migration and for reproduction. Over the past two decades, there has been a notable increase in the restoration of Baltic coastal meadows, primarily through extensive cattle grazing. However, cattle grazing carries the potential for negative side effects. Cattle may inadvertently trample bird nests and broods and inadequate grazing practices can exacerbate the predation risk. Additionally, weather conditions in the Baltic are changing because of climate change, with a particular increase in wind-driven floods that can wash away nests and young broods. To assess the impacts of these threats and adapt current management practices accordingly, we investigate breeding dispersal in response to nest failure of one of the most endangered waders in Europe – the southern dunlin (*Calidris alpina schinzii*). Using a long-term data set on their life history, we investigate if nesting success predicts the dispersal distance and direction in relation to the previous nesting attempts and if different causes of failure (e.g. predation, flooding) have different effects on dispersal decisions. Our study on dispersal behavior in southern dunlins provides crucial insights into whether and how threatened bird populations are able to deal with the ramifications of environmental change and provides fundamental data to assess the viability of populations.

MHC-II diversity reveals link with fitness parameters in adult black-legged kittiwakes *Rissa tridactyla*

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The major histocompatibility complex (MHC) is a polymorphic group of genes that encodes antigen-presenting molecules in vertebrate immunity. Individuals with high MHC-diversity are expected to recognise and eliminate a wider range of pathogens and therefore have fitness advantages over individuals with lower MHC-diversity. Individuals with high MHC-diversity are thus often preferred as sexual partners as they can provide indirect benefits via the heritability of MHC alleles, or direct benefits, such as increased parental care. Here we investigated the link between MHC-II diversity and fitness proxies (weight, phenology, clutch size, egg size, hatching probability, chick growth and chick survival) in the black-legged kittiwake, a genetically monogamous species. We found that highly diverse males have a lower weight outside the reproductive period, have eggs with a higher chance to hatch that are laid earlier and have second-hatched chicks growing faster during early chick-rearing. In females, a high MHC-diversity is related to a bigger clutch size, a higher hatching probability, and a higher growth rate of first-hatched chicks in early chick rearing. Highly diverse individuals seem to be advantaged in the environment thus should be more chosen as mates, but they only make a small portion (6.7%) of the population. We argue that there might be a disadvantage of being highly diverse and trade-offs might take place.

What birds disoriented by broadband radiofrequency fields tell us about the avian magnetic compass

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Night-migratory songbirds can, among other compass systems, use a magnetic compass to guide their migratory journey. This light-dependent magnetic compass sense can be disrupted by weak man-made radiofrequency (RF) fields, resulting in disoriented birds.

The leading hypothesis explaining this RF effect is the light-activated radical-pair-based mechanism of magnetoreception. According to the radical-pair mechanism hypothesis, a pair of radicals is formed upon light-excitation within cryptochrome 4, a protein found in the birds' eyes. The exact identity of the magnetically sensitive radicals in cryptochrome is uncertain *in vivo*, but the radical formation seems to require a bound flavin adenine dinucleotide chromophore and a chain of four tryptophan residues within the protein.

A combination of quantum-chemical calculations and behavioural experiments using RF fields have been used to reveal the properties and identities of the radicals involved in avian magnetoreception. While the lower bound of disorienting broadband RF fields is defined by the duration for which the radical-pair mechanism is magnetically sensitive, the upper bound is defined by the identity of the involved radicals. Organic molecules contain hydrogen and nitrogen atoms. The more of these atoms a radical contains, the higher the frequencies that can affect the radical pair. Theoretical calculations of a flavin-based magnetoreceptor predict the disorienting effects of broadband RF fields in the MHz range, suggesting an effective upper bound for disruption.

We tested these predictions in behavioural experiments. We show that broadband 75–85 MHz radiofrequency fields disorient Eurasian blackcaps (*Sylvia atricapilla*), while RF fields beyond the predicted effective upper bound do not affect the birds' orientation. The results provide strong support for radical-pair-based magnetoreception and are consistent with a flavin–tryptophan radical pair. Further, the boundaries of RF fields disorienting the magnetic compass of night-migratory songbirds are now established.

Spatio-temporal variability in foraging ecology of a High-Arctic zooplanktivorous seabird, the little auk *Alle alle*, breeding in Svalbard

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Global warming is affecting the zooplankton communities in the European Arctic via raising temperatures and an increased inflow of warmer water masses entering the Arctic from the Atlantic. These phenomena have repercussions on animals of higher trophic levels preying on zooplankton. The little auk *Alle alle* is the most abundant zooplanktivorous seabird breeding colonially in the High Arctic Svalbard Archipelago, the area being strongly affected by climate changes.

To characterize little auk response to environmental variability, data from three little auk colonies (Hornsund, Magdalenefjorden and Bjørnøya) exposed to different oceanographic conditions were collected. Combining information about the dive characteristics, the foraging location, and the environmental conditions, we investigated two questions: (i) if birds from different colonies, foraging in different oceanographic conditions, adopt different diving tactics/behavior, and (ii) if from one year to another, birds belonging to the same colony have the same diving behavior albeit the changes in environmental conditions (SST and/or chl-a). GPS and TDR (Temperature-Depth Recorders) loggers were deployed on breeding individuals. The GPS-loggers pinpoint the birds foraging locations, which were characterized with available remote sensing data about Sea Surface Temperature (SST), Chlorophyll a concentration (chl-a: used as a proxy for primary production) and bathymetry. The TDR-logger data allow characterizing bird dives, including dive depth, duration, profile, and water temperature. It has been found that foraging trip distances vary between the three colonies: birds from Bjørnøya and Hornsund forage mainly in cold water over the shelf zone located in the vicinity of their colonies, whereas birds from Magdalenefjorden go mainly further away to reach the marginal ice zone.

Color Polymorphism of Unfeathered Parts of the Great White Egret *Ardea alba alba* in Europe: An Analysis of the Internet Images

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Phenomenon of polymorphism has been described in various bird taxa including Ardeidae. This study investigated the spatio-temporal distribution of color polymorphic forms of the unfeathered parts (legs and lores) of native European subspecies of the Great White Egret (*Ardea alba alba*), basing on images from Internet. In total, 140 pictures of presumed polymorphic individuals from 16 countries have been chosen and analyzed. Eight types of coloration schemes of differently colored unfeathered parts were distinguished. Most of polymorph cases were recorded in the Netherlands and the southwestern coast of Norway. Local concentration of reported polymorphic individuals suggest some local factors affecting, e.g., diet composition or contact with hormone-disrupting compounds. On the other hand, some observation biases like presence of local breeding population or high numbers of nature photographers in this area cannot be excluded and could have affected our observation pattern. Some analyzed features also followed temporal patterns. Most polymorphic egrets were observed exclusively during the breeding season, suggesting disruptions of sex hormones as one possible cause. Studies of spatio-temporal patterns of polymorph occurrence may allow us to obtain insights into the causes of large variation in coloration schemes in polymorphic species.

Skyglow as a bright background for prey detection in the European nightjar (*Caprimulgus europaeus*)

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The European nightjar (*Caprimulgus europaeus*) is a crepuscular insectivore known for its ability to spot flying prey against the illuminated sky. Nightjars use two main foraging techniques: either they perch at the edge of open fields, using vantage points to sally for flying insects that are silhouetted against the bright sky, or they hawk for insects mid-flight. The efficacy of these foraging strategies is intricately tied to optimal light conditions, with peak activity observed during dusk and dawn, although brighter nights can allow nocturnal foraging as well. Bright nights can originate from natural light sources, such as moonlight, or from skyglow, the artificial brightening of the night sky due to human activities.

Analysing patterns in the nightjars' body acceleration, obtained from accelerometers, enabled the classification of their two foraging strategies. We then utilised a simplified dead-reckoning algorithm, combining accelerometer, magnetometer, and GPS data, to determine the bird's orientation during these foraging events. Subsequently, we correlated these variables with ecological factors such as moon illuminance and sky brightness.

Our research aims to determine how nightjars use natural and artificial light as bright backgrounds for prey detection. By studying the impact of skyglow on European nightjars' foraging behaviour, valuable insights are provided into the intricate relationship between these nocturnal birds and their environment. Furthermore, this study aims to reveal ecological nuances of nightjar behaviour and emphasise the potential impact of anthropogenic factors, such as artificial lighting, on their foraging strategies.

Nest defence may not evolve as expected with latitudinal gradient

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From a macroecological perspective, an increase in species diversity along a latitudinal gradient towards Equator is expected to result in higher biotic interactions in the tropics. Differential predation levels are expected to influence selection processes on anti-predatory strategies of prey species. Some may claim that in a breeding context, high predation pressure on eggs is expected to preferably select lower investment in clutch size and defence by parents, to save energy for future breeding attempts. At lower predation rate and higher latitude, a shorter breeding season is incompatible with re-nesting, influencing higher investment in a given attempt. On the other hand, others argue that low predation rates could be linked with lower predator abundance or diversity, and naive birds would not react to predator they rarely or never encounter, ultimately leading to low defence levels towards the poles. To investigate those hypotheses, we exposed Northern (*Vanellus vanellus*) and Southern Lapwings (*V. chilensis*) to dummies of three different predatory guilds and a control. We measured investment in nest defence and clutch attendance by parents, and mobbing behaviour shared with con- and heterospecifics. Lapwings on both hemispheres appeared to react specifically to certain predatory guilds, and showed strong discrimination abilities. Species differed in boldness, but not necessarily aggressiveness. Surprisingly, study species demonstrated opposite latitudinal trends in aggressiveness, thus supporting both hypotheses. Our pilot results tend to show a differential role of selective pressure and personal experience influence in individual nest defence behaviour against predator, that could vary between closely-related species.

Dependence of the dynamics of avian influenza virus infection in wild ducks on environmental factors in the south of Western Siberia

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Viruses can stay active for long periods of time in the surface water layers of non-flowing reservoirs. Although LPAI (low-pathogenic avian influenza) is believed to be transmitted to wild birds primarily through the surface water, the phenomenon of the virus spreading in the habitat by waterfowl has been studied more rarely than direct transmission of infection. Both laboratory and field approaches have provided strong evidence that LPAI strains can remain infectious for long periods of time. Local weather conditions and local climate can affect the stability of LPAI in water. In small water pools, the possibility of virus transmission is greater, since there due to lower dilution and, consequently, the concentration of the virus is higher. The climate features of the south of Western Siberia create favorable conditions for the long-term stability of the virus in soil and water.

Individual characteristics of wild dabbling and diving ducks (species, sex, age) affect their infestation with LPAI virus during the autumn migration period in the south of Western Siberia. Among the examined ducks, the distribution between species differed between infected and uninfected individuals. The Eurasian Teal was under greater risk of being infected with the avian influenza virus. In this species, the sex of the individual influenced the probability of infestation both in young and adult individuals. The dynamics of avian influenza virus infection in dabbling ducks during the autumn migration period depends on the weather conditions (temperature and humidity) that occurred long before probable infection date (41-50 days before the date of capture of the bird). In the period 41-50 days before the date of capture of the bird, the temperature varied from 16 to 25 ° C, humidity — from 47 to 68%. If the temperature inside this interval increases by 1 ° C, the probability for the duck to become infected with LPAI decreases by 3.3%. With an increase in relative humidity within this interval by 1%, the probability for a duck to become infected with LPAI increased by 1.2%.

