

Abstracts: Poster Presentations

Eighth International Hole-Nesting Birds Conference

Session 4: Posters

Date: Tuesday 31 October, 2017
Time: 17:10 – 19:00
Room: Seminar Room

From notebook to app: tit research in the twenty-first century

Presenting author: **Frank Adriaensen**

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We developed a software application for data input and workflow management in population studies on birds in nestboxes. The application supports input of various kinds of field data (e.g. nest controls, captures, and sample collections) from any mobile device (e.g. tablet, smartphone) and immediate transfer to a server-based database. This database is updated in real-time and available in the field at any time, and to all fieldworkers. Two-way communication with the main server allows for information also to be transferred from the server to the tablets (e.g. previous captures of observed individuals, unique tag codes available for a new individual). This application solves a number of problems that we believe are generic to many field studies involving large numbers of individuals, locations and/or researchers, and where specific data have to be collected according to a strict protocol.

App development was guided by data safety (data immediately transferred to server), data quality (immediate validation of input data), efficiency (data entered only once, pictures and sample IDs uploaded with the data), and optimization of research management (work schedules updated in real-time, allowing for optimal task division, in-situ selection of individuals or nests for experiments).

The software, now used in three field seasons with very good results, is not freely available as it is heavily customized to our study and was commissioned to a commercial software developer. The application runs on all commonly used operating systems, and is highly modular in structure. Therefore, it could be readily adapted to other population nestbox studies, but it could also be applied in very different types of data collection, with similar requirements in terms of data collection and safety.

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Age-dependent effects of predation risk on night-time hypothermia in blue- and great tits

Presenting author: **Fredrik Andreasson**

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During winter at northern latitudes, many factors combine to constrain the energy budget of passerine birds. The days are short, there is often snow cover, and ambient temperatures can be very low. Therefore, it is crucial for these birds to maximize energy intake and minimize energy loss.

One way to conserve energy is to use night-time hypothermia, which reduces the temperature gradient between the body and the surrounding air. Together with behavioural strategies (such as ptiloerection and body posture) hypothermia reduces heat loss and consequently energy expenditure. Even shallow hypothermia (< 10 °C body temperature reduction), which is common in our study populations of great tits (*Parus major*) and blue tits (*Cyanistes caeruleus*), can reduce the metabolic demands substantially.

We know from previous studies that if blue tits are fed *ad libitum* they avoid hypothermia during the night, implying that there are costs associated with this strategy. A potential and likely cost is an increased risk of night-time predation, due to slow escape response by hypothermic birds at nocturnal predation attempts. Unfortunately, data on the effect of predation risk on nocturnal hypothermia is scarce. In this talk I will discuss a recent experiment where we increased perceived night-time predation risk by adding olfactory predator cues to nest-boxes. Roosting blue tits were less prone to use hypothermia as an energy-saving strategy at low ambient temperatures. However, this seems to hold true for first winter birds (2k) only, but not for second winter or older (3k+) birds. Interestingly, preliminary data indicate that great tits of different ages respond in a similar manner to increased perceived predation risk. Understanding these costs is important since night-time hypothermia and other facultative hypothermic responses are common and widespread across the avian phylogeny.

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Estimating the variation and autocorrelation of phenotypic selection on great tit

Presenting author: **Yihan Cao**

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Temporal variation in phenotypic selection in the wild has traditionally been estimated through the Lande & Arnold approach without properly accounting for sampling error and without any underlying biological model for temporal auto-correlated fluctuations in the fitness function. Here we introduce state-space models (SSMs) to analyse the phenotypic selection process and recommend using Template Model builder (TMB), an R package for fast fitting statistical latent variable models (including state-space and mixed models) by maximising the Laplace approximation of the marginal likelihood computed using automatic differentiation. With a long-term great tit data set, we fit several SSMs with TMB and conduct model selection based on Akaike information criterion (AIC) to assess the support for stabilizing selection on breeding time of the great tit population. Using TMB to fit SSMs allows us to estimate additional parameters, the variation, correlation and autocorrelation of the fitness parameters without substantial increase in computational costs.

Specifically, the maximum fitness, the optimal phenotype and the width of fitness function are estimated with order-1 vector autoregressive model (VAR1), and the count of failed broods (zero inflation) is modelled as a separate episode of selection. Our results agree with the change patterns of the mean number of fledgling of each brood and the mean probability of failed brooding from the previous studies of this species. We conclude that our method can be directly applied to exploring phenotypic selection induced by environmental change for other species.