Quantifying nocturnal thrush migration using sensor data fusion between acoustics and vertical-looking radar

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Studying nocturnal bird migration is challenging because direct visual observations are difficult during darkness. Radar has been the means of choice to study nocturnal bird migration for several decades, but provides limited taxonomic information. Here, to ascertain the feasibility of enhancing the taxonomic resolution of radar data, we combined acoustic data with vertical-looking radar measurements to quantify thrush (Family: *Turdidae*) migration. Acoustic recordings, collected in Helsinki between August and October of 2021-2022, were used to identify likely nights of high and low thrush migration. Then, we built a random forest classifier that used recorded radar signals from those nights to separate all migrating passerines across the autumn migration season into thrushes and non-thrushes. The classifier had a high overall accuracy (≈ 0.82), with wingbeat frequency and bird size being key for separation. The overall estimated thrush autumn migration phenology was in line with known migratory patterns and strongly correlated (Pearson correlation coefficient ≈ 0.65) with the phenology of the acoustic data. These results confirm how the joint application of acoustic and vertical-looking radar data can, under certain migratory conditions and locations, be used to quantify family-level bird migration.

Timing of spring migration of the Eurasian Wren at the southern coast of Baltic in response of climate patterns at its breeding and non-breeding grounds in Europe

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Migratory birds adjust the timing of their seasonal migrations to the conditions on the breeding grounds in response to climate change in Europe. However, the influence of climate variability at other life stages on their spring phenology in Europe is poorly known. We aimed to determine the influence of three large-scale climate indices, the North Atlantic Oscillation (NAO), the Mediterranean Oscillation Index (MOI) and the Scandinavian Pattern (SCAND), on spring migration timing of a medium-distance migrant, the Eurasian Wren, at the southern Baltic coast, using data from ringing stations Bukowo-Kopań and Hel, during 1982–2021. We found large year-to-year variation, but no long-term trends, for any stage of Wren's spring passage. However, over 40 years the dates for 5% and 50% of passage shifted earlier at Hel, and for 95% shifted later at both stations, thus the passage duration at Hel extended by 7.6 days. Spring passage at Hel was early after positive MOI in spring and previous autumn. Late spring passage at Bukowo-Kopań followed positive NAO in the previous summer, winter and spring. High local temperatures near the stations at spring were associated with early start and median of passage. Wren's passage at Hel was shaped mostly by conditions where MOI operates, in south-eastern Europe. But spring migration at Bukowo-Kopań was related to NAO, which shapes climate in western Europe. These relationships likely reflect different proportions of Wrens arriving from these winter quarters at each station. At both stations, spring migration timing of Wrens was related to high SCAND in the previous summer. We showed that conditions the migrants encounter at breeding and non-breeding grounds have combined carry-over effects on their spring phenology in Europe.

Reproductive performance and survival varies across migratory strategies in a partial migrant

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Understanding the variation in migratory strategies within populations provides insights into the cost and benefits governing individual decisions. This contributes to our understanding on why some individuals of partially migratory species choose to migrate while others do not, and how this balance is maintained. Although recent research has addressed comparisons between sympatric-breeding residents and migrants, fewer studies have quantified variations in reproductive success and survival among multiple coexisting phenotypes, particularly in partial migrants. This study investigates the reproductive performance and survival of European Blackbirds exhibiting different migratory strategies. We color-banded individuals and collected mark-encounter data from 2020 to 2023. Using program E-Surge, we tested the effects of migratory strategy (resident/early migrant/late migrant) on annual survival rates. Reproductive success was tested by fitting a generalized linear model to assess whether mean reproductive success differed between the three categorized migratory strategies.

We hypothesized that migratory behavior plays a crucial role in shaping individual and within-pair reproductive success, with residents exhibiting higher success than migrants. Preliminary findings suggest that residency influences the reproductive success of individuals indicating a potential positive effect of the maintenance of this strategy. On the other hand, annual survival is predicted to be lower in migrant individuals. This study contributes to our understanding of how migratory strategies are linked with individual and within-pair fitness in partially migratory populations as it underscores the importance of considering distinct strategies as a factor influencing both reproductive success and survival and their interaction.

Investigating the call repertoire of a Red-billed Chough (*Pyrrhocorax pyrrhocorax*) colony in the Italian southern Apennines with a bioacoustics approach

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The red-billed chough (*Pyrrhocorax pyrrhocorax*) is a social species with a complex and articulated vocal repertoire. The study of the communication system of the species can provide interesting data on their sociality, on their behaviour with potential implications for their conservation. However, the species is poorly studied and research on their vocal repertoire is scarcely represented in the literature. Here, we conducted the analysis on a small population of red-billed choughs in the Italian southern Apennines, where studies on this species have never been conducted. The calls were recorded during August 2021 and August 2022 with a dual channel SM4 waterproof acoustic recorder at 1850 m a.s.l for a total of 384 hours. Through the analysis of the vocal repertoire, we identified six structurally different calls among the population. A fair degree of variation related to the variability of the individual was found, reflecting the high vocal plasticity of the species. Similarly to other studies, the commonest call type was the 'chwee-ow'. Furthermore, the population analysed also showed two different calls which are not present in the currently known vocal repertoire of other populations, suggesting that the presence of a different dialect might occur.

What can we learn from the evolutionarily important genes (MHC) and their polymorphism in non-Passeriformes?

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The genes encoding Major Histocompatibility Complex (MHC) molecules, cell surface proteins that play a key role in the adaptive immune system, are considered to be one of the most important genes in the evolutionary context. A characteristic feature of these genes is differences in polymorphism level between species. Therefore, observed multiple duplications in the MHC region due to multiple alleles within a locus. The evolutionary forces which drive such polymorphism are generally regarded as a pathogen-host-dependent. Despite there are growing body of information on MHC diversity in bird species, non-passeriformes - systematically heterogeneous group formed by all orders of birds not belonging to passerines - are still underinvestigated. Here we compare the variability of MHC class I and II in different orders and species belonging to non-Passeriformes. Based on NCBI database we constructed a phylogenetic tree and investigated selection acting on MHC for 36 species for MHC class I exon 3 and for 120 species for MHC class II exon 2. We expected that due to a large diversity of the group resulting from the different phylogenetic backgrounds and life histories of the species, there will be large differences in the level of polymorphism of taxa belonging to different orders. Our results supported expected differences in MHC polymorphism and variability between species and orders of non-Passeriformes. Our survey represents wide characterization of MHC genes in non-Passeriformes with its evolutionary background of the observed polymorphisms.

Home range size in the Eurasian Goshawk *Accipiter gentilis*: the effects of sex, season and territoriality

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Identification of factors shaping the home ranges is of primary importance in species ecology and conservation. We addressed this in the rarely tracked Eurasian Goshawk *Accipiter gentilis* by analysing home range sizes of 25 resident individuals over different phases of annual cycle for up to five years. The mean annual home range (estimated with 95% kernel density) of territorial females reached and was significantly larger than that of males. On average, the home ranges of successfully breeding birds tended to be smaller than those of unsuccessful ones, but the differences were statistically not significant. Males were associated with their nest sites throughout the year while the fidelity of females weakened in the non-breeding period. These differences could be explained by different strategies in males as territory holders and females as explorers of new potential mates and nest sites or by reducing competition between the partners. Our results also highlight the importance of long-term tracking in determination of annual home ranges and calls for restricting disturbance at nest sites throughout the year.

Great tit wing stripe – another piece in a puzzle of multiple ornaments?

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One of the key puzzles in evolutionary ecology is why some animals, including a great number of brightly coloured birds, display multiple sexual ornaments. To tackle this question in species with complex plumage patterns, it is necessary to know which patches are sexually selected. Here, we investigated colour traits of the great tit (*Parus major*), with a special focus on the so far unstudied wing stripe. For this purpose, we analysed spectral characteristics of the white dot and adjacent grey area of the greater coverts that create the stripe, together with other ornamental plumage traits: the melanin-based cap and breast tie, and the carotenoid-based breast plumage. Specifically, we aimed to examine sexual dichromatism within the wing stripe, identify its position in the correlation structure of great tit colour traits, and examine assortative mating based on all analysed traits. For the latter purpose, we assessed UV chroma and brightness both, within distinct plumage traits and integrated between the analysed patches. We show noticeable sexual dichromatism within white dots creating the wing stripe and the adjacent feather vane. Colour traits were moderately intercorrelated, and the pattern of correlations between colour ornaments differed between sexes. Importantly, we found positive assortative mating based on the UV chroma of the wing stripe and on the UV chroma signal integrated between the analysed colour patches. These outcomes suggest that the great tit wing stripe plays an ornamental role in mutual mate choice. Future studies should aim to resolve its signalling content as a predictor of reproductive success. We presume that sexual selection on achromatic ornaments might be widespread among birds.

Linking nest predation patterns and ecology in Southern African birds

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Nest predation is the main cause of reproductive failure in birds, ultimately influencing avian population dynamics and the evolution of avian breeding behaviour and life history. Given this impact, extensive research in behavioural, evolutionary, population and conservation biology have assessed nest predation. However, it has become clear that revealing the causes and consequences of nest predation is complex, due to the interplay between several actors with a specific biology (prey and different types of predators) and abiotic factors that affect ultimate rates of predation. Therefore, in this study, we quantified nest success for 54 bird species breeding in a small area of savannah habitat with overall high predation rates (~80%) in Eswatini, Southern Africa, and identified predators using continuous video recording of nests. We analysed nest success of more than 1000 nests, and related this to numerous biotic and abiotic factors that might affect nest predation, including species characteristics and biology, predator type and density, nest-site selection, phenology, and weather patterns. The findings aim to elucidate the complex relationships between predation rates, environmental factors and ecology of predator and prey. Ultimately, our results will contribute to a comprehensive understanding of nest predation's impact on avian communities and how this selection pressure acts on breeding birds in sub-Saharan Africa, and beyond.

Differences in flight performance and their connections to morphological traits of 12 bird species exploiting thermal soaring

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Thermal soaring is a great but challenging possibility for birds to perform cost-efficient flights during foraging or migration trips. To maximise energy savings, gliders have to continuously adjust their flight path and make decisions about how to take advantage of complex environment that is dominated by vertical and horizontal flows with various strengths. The morphology of birds influences flight behaviour due to aerodynamic differences. To quantify this relationship, we've focused on analysing a considerably large data set – composed of several published and unpublished data sets including our own and data acquired by collaborating with other research groups. More specifically, we analysed high-resolution (range between 10 and 0.3 Hz) GPS recordings of ninety individuals belonging to 14 bird species: Steppe eagle, Verreaux's eagle, Tawny eagle, Bald eagle, Eurasian griffon vultures, Himalayan Vulture, Rüppell's vulture, Andean Condor, Lesser kestrel, Peregrine falcon, White stork and Northern bald ibis. Our results show inter-species differences in flight performance linked to morphological divergences as well as inter-individual differences; some individuals seem to be better at maximizing flight performance and corresponding energy saving.