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A data platform for long-term monitored population – let's start with the great tit

Presenting author: **Antica Culina**

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As a part of the 3 year NWO (The Netherlands organization for scientific research) funded research project on the stability of pair-bonds between males and females, I will be developing a platform for data-sharing and collaboration among ecologists working with long-term wild populations. This platform will serve to depositing data and/or metadata (data about the datasets) on long-term monitored populations, starting with the great tit, and hopefully hosting other species to in the future. The main aim of the platform is to enable more efficient collaborative projects, as it will make easy to locate populations that contain data of interest (e.g. behavioural data, genetic data). Currently, I have secured the access to data on 62 populations, with the standard breeding season data (parental identity, breeding success) available for all populations. General winter social data (are flocks formed, is the population resident) are available for >30 populations, and the social network data for three populations. The platform will be developed in a collaboration with EU Open Science programs (e.g. OpenAIRE). The participating populations will contribute the relevant information on the data that have been collected, but will not have to (but can choose to) expose their raw data. To achieve the most ambitious level of data acquisition, I will organise a stake-holder workshop (data-providers and developers of the data-hosting platform) at the end of 2018 at the NIOO-KNAW. In this way we can identify the main concerns that data-providers have for wider availability of their data, establish relevant, community-driven meta-data fields for the platform, and efficiently communicate the benefits that researchers gain by openly exposing their meta-data (and data). Herby, I also call for PA's to contact me if they would like to contribute their data or meta-data to this project.

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Breeding performance of urban birds nesting in natural cavities

Presenting author: **Irene Di Lecce**

Authors: **Joanna Sudyka¹, Irene Di Lecce¹, Marta Szulkin¹**

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Hole-nesting species that are able to adapt to urban environments appear to be restricted in terms of available nesting sites. Nest-boxes are often provided as a conservation measure, however it is not clear if these artificial cavities are optimal for birds in terms of increasing their reproductive success. Nest-boxes also provide a convenient framework to study hole-nesting bird breeding performance since sampling is simple while compared to natural cavities. However, studies in nestbox populations have been criticised since they induce artificial densities of breeding pairs and are characterised by altered nesting properties (e.g. microclimate), which contrast with natural cavities these birds originally evolved in and to which they may have optimised their breeding performance. Here, we examine various breeding-related traits of great tits (*Parus major*) and blue tits (*Cyanistes caeruleus*) nesting in natural cavities of an urban forest characterised by elements of primeval ecosystem (Las Bielański) and compare them to reproductive success in nestboxes located in eight sites in a gradient of urbanisation in Warsaw. Surprisingly, the densities of breeding pairs in natural cavities of Las Bielański were similar or greater than those observed in the nestbox study sites. A striking feature emerging from our preliminary analyses is that 15 days after hatching, both blue tit and great tit nestlings from natural cavities in Las Bielański achieved the highest body mass relative to all nestbox populations in the Warsaw gradient of urbanisation.

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Artificial light at night affects sleep behaviour differently in two closely related hole-nesting songbird species

Presenting author: **Marcel Eens**

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Artificial light at night (ALAN) or light pollution is an increasing and worldwide problem. There is growing concern that because of the disruption of natural light cycles, ALAN may pose serious risks for wildlife. While ALAN has been shown to affect many aspects of animal behaviour and physiology, few studies have experimentally studied whether individuals of different species in the wild respond differently to ALAN. Here, we investigated the effect of ALAN on sleep behaviour in two closely related songbird species inhabiting the same study area and roosting/breeding in similar nest boxes. We experimentally exposed free-living great tits (*Parus major*) and blue tits (*Cyanistes caeruleus*) to artificial light inside their nest boxes and observed changes in their sleep behaviour compared to the previous night when the nest boxes were dark. In line with previous studies, sleep behaviour of both species did not differ under dark conditions. ALAN disrupted sleep in both great and blue tits. However, compared to blue tits, great tits showed more pronounced effects and more aspects of sleep were affected. Light exposed great tits entered the nest boxes and fell asleep later, woke up and exited the nest boxes earlier, and the total sleep amount and sleep percentage were reduced. By contrast, these changes in sleep behaviour were not found in light exposed blue tits. Our field experiment, using exactly the same light manipulation in both species, provides direct evidence that two closely related species respond differently to ALAN, while their sleep behaviour under dark conditions was similar. Our research suggests that findings for one species cannot necessarily be generalised to other species, even closely-related species. Furthermore, species-specific effects could have implications for community dynamics.