Turn Where? Using GPS to Learn Where Common Terns are Foraging in the Gulf of Maine

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The purpose of this study was to identify foraging hotspots of common terns (*Sterna hirundo*) and investigate the use of this marine predator in the development of preyscapes in the Gulf of Maine. We hypothesized that common terns forage in separate areas for different species of fish. We used GPS devices to track the flights of nine individuals raising chicks on Seal Island National Wildlife Refuge (United States) during the summer of 2022. At the same time, we collected chick diet data from these same individuals over 10 days. We paired the foraging location and prey data to elucidate where birds were foraging prior to provisioning their chicks with identified prey items. We examined 66 distinct foraging trips, consisting of 26 trips for hake (*Urophycis spp.*), 27 trips for Atlantic herring (*Clupea harengus*), and 13 trips for Atlantic saury (*Scomberesox saurus*). Six of the nine birds provided their young with all three prey types in our study. We found that common terns forage in three separate areas for hake, herring, and saury. However, they also forage in areas where all three food types are present. Our results provide insight into the foraging strategy of breeding terns and highlights marine areas that are important to provisioning seabirds in the Gulf of Maine, which is home to multiple restored seabird colonies.

Hoo's there? A comparative review and exploratory analysis of vocal individuality in owls, in relation with life-history traits.

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The ability to recognize and be recognized underlies the social behaviour of many animals. This could be at the level of species, group, neighbour, rival, mate, offspring, or self. Individual-level recognition holds special importance in intra-specific recognition, where it is key to basic processes like reproduction, locating own offspring, degree of escalation of territorial conflicts with conspecifics, etc. Individual identity signalling involves producing unique, identifiable signatures that remain stable over time.

A comparative study of vocally individual traits can reveal commonalities in related species, or common selective pressures in both related and unrelated species. Here, we conducted a literature review on vocal individuality in the owl clade. Owing to their nocturnal habit, the acoustic channel is very important for communication in owls. Territorial calls in many owl species have also been shown to be individually distinct and stable over several years. Further, we also classified the studies as fitting into one of 'Tinbergen's four questions' (ontogeny, mechanism, phylogeny, and function) when possible. In total, we collected 32 papers on vocal individuality in owls, representing 22 species from 9 genera. We converted reported values of individuality to a comparative metric: Beecher's statistic. Upon investigation of these values, the genus *Strix* seemed to encode highest individuality in their calls, which could be attributed to their longer, multi-element calls relative to other owl species. Further, we also conducted preliminary analyses investigating the relationships between different vocal traits, including individuality, to life-history traits of owls.

Investigating individuality in the context of these four questions can inform us not only of the mechanism of how and where identity is encoded, but also of the evolution of individuality through the life span of species and through phylogeny.

Testing the links between bird diversity, alien species and disturbance within a human-modified landscape

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Introduced alien species are associated with lower taxonomic, functional and phylogenetic diversity of native communities and negative impacts on ecosystem functioning. This is particularly evident in habitats where human disturbance may favour alien species, posing an additional stressor on native communities. Following the community resistance hypothesis (higher diversity promotes higher resistance to invasion), we predicted: 1) higher taxonomic, functional and phylogenetic diversity (TD, FD and PD respectively) in non-invaded bird communities (i.e. no alien bird species); and 2) higher diversity and resistance to invasion in less human-disturbed areas. We surveyed bird communities in a modified Mediterranean landscape subject to varying levels of human disturbance. We tested whether TD, FD and PD were significantly different between non-invaded and invaded bird communities, and assessed the effect of land classes (forest, agriculture, urban), landscape composition and heterogeneity on these metrics. We found that non-invaded communities retained higher TD and FD, but not PD, than invaded communities. Alien birds occupied marginal niches in invaded communities, and did not fully compensate for the taxonomic and functional diversity loss caused by the absence of native species. These results were consistent across different land classes, suggesting weak environmental filtering of communities. Generally, less human-modified and more heterogeneous areas supported higher TD regardless of the presence of alien species. FD and PD of invaded communities decreased with increases in human-modified areas, whereas non-invaded communities were not affected. Our results suggest that even within a human-modified landscape, invaded community diversity is more affected by, and thus has a lower resilience to, disturbance. Restoring and protecting natural habitats within human-modified landscapes is likely to increase the resilience of native species.

Activity of incubating common terns (*Sterna hirundo*) in freshwater and marine habitats

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The common tern (*Sterna hirundo*) is a colonial seabird nesting in both marine and freshwater colonies. Colony characteristics, such as its location, size, and habitat may impact nest attendance, brooding rate and fledgling survival. Because of the complexity of colony site choice and the array of behaviours exhibited by colonial seabirds, existing data should be expanded to include different freshwater and marine habitats to gain a clearer picture of bird on-site behaviour. Therefore, we collected continuous camera trap photographs of seven nests of the common tern at three colony sites in Croatia, from 2021 to 2023. In order to quantify the difference in nest attendance and brooding rate between nests and between habitats. The collected data was categorised into three states (incubating, near the nest and not present) based on the birds' relation to the nest in a given photograph. Using the R programming language, these photographs were sorted en masse into three variables: state duration per day (SDPD), state durations until change (SDUC) and number of state changes (NOSC). Nonparametric statistical tests showed a significant difference in most variables between marine and freshwater colonies during incubation, as well as during specific parts of the day (nighttime, afternoon and morning) within that period. In general, terns from the freshwater colonies had higher nest attendance and brooding rates and incubation bouts were longer. Marine terns left their nests unattended for longer periods. Such activity patterns probably reflected the differences in prey availability and foraging activities between freshwater and marine habitats. These results shed light on important variations in parental behaviour, as well as the link between common tern behaviour and specific characteristics of freshwater and marine habitats.

Brood sex ratios in European Blackbirds (*Turdus merula*) across urban and forested environments

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Raising male and female offspring often involves different costs, and at the same time, the two sexes can also contribute differently to the parents' fitness. According to the Trivers-Willard hypothesis, if the sexes have different reproductive values, females may adjust the sex of the offspring based on their own condition, quality, and the resource abundance of the breeding area, leading to biased brood sex ratios. Urban environments present challenging conditions for raising nestlings in numerous bird species, and therefore we predict a skewed sex ratio towards the less costly sex during the nestling period. In our study, we compared the sex ratios of European Blackbird (*Turdus merula*) broods in urban and forested areas from 2019 to 2022 near and in the city of Debrecen. We determined the sex of 394 nestlings from a total of 111 nests using molecular methods. No significant differences were observed in brood sex ratios, clutch size, or brood size between the different areas. Urban nestlings displayed larger body mass at day 6 of age compared to forest nestlings, however, no significant difference was found in the body mass of the sexes. The sex ratio was not affected by seasonality or parental age (assessed with a smaller sample size $n=44$). In summary, our findings indicate that, for European Blackbirds, urban areas may offer a favorable environment for nestling rearing, with comparable costs to their forest-dwelling counterparts.

Flying through the waves: Does electrosmog affect migration of free-flying songbirds?

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Each year, millions of naïve songbirds migrate thousands of kilometers between hatching and wintering grounds using their magnetic compass. As many migratory species suffer from population declines, it is crucial to identify the main drivers. One potential driver is anthropogenic electromagnetic radiation, i.e. “electrosmog”, which is emitted by electronic devices and thus closely linked to anthropogenically used areas – which are in turn often used by birds as stopover sites. Cage experiments showed a disruption of the magnetic compass and, consequently, disorientation of migratory birds when exposed to electrosmog. In order to identify the ecological relevance of electrosmog effects on bird migration, it is essential to test the findings from the laboratory with free-flying birds in the field. For this purpose, night-migratory Northern wheatears (*Oenanthe oenanthe*) were exposed to artificially generated electrosmog during a stopover on the German island of Heligoland during their first migration. Under a starry sky, no effects of electrosmog were found on their departure decisions, i.e. departure probability, timing and orientation. However, these birds had access to the stars, which is why we recently tested birds under an overcast sky to exclude the use of a star compass. First results indicate again no effect of electrosmog on the decision to leave an electrosmog-polluted area, suggesting that birds make this decision independent of the magnetic compass. Our findings do not generally exclude the impact of electrosmog on bird migration, but it currently seems unlikely that electrosmog acts as a main driver for population declines in migratory species.

Sex-specific differences in the foraging ecology of the little auk (*Alle alle*)

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Differences in the foraging areas and diving behaviour were found to occur among sexes in size-dimorphic as well as monomorphic seabird species. Therefore, to better understand the species-specific foraging niche, it is of importance to assess their foraging behaviour in horizontal (feeding locations) and vertical (depth) dimensions, while considering the possible sex differences. In this study, we investigated the variability in the foraging strategies between sexes using global positioning systems (GPS) and time-depth-recorders (TDR) attached to zooplanktivorous little auks (*Alle alle*) during the chick-rearing period in the Svalbard archipelago, Arctic. To verify the assumption of sex differences in foraging performances of monomorphic little auks, we compared diving behaviour and environmental condition at the foraging locations between sexes. We found that all tracked individuals foraged more frequently in colder than warmer water masses, which may be due to energy-rich copepod prey mainly being found in colder waters. Moreover, males tend to dive deeper than females in colder waters, whereas females seem to dive deeper than males in warmer waters on average. Regardless of environmental condition/water temperature, we found that females preferred shallower dives compared to males.

The impact of human disturbance on nest predation in the Eurasian Reed Warbler *Acrocephalus scirpaceus*

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Human disturbance and its effect on legitimacy of nest predation studies have been of researchers' concern for a long time. Generally, it is thought that human disturbance reduces nest success in birds. However, recent studies reveal that in most passerines there is no discernible effect on nesting success, some even suggest that birds could benefit from researchers' disturbance near nests. Here I examine the effect of research activities on nest predation in a small reed-nesting passerine – the Eurasian Reed Warbler *Acrocephalus scirpaceus*. Nest survival and the effect of nesting microhabitat on nest predation have been examined. The study plot consisted of two adjacent parts differing by the frequency of nest visits and nest searches. After one breeding season the methods used for each part of the study plot were swapped to minimise the effect of external factors on nest predation. Overall, there were no significant differences in nest predation rates between nests located in both parts of the study plot suggesting that researchers' activity does not significantly impact nest predation rates in reed warbler.

People, wealth and wildlife: How sociodemographic drivers influence environmental injustice

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Urban biodiversity is known to enhance the quality of life of urban dwellers, but its benefits are not shared equitably by the human population. The positive correlation between urban biodiversity and socioeconomic status within cities (often termed the Luxury Effect) thus represents a measure of environmental injustice. While common, this relationship is not universal, indicating a need to understand its drivers more comprehensively to develop more equitable cities. The wider socioeconomic context of a given city, which relates to factors such as human population size and national and regional levels of economic wealth and inequality, may influence the extent of environmental injustice. We undertook a meta-analysis to examine the links between the strength of environmental injustice (as measured by the Luxury Effect) and a range of socioeconomic variables (human population size and density, and wealth and income inequality at both national and city levels) in terms of urban terrestrial biodiversity. Across a large sample, there was the expected positive relationship between biodiversity and socioeconomic status within cities which we take as a measure of environmental injustice. There was evidence that this relationship was stronger in wealthier cities and in countries with a lower GDP. There were complex non-linear relationships between human population size and environmental injustice. However, there was no support for an effect of income inequality. The results, therefore, suggest that poorer societies do not have the economic resources to confront environmental injustice. Non-linear models generally provided a better fit, which supports the theoretical background on the association between economic development and its environmental impacts. We suggest that non-linear associations need to be routinely considered in Luxury Effect studies. However, to properly address this, further research is needed in under-represented countries, which, according to our findings, are those where levels of environmental injustice are greatest.

Sexual dichromatism in shorebirds: a comparative perspective

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Sexual dichromatism – difference in colour between male and female of the same species – has been attracting scientists for centuries. Sexual dichromatism has been proposed to arise from either sexual selection that favours colourful and ornamented individuals (Charles R. Darwin), but also from natural selection, that favour inconspicuous individual, especially females, less obvious for potential predators (Alfred. R. Wallace). Here, we analyse sexual dichromatism and its evolution among the whole 253 shorebird species, utilizing drawings from Handbook of the Birds of the World plates, paired with colour extracted by museum specimens, in the framework of the diversity of mating system and parental care strategies that shorebirds (Order *Charadriiformes*) exhibit. Some degree of sexual dichromatism is present in 96 (38%) species of shorebirds. The upper breast, cheek and throat are the most dichromatic plumage patches, highlighting the importance of these plumage regions for intraspecific signalling. On average, polygamous species, both polyandric and polygynous, shows slightly higher level of dichromatism. However, the pattern is not as clear with some monogamous species also showing higher dichromatism, sometimes even higher than polygamous species. The relationship between dichromatism and incubation, however shows that species with biparental incubation tend to be less dichromatic than species where one of the sexes take care of majority, or all, incubation, suggesting that natural selection favours inconspicuous individual during the incubation. During the presentation, with use of various behavioural and life-history traits, we will discuss the support for either Darwin's or Wallace's hypotheses concerning the rise of sexual dichromatism in shorebirds.

Estimating apparent survival and turnover in a long-lived generalist raptor: a comparison of marking methods

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The population dynamics in many long-lived species is more sensitive to adult survival rates than it is to reproductive parameters, highlighting the importance of its proper evaluation in such species. In wild populations, separating survival and dispersal is often challenging, because it is often impossible to distinguish between the death and emigration of an animal. Therefore, 'apparent survival', defined as the product of true survival and site fidelity, is often estimated. In our study we used three different marking methods, colour ringing, GPS telemetry and DNA sampling from shed feathers, to calculate and analyse the survival and turnover rates of Lesser Spotted Eagles from 1997 to 2023. Our aim is to find the optimal method, or a combination of methods, that could be efficiently used for estimating survival in that species of conservation concern, as well in other long-lived birds.

The effect of nestling age, habitat and weather on provisioning rates and prey composition of the Little Owl (*Athene noctua*) in contrasting European farmlands

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The Little Owl (*Athene noctua*) is a small, sedentary raptor associated with agricultural landscapes. Though widely distributed, it is rapidly declining in Central and Western Europe. The key factor of its decline may be linked with food limitation during the breeding season, which results in reduced reproductive success. However, it remains poorly understood how diet composition and/or provisioning during the breeding season is related to different nestling stages, weather conditions and habitat quality in contrasting farmlands. To fill this gap, we studied prey composition, provisioning rates (PR) and provisioned biomass (BM) of breeding Little Owls in different European countries (Czech Republic, Netherlands, Slovakia and Germany) using nest boxes with cameras. From 44,045 provisioned prey items from 57 broods and 40 nestboxes across our study sites, we identified small mammals to form the highest proportion (37%) of biomass (BM) delivered to nestlings, followed by earthworms (31%), insects (24%) and birds (8%). Mammals also formed highest proportion during first ten days and at 11-20 days after hatching (46% and 34% BM, respectively). Insect provisioning peaked during 11-20 days after hatching (32% BM) and earthworms after 20 days of hatching (46% BM). Mixed Effects Models indicated that PR was highest at intermediate temperatures and reduced under rainy and humid conditions, while BM decreased with temperature. The significant interaction between chicks' age and high-quality habitats (grasslands, orchards, gardens) indicated that parents in high-quality territories provisioned more during the intermediate nestling period and were able to reduce PR to a greater extent during the late nestling period. This may positively impact both adult and chick survival and/or body condition in high-quality territories. We also used multinomial models to show how prey composition varied as a function of nestling age, habitat and weather predictors. These results will be crucial to inform conservation interventions for the species.

Investigating the role of astronomical light pollution on the communication in nocturnal birds

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Astronomical light pollution, known as skyglow, is a pervasive sensory pollutant that extends into natural areas, artificially altering the nocturnal sky brightness and disrupting natural light cycles, which were constant throughout evolutionary history. While previous studies have focused primarily on direct light sources that affect nocturnal habitats, the biological consequences of skyglow on nocturnal communities remain unknown.

My Ph.D. project represents a pioneering effort to investigate the impact of skyglow on acoustic and visual communication in free-living birds active at night. Using animal-borne tracking technologies, coupled with detailed measurements and simulations of nocturnal sky brightness, I examine individual-level communication responses to daily variations in natural (twilight, moonlight) and artificial light across a population-level gradient of skyglow pollution, from near-pristine to heavily polluted skies. Biotic variables, including the age and breeding status of individuals, are also considered when synthesising factors that influence communication. To test the behavioural responses under different ambient light conditions, I designed decoy experiments.

As a model organism, I focus on the European Nightjar (*Caprimulgus europaeus*), a nocturnal bird known for its sensitivity to subtle changes in ambient light. Recent findings from our study group highlight the species' response to artificial light at night. My intention is to expand this knowledge on communication patterns and contribute to unravelling the role of nocturnal light in animal signalling—a largely unexplored research frontier. In my presentation, I will outline the goals and share the preliminary results of this project.

Facebook as a tool for monitoring selected bird species endangered by illegal trade in Indonesia

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Populations of many bird species across Southeast Asia are experiencing drastic declines and in the wild due to habitat degradation and high demand for trade and breeding. Indonesia represents one of the countries with the highest rate of illegal capture and trade in birds. Currently, species threatened by these factors face a new threat in the form of online trade via social networks. Cultural traditions and economic opportunities put enormous pressure on wild populations of endangered species. The research part of this thesis is focused on the issue of illegal unsustainable trade in Indonesian bird species, the extent of the modern market via social networks, cultural and economic aspects of bird breeding in Indonesia and the characteristics of the taxa under investigation. During my own research, 113 groups on the social network Facebook were monitored. Data collection took place over the period of 17 months from November 2021 to the end of March 2023. Advertisements with eleven species of Indonesian songbirds selected for data collection were recorded. In total, 8,042 advertisements were recorded in the created database, which contained offers of a total number of 16,812 of birds. The total sales of the advertised birds were IDR 16,775,017,000, which is equivalent to EUR 1,041,970.850. The main objective of this thesis was to map the extent of illegal online trading across selected Indonesian regions and to find out specifications and structure of the trade during the monitored period. Other goals of the work included comparing the prices of individual taxa and monitored years, comparing the given localities at the level of large cities and rural areas, and evaluating the age composition of the birds offered. A significant dispersion of prices between the selected species was discovered for three taxa, it was the most evident for the straw-headed bulbul. The largest dispersion of prices within the monitored years was recorded in 2022. Despite the majority of advertising found in close proximity to large Indonesian cities, an unexpectedly high number of locations was recorded in rural areas, especially on the islands of Sumatra, Java and Bali. The assumed advertising of adult birds was confirmed in the majority of advertisements, yet the number of advertised chicks and juveniles amounted to 31 % of the total number of birds. The results of the work show that online (illegal) trade is a significant problem and further research is needed to map its extent.

Sunbird-plant interactions on Mount Cameroon: Drivers and Ecological Relationships

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In recent times the level of specialization or generalization of plant pollinator interactions have been of interest for researchers. In this sense elevational gradients represent an extraordinarily suitable study system, enabling researchers to test hypotheses on the effects of complex environmental factors on specialization-generalization. Our research group is focused on the pollination systems present on Mt. Cameroon, Cameroon. We have studied how sunbirds and visited plants interact with each other. Moreover, we are interested in the temporal variation on sunbird-plants interactions, and how this affects the pollination networks. Additionally, we have challenged the concept of bird pollination syndrome to see if it is a good predictor of plant visitation. For this purpose, we combined data on insect visitation together with data on bird visitation. We demonstrated that although the bird pollination syndrome is a good predictor of bird visitation, birds are mainly driven by the nectar reward. Finally, we have explored the presence of trait-matching between the sunbirds and their floral resources. We have measured or collected floral pollinator attraction traits, plant morphological traits and plants' life forms, Bird traits were collected from the literature. We demonstrate that bill-tube length relationship is an important factor behind the observed interactions. Moreover, also our data suggests that trait matching becomes more important during the rainy season.

Addressing conflict between fishermen and the Titicaca Grebe (*Rollandia microptera*) through diet analysis

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Human-wildlife conflict is often a driver of species declines, and understanding the material basis of this conflict is the first step in addressing it. The Titicaca Grebe (*Rollandia microptera*) is an endangered endemic species found solely in the Lake Titicaca watershed of Peru and Bolivia, and has experienced population declines due to fisheries bycatch. Fishermen often have negative opinions of the Grebe, because they consider it as a competitor for declining fish stocks. We tested that assumption by an analysis of the bird's diet and found that the Grebe does not compete with fishers for more lucrative fish species such as trout (*Salmo sp.*) and pejerrey (*Odontesthes bonariensis*), but does compete for the less desirable (to human fishers) native *Orestias sp.*

Conservation of birds leverages building bridges between science, management and society through landstewardship

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Landstewardship is a conservation tool based on voluntary agreements that allows society to become involved in the sustainable use of natural, cultural and landscape resources, recognized by the Spanish Biodiversity Law.

The present work shares the conservation and management actions promoted by the Spanish Society of Ornithology/BirdLife International in the Montaña Oriental Costera de Cantabria. This area has a high degree uniqueness and it is recognized as an International Bird and Biodiversity Area by BirdLife International (IBA n. 422). It includes breeding sites of endangered Egyptian vulture (*Neophron percnopterus*) as well as the unique maritime breeding colony of griffon vulture among many singularities.

However, the area is not integrated into the Natura2000 Network nor regionally protected. In order to counteract the great deal of threatens and also help integrate the area into the Natura2000 Network, the Spanish Society of Ornithology has been extensively and successfully promoting a bottom-up conservation rationale through landstewardship agreements.

In this paper we highlight the synergies between the scientific monitoring of birds and their habitats, and the establishment of alliances with municipalities and the primary sector, especially farmers, to contribute to the conservation of the area based on traditional management that promotes the biodiversity and the sustainable planning of this internationally recognized area.

We describe the successful outcomes, processes and alliances with local entities and results aimed at the conservation of species and the habitat with a focus on birds scientific monitoring (GPS tracking and censuses) to bridge the gap between science, management and society. Our work in this interface is a strategical view to cope with a multiplicity of threatens (lost and fragmentation of habitat, lack of rational public use, among others) while promoting conservation thought monitoring of birds, raising awareness and co-generating scientific knowledge with local stakeholders and society.

The unknown migration: long-distance movements tracking seasonal rainfall across the equator and other surprising intra-African migratory systems

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Recent research advances on migration mostly focused on birds from the northern hemisphere. Conservation challenges call for a better understanding of movements within tropical and subtropical regions: this is especially urgent in Africa, subject to large-scale changes in habitat and seasonal weather. Intra-African migratory systems are complex and diverse but poorly known. For the first time, we equipped small intra-African migrants with multi-sensor loggers. Innovative analyses based on atmospheric pressure allowed to retrieve stationary sites, flight behaviour and timing. Woodland Kingfishers performed a trans-equatorial, 4000 km journey tracking their seasonal ecological niche by breeding in the South African rainy season and reaching non-breeding sites in the rain season, a major difference with palearctic migrants that arrive in the Sahel at the beginning of the dry period. Non-breeding sites were located at a single location in South Sudan, unprecedented evidence of connectivity in an austral migrant. Mangrove Kingfishers and Red-capped Robin-Chats were short-distance migrants along east-African coasts but had typical migratory flights and well-defined breeding and non-breeding sites. We discuss the relevance of these results for conservation and call for research on intra-African migrants, some of which is urgently needed in the context of population decline and poorly known seasonal range.

Strength of acoustic identity coding in territorial bird species

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Individual variation expressed in diverse sensory modalities is a crucial attribute of life, and it is being studied across many animal species. However, the evolutionary mechanisms shaping individual distinctiveness remain unclear. Traditionally, researchers have looked for high individuality in species with large and complex social groups, where the need for recognition is more evident. Nevertheless, even among territorial animals, identity signals come into play, particularly in the context of advertisement calls used during territorial defense and mate attraction. This study explores both the intensity of acoustic identity and the effect that population density and spatial patterns, as proxies of the number of competitors an individual may face, have on vocal identity traits of territorial bird species. Acoustic and spatial data were collected from populations of two species that significantly differ in habitat, phylogeny, and song production: the Ortolan bunting (*Emberiza hortolana*), a migratory and song-learning species breeding in Polish farmlands, and the Emerald spotted wood dove (*Turtur chalcospilos*), a non-learning species that inhabits African savanna woodlands. Preliminary results show a significant potential for identity transmission in the vocalizations of both species, providing evidence on the reproducibility and social determination of vocal identity traits. Males differ more from each other if the breeding density, and thus the number of competitors is high. This suggests that a correct discrimination between individuals may be decisive in preventing unnecessary and costly aggressions, supporting the role of intra-sexual selection as a driving force of identity signals. All together these findings shed light on the still poorly known interplay between territoriality and identity traits, advancing the understanding of the individual recognition process.

POSTER PRESENTATIONS

Is the common ringed plover capable of predator recognition?

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The common ringed plover (*Charadrius hiaticula*) is a ground nesting species from the group Charadriiformes. Its nest defence includes camouflage and distraction display. This work aimed to test the reaction of plovers to predators differing in dangerousness to adults and clutches and to evaluate their ability to recognize them.

The research took place in breeding season 2023 on the Varanger peninsula in Norway. Different dummies were presented at plovers' nests (n=14): parasitic jaeger (*Stercorarius parasiticus*) and Eurasian magpie (*Pica pica*) as nest predators, merlin (*Falco columbarius*) as a predator of adults, European golden plover (*Pluvialis apricaria*) as a harmless species, and a wooden log as the baseline. All dummies associated with contact calls of the given species were presented at one nest in randomised order. The reaction of the plover parent was recorded on a video camera and voice recorder.

The results show that plovers use distraction displays and alarm calls in the presence of jaeger more often than in the presence of merlin and the control log, which elicited very few excitement. The merlin is capable of threatening a plover; however, it is specialized predator of songbirds, and it hunts plovers only rarely, which could affect plovers' reaction. The response to the magpie and the golden plover was intermediate, it did not differ significantly from other dummies. Some plovers treated them as a threat, while others did not. The poor reaction to the magpie may be caused by the low population density of magpies in the locality and thus low experience of plovers. Restlessness during the presentation of the golden plover dummy could be a reaction to the calls of closely related species. In conclusion, plovers distinguish jaeger as a dangerous predator and respond to it adequately, however, they do not consider merlin and the log as a threat.

AviSample Network metadata repository

Brlík, Vojtěch; Pipek, Pavel; Brandis, Kate; Chernetsov, Nikita; Costa, Fábio J.V.; Herrera M.L., Gerardo; Kiat, Yosef; Lanctot, Richard B.; Marra, Peter P.; Norris, D. Ryan, Nwaogu, Chima J.; Quillfeldt, Petra; Saalfeld, Sarah T.; Stricker, Craig A.; Thomson, Robert L.; Zhao, Tianhao; Procházka, Petr

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Tissue samples are frequently collected to study various aspects of avian biology, but these samples are often not used in their entirety and are stored by the collector. The already collected samples provide a largely overlooked opportunity because they can be used by different researchers in different biological fields. Broad reuse of samples could result in multispecies or large-scale studies, interdisciplinary collaborations, and the generation of new ideas, thereby increasing the quality and impact of research. Sample reuse could also reduce the number of new samples needed for a study, which is especially pertinent to endangered species where sample collection is necessarily limited. Importantly, reusing samples may be mutually beneficial for both the researchers providing samples and those reusing them. To facilitate the reuse of avian samples worldwide and across research fields, we introduce the AviSample Network metadata repository. The main aims of this metadata repository are to collate and provide access to descriptions of available avian tissue samples. Currently, the repository contains information on more than 29000 avian samples of 432 species across the globe. We hope that the AviSample Network metadata repository will encourage sample reuse, and provide the opportunity for new studies and collaborations between ornithologists across the globe.

UrBio: a Citizen Science project to monitor urban biodiversity in Italy

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Urban biodiversity profoundly shapes environmental health, human well-being, and ecosystem services within cityscapes. As urbanization advances, diverse species, notably birds and mammals, become integral components of urban habitats, fostering unique synanthropic communities. Species like the common swift, Italian sparrow, and European hedgehog exemplify species that thrive in urban habitats.

However, the rapid pace of urban development, characterized by structural environmental transformations, poses challenges leading to the decline of certain synanthropic bird species, such as the Italian Sparrow. Conversely, problematic species like the hooded crow, yellow-legged gull, and the rose-ringed parakeet show an increasing population trend. Current estimates are lacking, posing risks to many species.

The UrBio project, funded within the framework of two NextGeneration EU initiatives (NBFC and MUSA projects), stands out as a crucial initiative, aiming to comprehensively evaluate and monitor urban biodiversity throughout Italy. This citizen science endeavour engages naturalists, birdwatchers, and enthusiasts, encouraging their participation in understanding synanthropic species' distribution and population trends documenting observations on 'Ornitho.it' and user-friendly tools like the Naturalist app. Preliminary results from 51 cities include 4,728 observations of 112 species.

Comparative analysis of data across cities aims to identify patterns influencing urban ecosystems, guiding effective biodiversity conservation and sustainable urban planning. This collaborative effort bridges academia-public gaps, fostering environmental awareness, and will contribute to the sustainable management of urban ecosystems.

What influences breeding site fidelity in partially migratory European robins (*Erithacus rubecula*) and are there genetic differences between migratory phenotypes?

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Carl of Ossietyky University Oldenburg, Germany

With the focus on variability of songbird migration, we try to understand which factors influence this behaviour. Breeding site fidelity seems to be essential for the evolution of migration, as it is an important strategy to return to a successful breeding area to persist in seasonally changing habitats.

We investigated the breeding territory fidelity of a partially migratory population of European robins (*Erithacus rubecula*) in a forest in North-West Germany. We monitored colour-banded individuals over three consecutive breeding seasons as part of a research project which studies the migratory behaviour of individual robins using radiotelemetry. This data was used to assess migratory phenotypes of tagged birds, which was complimented by monitoring robins during winter. Breeding territory fidelity was determined by the distance between breeding territories from previous and following years, being the place where the robin was either caught or observed during breeding season. Over the three-year observation period, a median distance of 101.95m, with a minimum of 7.21 and a maximum of 983.84m, was found.

Comparative morphological analyses consider wing length and tarsus length in correlation with distance between consecutive territories. A significant negative correlation could be only found for tarsus length. Tarsus length is used as an indicative measure for general size of a bird, which would in this case mean that larger birds are located closer to their previous-year breeding territory than smaller birds.

Next to morphological analyses, genetic analyses, namely investigating mitochondrial copy number, are currently performed. This genetic measure is sometimes used as a fitness proxy. We want to investigate this regarding differences between years and between migratory phenotypes. The results are supposed to help get insight into this measure in robins, as well as possibly determining if fitness influences the possibility of staying close to a previous breeding territory in robins.

Work rate affects resting metabolism but not performance in a wild bird

Elena, Engert; Nord, Andreas; Andreasson, Fredrik; Nilsson, Jan-Åke

Lund University, Sweden

Birds can adjust their metabolic machinery to match energy demand. This is well documented in birds preparing for migration or winter. However, it has yet to be tested if free-living breeding birds can increase their aerobic capacity in response to an increase in reproductive effort. We manipulated reproductive effort in wild blue tits in southern Sweden by giving them either extra or fewer nestlings. We then captured the male parent of each brood and measured the resting metabolic rate (RMR), maximum exercise metabolic rate (MMR) and endurance. We found that parents of enlarged broods had a higher RMR, but did not perform better or exercise for longer than parents of control or reduced broods. The number and quality of offspring produced in each breeding season is a result of the amount of food delivered per nestling by parents and is therefore directly related to fitness. We demonstrate that some fitness-related metabolic traits may be more flexible than others in breeding birds.

Vocal and genetic variability of Czech Tree pipits (*Anthus trivialis*)

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The tree pipit (*Anthus trivialis*) is a migratory passerine bird with a strong breeding-site philopatry. Previous research has shown that its songs, often conspicuously sung in flight, are individually unique and temporally stable, and they have clear geographical structure. In this project, we explore whether the geographical variation of song corresponds to genetic variation. We investigated variation of a mitochondrial marker (control region domain I) in 53 tree pipit males captured at five Czech localities. We were able to identify 21 haplotypes, but no clear structure could be found among the populations studied. Although a marked song differentiation (presence of locally characteristic syllable types) was previously confirmed among the study sites, the identified haplotypes did not correspond to individual localities. This supports the assumption that cultural evolution is much faster than fixation of genetic variability at the studied marker. It is likely, however, that the chosen mitochondrial marker is not sufficiently variable in pipits to reflect variation between populations, and therefore another potentially more variable gene will be analysed in the future. In addition, we will analyse song structure of the genetically studied males, and we will compare song and genetic variability in these particular individuals.

How do small passerines assess the dangerousness of European owls - a feeder experiment

Helebrant, Václav; Fuchs, Roman; Fišer, Ondřej; Antonová, Kateřina; Veselý, Petr

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In previous research, we found that small birds approaching the feeder are not afraid of the dummy of the Eurasian pygmy owl, which is their specialized predator. We therefore decided to compare the behaviour of passerines visiting the feeder towards four species of European owls differing in their size and food specialization: the Eurasian pygmy owl, the little owl, the tawny owl and the Eurasian eagle-owl. The presentation of these stuffed owls was alternated with the presentation of stuffed harmless birds, also differing in their size: the hawfinch, the song thrush, the common wood pigeon and the common pheasant. Besides the number of birds approaching the feeder we monitored whether they approached the stuffed bird from the front or from the back, the distance from the stuffed bird and the latency of the first arrival.

The number of birds visiting the feeder in the presence of owls was generally lower than in the presence of harmless birds. Birds approached the stuffed owls more often from behind than from the front. The number of birds approaching the individual species of owls did not correspond to the owl's dangerousness. The number of approaches was also reduced by large harmless birds. Preliminary results indicate that birds approaching the feeder do not recognize the dangerousness of the presented species of owls, in contrast to the dangerousness of diurnal birds of prey presented in previous experiments. In the case of the Eurasian pygmy owl, its small size may lead to being overlooked, which could give it an evolutionary advantage.

Feather Growth Comparison: Different Feather Investment in Tropical and Temperate Songbirds

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The bird feather is a unique structure with fascinating properties, fulfilling thermoregulatory, signalling and movement functions. Its quality and good condition are crucial for the survival of each individual, which is reflected not only in its daily maintenance, but also in the annual renewal of all feathers (moulting). Although birds represent a model group for studying latitudinal changes in life strategies and pace of life, the study of feather investment has been neglected.

This study examines differences in feather investment of songbirds across two distinct environments: tropical Africa (Cameroon) and temperate central Europe (Czech Republic). Within this latitudinal contrast, growth rates of tail and wing feathers were compared in a total of 75 tropical and 57 temperate species, considering various factors such as migration strategies, body mass, and other relevant aspects.

The results of the study reveal distinct patterns of investment in the wing and tail feathers between tropical and temperate species, independent of phylogenetic relatedness. Tropical birds show faster growth of the wing feathers and slower growth of the tail feathers than temperate birds. Within groups, a positive correlation was found between the growth rate of the wing and tail feathers. In agreement with our previous study on tail feathers, the growth rate of the wing feathers was not influenced by the environment of the moulting site, as the same growth rate of the wing feathers was shared by temperate residents and long-distance migrants moulting in the tropics.

Seasonal changes in habitat preferences of birds

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The needs of migratory birds may vary throughout the year; while on the breeding grounds their main goal is successful breeding, on the wintering grounds they are no longer bound to the available nesting opportunities or the nest location when searching for food. Therefore, their habitat preferences may differ at different stages of the annual cycle. The main aim of this research is to use species distribution modelling (SDM) to examine changes in habitat preferences throughout the year. To identify specific factors influencing the occurrence of different bird species, we investigate the relationships between presence/absence data from public databases (eBird, Avif) and other citizen science projects, and environmental remote-sensing data available on the Google Earth Engine platform. Using two species, the golden-cheeked warbler (*Setophaga chrysoparia*) and the corn bunting (*Emberiza calandra*), we illustrate the applicability of SDM for species with different migration strategies. The golden-cheeked warbler is a strictly migratory American species with distinct breeding (Central Texas) and wintering (Guatemala, Honduras, Nicaragua) ranges, facilitating the identification of the exact seasonal phase and tracking any shifts in the preferred habitat throughout the year. In contrast, the corn bunting is a partially migratory species with overlapping breeding and wintering ranges - its migration may be influenced by current conditions. The same area may be occupied by different populations of birds throughout the year: including migratory birds and resident birds, possibly adapted to different conditions and habitats. Modelling could shed light on these differences and adaptations. The results of the study will reveal which habitats are crucial for the occurrence of these species at different times of the year. The long-term goal of the project is to develop a comprehensive algorithm that can be used to predict the occurrence of a large number of migratory species, their response to environmental changes, and to prepare relevant conservation measures.

Population trends of urban birds – a missed opportunity?

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Despite many avian ecology studies focusing on long-term population trends in different environments (forests, farmlands, wetlands), bird population trends in urban areas have been, and continue to be, generally neglected. One of the main reasons for this neglect is the lack of long-term data on bird abundances in urban areas, attributed to observer bias. Volunteers tended to avoid urban areas in non-random monitoring schemes as these were considered unimportant for birds and therefore deemed boring for the observer.

Nevertheless, the last few decades of urban ecology research have highlighted cities as a great opportunity for studying species adaptation to human presence. Bird populations in urban areas show significant differences from their rural counterparts. The growing interest in urban bird ecology has led to a substantial number of studies on behaviour, physiology, ecological communities, and species traits linked to urban areas.

Given that cities undergo changes in both time and space, the bird population in cities is dynamic. These dynamics should be reflected in the species population trends of urban birds. However, to date, there have been no studies focusing on the long-term population trends of urban birds. This presentation will introduce the results of two studies focusing on urban population trends of birds. The first study investigates urban bird population trends in Europe, while the other focuses on Czechia.

Wings over water - tracking songbirds across the North Sea

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Carl von Ossietzky Universität Oldenburg, Germany

Millions of songbirds migrate between their breeding and wintering grounds every year, crossing marine areas such as the North Sea. Knowledge about how many songbirds, which species and which population proportions fly across the sea and under which environmental conditions is still insufficient. For this reason, individual and small-scale flight paths of songbirds around the North Sea are being researched in this project. For this purpose, songbirds are fitted with radio transmitters that can be tracked with specially erected receiving antenna stations as part of the international and collaborative MOTUS wildlife tracking system. Ultimately, these findings can help to develop effective avoidance and species protection measures to minimise the impact of commercial use of the North Sea.

Infectious hotspots and prevalence rate of *Chlamydia psittaci* in the urban landscape of Antwerp, Belgium

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Given the inexorable rate of urbanization, we must urgently recognize cities as environments that provide unique opportunities for wildlife. However, animals that survive and thrive in cities must contend with the spatio-temporal variability, novelty, and complexity of urban landscapes, which, among other things, also create conditions for disease transmission. We used *Chlamydia psittaci* and its host, the feral pigeon, as a model system to explore the link between urbanization and disease dynamics. We collected pharyngeal and cloacal samples from pigeons in Antwerp (Belgium) and screened using standard PCR. To study the spatiotemporal variation at genetic level, the positives samples underwent sequencing and cluster analysis. The prevalence rate of *Chlamydia psittaci* in Antwerp currently stands at about 5.38%, without any obvious spatial clustering. Ultimately, this study will enhance our understanding of the interplay between cities and synanthropic species, shedding light on how these factors shape disease dynamics in urban wildlife.

Territorial defence against simulated intra- and inter-specific intrusions in reed warblers (*Acrocephalus scirpaceus*): Revealing the impact of personality and density

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Personality and density might be important factors which shape territory defence in the wild. Individuals perform consistent behaviours across contexts and time which refers to personality. However, these behaviours might reveal different responses in social interactions. This study aims to investigate the impact of personality traits, including aggression and exploration in captivity, as well as density on territorial defence responses against intruders in reed warblers. Contrary to expectations, aggression and exploration which were measured in captivity were not associated with territorial defence. Interestingly, a negative relationship was found between breeding density and territorial aggression, indicating that individuals in high-density breeding areas display lower aggression against intruders. These findings showed the complexity of individual traits and environmental factors in shaping territorial responses, which also helps to understand social interactions and how change with different contexts.

The later the worse? Oxidative status of nestlings correlates with hatching date but not with plumage coloration

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We can define oxidative stress as a condition when the amount of reactive oxygen species cannot be compensated by the individual's antioxidant defense system, which can lead to negative fitness consequences. The conditions experienced by developing altricial nestlings can have a significant influence on their oxidative state, with possible long-term consequences. Although the effect of oxidative stress on different physiological and life history traits is a well-studied area in adult birds, we have limited knowledge about the determinants of oxidative state in nestlings and its consequences for their phenotype and well-being. We investigated oxidative parameters and haematocrit of mid-growth collared flycatcher (*Ficedula albicollis*) nestlings in relation to nestling-level and brood-level characteristics and pre-fledging plumage coloration. We estimated the amount of reactive oxygen metabolites (ROM), the antioxidant capacity of the plasma (OXY) and the ratio of the two (oxidative status, OS), while nestling plumage traits (brightness and UV chroma of melanin pigmented and yellow areas) were calculated from spectrometric data. We found that nestlings that hatched later in the season had a higher ROM value and correspondingly higher OS, indicating a greater degree of oxidative stress. Descriptors of oxidative state were not related to other brood and individual characteristics, including coloration. Our results suggest that environmental conditions associated with late hatching can influence the oxidative stress level of nestlings, but further studies are necessary to examine the consequences of this pattern for the future of these individuals.

Red-backed shrike (*Lanius collurio*) vs. common cuckoo (*Cuculus canorus*): Clutch variability and egg recognition

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Nest parasitism is a classic example of coevolution between a nest parasite and its host. The red-backed shrike (*Lanius collurio*) was a frequent host of the common cuckoo (*Cuculus canorus*) until 50 years ago, but nowadays parasitism has practically disappeared. There are several hypotheses explaining the disappearance of parasitism. In this work, we describe the hypothesis of the high interclutch variability of shrike eggs and the associated high ability to recognize and reject parasitic eggs. The aims of this work were 1) to describe intra- and interclutch variability of shrike eggs and 2) to experimentally test the ability of shrikes to recognize foreign eggs. For our experiment, we chose three types of experimental eggs (artificial shrike and cuckoo eggs and real conspecific shrike eggs), which were placed in shrike nests at the beginning of incubation. Standardized photographs of the eggs were used to describe variation in egg color (chromatic and achromatic contrast), spot pattern and size using ImageJ software. The results showed that intraclutch variability was significantly lower than interclutch variability, in contrast to the common chaffinch, which has higher intraclutch variability than interclutch variability. The experimental results showed that the shrikes had an excellent ability to recognize foreign eggs as they rejected most of the artificial cuckoo and shrike eggs. The rejection rate of real conspecific eggs was 60%, which is also a remarkably good result compared to other songbird species. The low level of intraclutch variability and high level of interclutch variability is a useful preadaptation of shrikes against the nesting parasite, the common cuckoo.

Who is who? Is individual acoustic monitoring useful for studying the population dynamics of an endemic species?

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Charles University, Czechia

The Berthelot's pipits (*Anthus berthelotii*) are sedentary passerines that colonised the Macaronesian islands and separated from their sister species, the Tawny pipit (*Anthus campestris*), about 2.5 million years ago. Their song is short and simple, consisting of several elements, and males typically have only one type of song, which is individually unique, making it possible to identify these birds from their recordings alone. Our group has already recorded over a thousand individuals from most of the species' range (Madeira to Canaries). So far, none of them had a song type identical to that of another bird, although the differences were sometimes very small. These analyses, however, were based on visual assessment and quantitative analyses of a single song per individual only. To determine the consistency of individual songs, we analysed ten songs per bird from 30 males out of approximately 365 recorded on the islands of La Gomera and El Hierro by Dynamic Time Warp algorithm in Luscinia software. The preliminary results showed that, for most of the analysed males, the songs of the same bird clustered better with each other (i.e. were more similar) than with the songs of any other random bird.

Our next step is to compare the songs of males recorded in different seasons on the same transects in Tenerife (2021 2023 and 2024) and La Gomera (2023 and 2024) to check if we can detect the same individuals over the years. We expect that, similar to the Tawny Pipits, the songs are not only individually unique, but also temporally stable. If that is so, individual acoustic monitoring without the need to capture and mark birds would also be suitable for this Macaronesian endemic species.

A late burst of color evolution in a radiation of songbirds (*Passeriformes: Parulidae*) suggests secondary contact drives signal divergence

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Charles University - Faculty of Science, Czechia

Evolutionary radiations keep providing important insights into species diversification, which is especially true of adaptive radiations. New World wood warblers (*Parulidae*) are a family of small, insectivorous, forest-dwelling passerine birds, often considered an exemplar adaptive radiation due to their rapid diversification followed by a slowdown. However, they deviate from the expectations of an adaptive radiation scenario due to the lack of conspicuous morphological and ecological differentiation. We tested different scenarios of the wood warbler radiation by fitting several macroevolutionary models to trait data in 105 species. We tested whether morphological traits underwent an early burst of evolution (indicative of adaptation to new ecological niches in adaptive radiations) and whether song and color underwent a diversity-dependent acceleration of trait evolutionary rate (consistent with reproductive interference driving signal evolution). Morphology and song evolved gradually under stabilizing selection, suggesting niche conservatism, with morphology possibly acting as a constraint on song evolution. In contrast, many feather color traits underwent a diversity-dependent burst of evolution occurring late in the clade's history. We suggest that a two-step process has led to the remarkable diversification of wood warblers. First, their early diversification probably proceeded by allopatric speciation. Second, feather color divergence likely occurred during secondary contact after range expansion. This diversification of signaling traits might have facilitated species coexistence, in combination with behavioral niche partitioning. Wood warblers seem to present characteristics of both adaptive and non-adaptive radiations.

How local research contribute to showing general trend: phenology of autumn migration of Little Ringed Plover (*Charadrius Dubius*)

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Existing knowledge of the autumn migration of the Little Ringed Plover (LRP) across Europe is based mainly on counts at stopover sites, but these are scarce in number, and show only the local passage dynamics of the species. The aim of our study is to present the phenology of the autumn migration of the LRP across Europe. We combined the results of regular counts from 30 stopover sites in central Europe and calculated the date of appearance of 5%, 25%, 50%, 75%, and 95% migrants for each site. We were looking for correlations between these dates and the longitude and latitude of stopover sites, as well as the sum of latitude and longitude. The mean migration date in different European sites fell in the broad period between 15 July and 5 September. The only significant relationship we found occurred between latitude of stopover site and dates of passage of 50% of the migrants. The analysis showed that the more northerly the stopover site is located, the earlier the birds migrate through it. This result also indicates a generally southerly direction of LPR movements during autumn migration. We suggest that birds breeding in the southern part of their range migrate to wintering grounds later, as suitable conditions persist longer at lower latitudes, and offer better breeding opportunities, in contrast to more northerly breeding grounds, where the breeding season is shorter. Our study showed that combined results from many stopover sites, can be useful for determining the overall pattern of bird migration phenology of birds on a continental scale.

Effects of age on reproductive performance in a high alpine bird species, the Northern Wheatear

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Climate change is leading to the advancement of spring conditions, resulting in an earlier snowmelt and green-up, with the highest rates of change in highly seasonal environments, including alpine habitats. High elevation birds need to adjust their phenology accordingly to maximise reproductive output. However, individual characteristics may explain differences in their capacity to adapt to these changes.

In many bird species, reproductive success increases with age. Differences in breeding performance (e.g. probability to fledge offsprings, number of nestlings) are often reported between young individuals (unexperienced) and old ones (with previous breeding experience). This age-related relationship can be explained by enhancements of the foraging capacity and breeding competences of adults which would enable them to be more successful in their reproduction. However, these differences could also be determined by other ecological events, especially the arrival date for migratory species.

The Northern Wheatear (*Oenanthe oenanthe*) is a characteristic migratory species of alpine grasslands. Since 2016, we are conducting an accurate nest monitoring in a wild alpine population of wheatear in the Western Italian Alps. It allows thus to get data on breeding success, phenology, survival (part of the population is colour-ringed) and habitat selection. Previous work showed that the probability for a nest to fail was higher early in the season but that the mean nestling mass was decreasing over the season.

Thus, we aim to investigate whether the age (yearling or adult) influences the breeding success using several indicators of reproductive performance such as the nest survival probability, the clutch size or the mean nestling mass. This will help us to understand whether the age is an important factor for the wheatear breeding performances in highly variable spring conditions.

Sibling food competition and aggressiveness in the little egret (*Egretta garzetta*)

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Although asynchronous hatching is known as a regular hatching pattern in the little egret (*Egretta garzetta*), its role in maintaining dominance relationships and feeding hierarchy among siblings remains poorly studied. In this study we investigated this issue using data on the broods of little egrets breeding in a southern Tunisian colony. In particular, we assessed whether feeding hierarchy within a brood followed hatching sequence, we compared the aggressive and begging behaviors of siblings, and we investigated whether parents showed any feeding favoritism to counteract or to reinforce the effects of hatching order. Our results showed evidence of feeding hierarchy among siblings according to hatching order. Senior nestlings were the first to access the food brought by the parents and ingested more food than their younger siblings. Second nestlings were the most aggressive of all their siblings, while the third nestlings were the most frequently aggressed. However, the youngest nestlings showed a more resigned and less aggressive behavior, thus receiving a little less food, but much less pecks and injuries than their elders, which may be a profitable strategy. Overall, our findings stress the importance of hatching order in establishing a feeding hierarchy among little egret siblings. They also suggest that access to food may not be the unique factor that shapes nestlings' feeding behavior and competitiveness, as the avoidance of injuries caused by siblings' attacks seems also to count.

Guess who? Evaluating individual acoustic monitoring (IAM) for males and females of a migratory songbird

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Individual acoustic monitoring (IAM), based on the analysis of vocal cues, is particularly suitable for identification and tracking of vocally active birds with temporally stable song or call characteristics. Unlike mark-recapture methods, IAM does not require physical manipulation of individuals, which can have long lasting effects on their behavior. When applied, IAM has usually focused on males, as the female singing has been traditionally overlooked, especially in temperate zones. Here, we evaluated the suitability of IAM for both males and females of the Tawny Pipit (*Anthus campestris*, *Motacillidae*), a migratory Palearctic species critically endangered in Central Europe, for which occasional female singing was occasionally documented. We confirmed that songs of all 101 studied individuals from an isolated population, both males and females, were individually distinct. Most individuals used in their repertoires only a single song type (only three males used two), and with two exceptions the song structure did not change either within or between breeding seasons. Multiple individuals often sang structurally similar song types, which nevertheless consistently differed in minor characteristics; such differences were detectable by visual inspection and also affected quantitative analyses of song similarity. Songs sung by females did not have any apparent sex-specific characteristics. Unlike previously suggested, females did not adapt their vocalization to their breeding partner, and we presume their song is also temporally stable. Our findings support IAM as a reliable approach for studying the behavior and ecology of this passerine species with a small repertoire and simple songs.

Effects of highly pathogenic avian influenza on the behavior and survival of black-headed gulls: a natural experiment from the 2023 outbreak in SE Sweden

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Highly pathogenic avian influenza (HPAI) is one of the most important wildlife diseases of our time due to its widespread circulation and considerable mortality rates. The lineage H5N1 2.3.4.4b has been circulating since 2021 and has been exceptionally successful: within two years it has achieved a near-global distribution and affects a broader host range than previous lineages, having been detected in species belonging to 21 avian orders.

In Europe the virus has become endemic, and its seasonal occurrence has changed from autumn and winter to year around. Colonially breeding seabirds including Northern gannets, Sandwich terns, and black-headed gulls have been particularly severely affected with widespread outbreaks in several countries.

Although outbreaks are associated with significant mortality, the epidemiology of the outbreak is often hard to study. Moreover the effect of the disease seems to be species-specific and it is currently unclear whether other species, other than its natural reservoir, waterfowl, could be similarly responsible for its dispersal.

Here we present data on the breeding season of 2023, when an HPAI outbreak was recorded in our study population of black-headed gulls in SE Sweden, affecting several colonies. During this time, 31 birds were marked with GPS/GSM tags and could be followed throughout the outbreak. In this study, we used the resulting tracking data in combination with observational data to investigate the effect of HPAI on the birds' behavior and survival. Additionally, we examine the role of host movements in contributing to the short-distance spread of the virus between colonies. This research not only enhances our comprehension of the ecological implications of HPAI on black-headed gulls but also contributes to the broader understanding of avian influenza dynamics in wild bird populations.

What kind of birds do we like? An investigation of birds' colours based on human preferences

Pripon, Liviu Razvan

Independent Researcher

This work contributes to the exploration of birds' behaviour in the cultural field generated by the chromatic preferences of humans. We aim to begin our research with the raw interaction between bird colours and human chromatic preferences, attitudes that manifest in selections based on preference and can be evaluated by pleasure quantification. The results obtained from these evaluations will be the grounding of more complex cultural interactions between birds and humans and are required as an initial step so that those relations can be fully understood. Our method involved conducting questionnaires in which 8 colours (white, grey, black, brown, yellow, red, green, and blue) and 8 localizations of the chromatic field (rump, legs, chest, belly, tail, head, primaries feathers, and wing without primaries feathers) were analysed in terms of selection and ranking. Based on their selection scores, ranking, and cluster analysis of those values, we found some preferred colours and locations, as well as some classes of preference. If beauty is in the eye of the beholder and the colour does not have an intrinsic value, then the colours should have had similar rankings and selection scores, with no differences between them. Our results suggest otherwise—that there are preferences. These results may be interpreted in two ways: 1. the colours applied to birds interact with human perception in a way that value is generated, or 2. the group of interviewed people show a consensus and a particular preference of the "beholders" independent of birds, and those cultural preferences are applied to birds. Either way, the colours and their localization have different applied values, and our future investigations should focus on the conditions that determine those values. Thus, we aim to develop and promote this method and direction of research for wider studies.

SORTEE: promoting open, reliable, and transparent ecology and evolutionary biology

Sánchez-Tójar, Alfredo; SORTEE

Bielefeld University, Germany

Science and society benefit when scientists conduct research in a transparent, reproducible, and collaborative fashion. The Society for Open, Reliable, and Transparent Ecology and Evolutionary Biology (SORTEE) was founded in December 2020 with the aim of bringing together researchers working to improve reliability of and access to science through cultural and institutional changes in ecology, evolutionary biology, and related fields. Since its creation, SORTEE has been joined by hundreds of students and researchers. The society organises a monthly workshop and webinar series as well as a code club and an annual virtual conference gathering hundreds of participants from across the globe. It also administers EcoEvoRxiv - the open access preprint server for ecology, evolutionary biology, and related fields. This poster will showcase some of SORTEE's ongoing efforts to promote Open, Reliable, and Transparent research practices.

Climate change and reproduction: a four-decade-long study in a Carpathian Basin collared flycatcher (*Ficedula albicollis*) population

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Global climate change encompasses various aspects of climate, such as alterations in precipitation and diminishing surface wind speeds. Long-term studies examining responses in bird populations have predominantly concentrated on the effects of rising temperatures and often concentrated on breeding onset, despite the possibility that other facets of breeding may also be influenced by diverse weather factors. Our investigation aimed to examine the associations between multiple breeding parameters and various weather components. Leveraging a dataset spanning nearly four decades, we explored how annual breeding parameters (e.g. breeding season length, clutch size) in a collared flycatcher (*Ficedula albicollis*) population correlated with local temperature, precipitation, and wind conditions. We also analyzed temporal trends in breeding parameters and their associated weather conditions. We discovered, for example, an extension of breeding season length with increased daily precipitation and an increase in clutch size with a higher number of cool days, an advancement in breeding onset, and a reduction in wind speed through the decades. These results underscore the complex interaction between climate change and the reproductive patterns of migratory birds, emphasizing the necessity for a comprehensive approach.

Host specificity of passerine *Lankesterella*

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Lankesterella parasites are blood coccidians that have recently gained attention as their records in common passerine species begin to emerge. To date, their occurrence has been molecularly confirmed in several passerine genera, mainly among members of the families *Paridae* and *Acrocephalidae*. Despite their relatively high prevalence in some host populations, their life cycles remain unclear, mosquitoes or mites being the proposed vectors. The aim of this study was to reveal *Lankesterella* host specificity and diversity focusing mainly on parasites of tit and warbler species (families *Paridae* and *Acrocephalidae*). Phylogenetic analysis revealed that passerine *Lankesterella* are host-specific, with specificity at the host genus or species level.

Niche segregation of two sympatric storm-petrel species (*Hydrobates spp.*) breeding on the San Benito Islands in the Eastern Pacific: a combined approach of GPS tracking and prey DNA metabarcoding

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Understanding the mechanisms of resource partitioning and niche segregation is crucial for studying animal communities and their coexistence. Colonial seabirds, such as storm-petrels, are 'central place foragers' and face significant competition for resources during the breeding season. In this study, we investigated the inter- and intraspecific niche segregation of two sympatric storm-petrel species, the Black storm-petrel (*Hydrobates melania*) and the Leach's storm-petrel (*H. leucorhous*), breeding in the Eastern Pacific on the San Benito Islands, Baja California peninsula, Mexico.

To investigate foraging movements and to identify the main foraging areas, we employed GPS tracking on 14 Black storm-petrels (8 males, 6 females) and 1 Leach's storm-petrel (female) during the chick-rearing period in September 2022. Additionally, we collected 57 diet samples from Black storm-petrels (44 fecal samples and 13 regurgitates) and 35 diet samples from Leach's storm-petrels (22 fecal samples and 13 regurgitates). The prey of both species was examined using DNA metabarcoding of these samples.

Our findings reveal insights into the resource partitioning strategies pursued by these sympatric storm-petrel species. We observed inter- and intraspecific differences in foraging distribution and prey composition, indicating niche specialization to avoid resource competition. This study contributes to our understanding of competition dynamics and niche segregation in colonial seabirds. The results highlight the importance of considering both spatial and dietary aspects when studying resource partitioning in avian communities. This project is funded by the German Ornithologists' Society (DO-G) through the Ursula Honig fund.

Stuffed sparrowhawk (*Accipiter nisus*) turned upside down or lying on the back is not recognized by great tits (*Parus major*) in aviary experiment as a threat

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In previous experiments, we have found that great tits (*Parus major*) in aviary experiments do not show fear towards an upside-down sparrowhawk (*Accipiter nisus*). We repeated the experiment with a stuffed sparrowhawk, which is more plausible than the dummy, and added three additional positions: in the normal position of sitting predator, lying on its back, and lying on its belly. A stuffed dove in the normal position sitting on a branch and turned upside down served as a control.

Great tits did not show more fear towards the stuffed sparrowhawk turned upside down and lying on its back than towards the dove. They were more afraid of the stuffed sparrowhawk lying on its belly than of the doves but somewhat less afraid of the perched sparrowhawk.

These results offer a twofold explanation. Firstly tits assess that a predator turned upside down or lying on its back cannot pose a danger. The second option is that they do not recognize a sparrowhawk in an unnaturally oriented stuffed bird. Both explanations would enrich our knowledge of recognition processes in birds.

Causes of hatching failure in urban-rural comparison

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In recent decades, the populations of many wild bird species have declined dramatically worldwide. One of the main reasons can be that the hatching failure rate increased slightly between 1940 and 2023. However, we do not know whether urbanisation and pollution can affect hatching failure. We therefore investigated whether hatching failure and the causes of hatching failure differ between urban and rural areas in Great- and Blue tits. We collected all unhatched eggs in Malmö (urban) and Skrylle (rural). We dissected the eggs to determine the cause of hatching failure (early embryo death, developmental failure, hatching incapability, infertility). The overall hatching failure rate was higher in the urban than in the rural site, and the urban Great tits are more sensitive to human disturbance than their rural conspecifics or Blue tits in general. Furthermore, we found that in the partially hatched nests the leading cause of hatching failure was the early embryo death in both species and habitats. In addition, we showed that the cause hatching failure is more diverse in the urban area compared with the rural area. In summary, we found that urbanisation has a species-specific effect on hatching failure. To further study this question we are looking for collaboration.

First data on the diet of Razorbill *Alca torda* wintering in the Mediterranean Sea: insights from social networks

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Understanding a species' diet is of paramount importance to ecology as it provides vital insights into the interaction among organisms and their environment. In this research, we report first data on the diet of wintering razorbills (*Alca torda*) in the Mediterranean Sea. Taking advantage of the irruption event that occurred in the Mediterranean in winter 2022/2023, a data mining search campaign was carried out on social networks to collect photographs and videos documenting razorbills feeding at sea. Additional information was gathered by analyzing stomach content of dead individuals retrieved from coasts of central Italy. Overall, we got records from 32 pictures and 7 videos as well as 7 dead individuals. All prey items belonged to the *Actinopterygii* class. Overall, 12 fish prey (2 at family, 3 at genus and 7 at species level) were identified. Razorbills fed on small- medium sized fish species of the neritic zone such as *Belone belone*, *Trachinotus ovatus*, *Atherina hepsetus* and *Engraulis encrasicolus*. Razorbills were mostly observed preying close to the coast and within harbours, as well as begging for food from humans, suggesting individuals encountered sub-optimal feeding conditions in the oligotrophic sea. Dead individuals mainly had empty stomachs, in line with the low weights and fat scores detected during necropsy. We underline how data from social networks have made possible to describe the behavior and feeding habits of an uncommon seabird typical of the North Atlantic seas using non-destructive methods, which caught the attention of photographers and enthusiasts, as well as scientists.

Use of African Sites by Migratory Birds After Crossing the Sahara

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The nonbreeding distribution and migration strategies of Eurasian-African migratory songbirds remains incompletely understood. Many species undertake multi-stage migrations, where resource availability at different sites significantly influences migration progress and success. During the northern hemisphere post-breeding migration over 50 migratory species from Eurasia converge in a specific area below the Sahel zone (10°-4°N) in the savannah, having crossed the Sahara along the East-African flyway. In this area, approximately 30-40% of locally staging European songbirds species undergo moult. These sites serve as a seasonal migratory stopover area, providing birds with a temporal opportunity to rest and refuel, enabling them to continue their migration to southern areas of Africa. Birds typically arrive at these locations towards the conclusion of the rainy season and the onset of the dry season. During this period, it is probable that food resources are still plentiful, although they gradually diminish over time. This highlights a strategy employed by the birds, involving a shift to non-breeding sites as a response to the changing availability of food. However, variations in seasonal weather patterns, including the possibility of drought at these sites, can impose constraints on migration, potentially reducing individual fitness and impacting breeding populations. The objective of our project is to connect these results to seasonal habitat conditions, as these sites are crucial for avian migrants after crossing the Sahara during southward migration from Europe. To comprehensively examine both the advantages and constraints of stopping over or wintering at these sites, the Swiss Ornithological Institute collaborates with local partners in Africa to conduct projects at study sites in South Sudan, Ethiopia, and Kenya.

Detection distance differs according to detection method in passive acoustic monitoring

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Passive acoustic monitoring (PAM) is a cutting-edge method for studying bird vocal activity, utilizing autonomous recording units for extended data collection. While manual detection methods remain popular, they are time-consuming, leading to an increasing interest in automatic tools like BirdNET. Despite advancements, PAM studies lack standardized procedures, particularly in recorder deployment, which influences detection spaces. We conducted a comparative analysis of manual (audible and visual) and automatic (BirdNET) bird detection methods in PAM, evaluating the detection distance of 43 bird species in Poland. Through range-testing experiments in two temperate forest habitats, our goal was to assess detection distances, identify influencing factors, and offer recommendations for ARU deployment based on the detection method.

Intermediate migration patterns of hybrids - study of Herring Gull complex

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Hybridization in birds is a common phenomenon and its occurrence is associated with species relatedness, underdevelopment of the reproductive barriers, and the formation of secondary contact zones between taxa as a result of overlapping geographical distribution or changes in species ranges. Hybridization could follow the production of hybrids, which are usually genetically, morphologically, and behaviourally different from the parental species. One aspect of hybridization that has been studied is the migration patterns of hybrid individuals. Most research has shown that offspring of parents from two distinct groups would exhibit intermediate routes of migrations. In so-called large gulls, regarded as one of the prime models for research on hybridization, the migratory behaviour of hybrids has not been extensively studied. We focused on determining migratory traits in interspecific hybrids of Herring Gull and Caspian Gull, notably distance and direction, based on ring recoveries of hybrid individuals contrasted with parental species from both stable hybrid zone and allopatry in Poland. We found migration patterns to be intermediate, but more similar to those typical for allopatric populations of Caspian Gull. These results are particularly interesting given that Caspian Gull is a species that has been rapidly expanding its range across Europe since the last few decades. The estimated patterns of hybrids' migration predict the direction of its expansion in the future and indicate changes in the structure of the hybrid zone.

Migratory birds: habitat generalists or specialists?

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One of the overarching questions in migration ecology is whether migratory species are opportunists that flexibly switch niches or specialists that track niches across the annual cycle. While breeding and non-breeding ranges of migratory species are relatively well known, studies explaining the interspecific differences in year-round niche use are mainly limited to climatic niches, but comparisons of habitats used during breeding and non-breeding seasons is missing. As habitat availability and quality directly impact population size of a species, habitat changes pose the most significant threats to bird populations globally.

To determine whether migratory species are habitat opportunists or specialists, we compiled available information on habitat use in all Western Palearctic passerine species during breeding and non-breeding seasons. Using this comprehensive dataset, we quantified the extent of habitat specialization during breeding and non-breeding seasons, and overlap in habitat use between the two seasons for each species. We then related the two habitat-use metrics to species' migratory strategy.

We found that the degree of habitat specialization between migratory and resident species did not differ significantly for breeding and non-breeding grounds. However, resident species showed bigger habitat overlap between breeding and non-breeding grounds than migratory species. This raises interesting questions about the consequences of habitat specialization and habitat overlap between breeding and non-breeding seasons for population trends and range changes which we plan to answer in a future study.

The decline of the Rook *Corvus frugilegus* breeding population in Ciechanów city between 2014 and 2023 in comparison to nationwide trends

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In 2014 and 2023, an inventory of the breeding population of the Rook (*Corvus frugilegus*) was carried out in Ciechanów city (32,78 km², central Poland). Between these years, the breeding population of the Rook declined from 900 to 599 nests (-33,4%). The number of colonies in 2014 and 2023 was the same (10), although only in 4 locations colonies were observed in both years. This decline of the Rook population in Ciechanów city fits well with the nationwide declining trend of this species. According to data from the Monitoring of Flagship Bird Species, the Polish population of the Rook decreased by an average of 4% per year from 2001 to 2022, although the numbers fluctuated in 2001-2008, only later a significant decline was observed. The population of the Rook in Poland was estimated at 310 thousand breeding pairs in 2010 and at 185 thousand pairs in 2017, which is a 40,3% decline. The causes for this decline in Ciechanów city are not explicitly known. However, it is speculated that they are similar to the nationwide problems of the Rook population, two prominent being direct conflict with human interest and agricultural intensification.