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Air pollution and birds' vitamin levels

Presenting author: **Tapio Eeva**

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Metal pollution can interfere with internal nutrient homeostasis and/or change dietary quality of insectivorous birds. We compared fat soluble vitamin (A, D3, E) levels in egg yolk and nestling plasma of the great tit (*Parus major*) and the pied flycatcher (*Ficedula hypoleuca*) between a polluted area near a Finnish copper-nickel smelter (emitting e.g. Cu, Ni, As, Cd and Pb) and relatively unpolluted control areas. Fresh yolk samples were collected in 2014 and plasma samples from nestlings were taken in 2011, 2014 and 2015. Vitamins were measured by UPLC-MS/MS from plasma and freeze-dried yolk. Presented vitamin levels represent a sum of similar vitamin-like compounds. Yolk vitamin D3 levels were significantly higher in the unpolluted area for both bird species while yolk vitamin A levels showed no difference. Yolk vitamin E levels were too low to be measured. Plasma vitamin A and D3 showed no consistent pattern over the years or between the two species, except that vitamin D3 showed no significant difference between areas. Plasma vitamin E was consistently higher in the polluted area, but significantly so only for the great tit in one year. Lower yolk vitamin D3 levels in the polluted area could indicate higher interference of metals with vitamin D3 metabolism, or dietary differences: calcium availability was better in the polluted area and female birds may have downregulated their D3 levels. Higher plasma vitamin E levels in the polluted area could be a response to higher oxidative stress levels, which have been documented in this area.

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Family planning in great tits (*Parus major*) in response to temperature extremes: a long-term study

Presenting author: **Michał Gładalski**

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Temperature variation affects various life stages of organisms. It has been suggested that climate change not only means higher temperatures but also more unpredictable weather. Temperature has a major influence on the optimal laying-incubation-hatching dates of insectivorous passerines, because it poses energetic constraints and affects the timing of food abundance. We have been studying breeding characteristics of great tits in two areas around the city of Łódź since 2002. In 2016 and 2017, there were cold spells during the period of egg production, which caused some females to produce laying gaps and/or to start to incubate even several days after producing a complete clutch. Since phenotypic plasticity plays a major role in adjusting to unpredictable weather conditions in spring, examining limits of plasticity may be an important goal for future research.

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Microclimate of great spotted woodpecker nest holes in living and dead trees

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The function of birds' nest design is to minimize the detrimental effects of predator and parasite pressure and to provide a suitable microclimate for developing nestlings. The insulating function of holes may be particularly important for woodpeckers, whose nestlings hatch naked and incapable of thermoregulation for at least a week. Insufficient insulation from ambient conditions may cause hypothermia during cold weather or hyperthermia on hot days. As the microclimate of holes can vary with position on a tree and internal dimensions, birds should use holes with the most favourable characteristics.

The microclimate of natural nest sites of hole-nesters is poorly documented. Few studies consider air temperature and humidity of tree holes in respect to detailed physical characteristics and location on a nest tree.

I present data on air temperature and humidity in tree holes used as nest sites by great spotted woodpeckers (*Dendrocopos major*), the most numerous woodpecker species in the Palearctic. Studies were carried out in the oak-lime-hornbeam stands of the Białowieża Primeval Forest. I discuss how the nest hole's dimensions and its position on a tree influence the microclimate within. Particular attention was paid to analyses of microclimate in respect to the condition of the nest tree and the location of the hole in a living or dead substrate.

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Interspecific transfer of parasites following range-shifts in *Ficedula* Flycatchers

Presenting author: **William Jones**

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Climate change is causing rapid range expansions and contractions of many species as weather patterns and habitats shift. This has wide-ranging and varied effects on organisms, including forcing previously allopatric species into sympatry and secondary contact. This can have a knock-on result in increased opportunities for parasites to encounter novel hosts.

Haemosporidians, the parasites responsible for avian malaria, are a widespread and diverse group of parasites that have been found in the majority of screened bird species with over 2800 lineages described from almost 1500 host species to date. The effects of these parasites on their hosts can vary widely both inter- and intraspecifically. I have investigated parasite prevalence and diversity in the closely related collared and pied flycatchers (*Ficedula albicollis* & *F. hypoleuca*). These species have a large historic contact zone in Central Europe and a newer contact zone on islands in the Baltic Sea. For this study, I have screened over 1500 individuals from 9 locations across Europe, representing allopatric and sympatric populations of both species, as well as using data from the MalAvi database. Pied flycatcher populations vary greatly in both the diversity and prevalence of haemosporidians. Collared flycatchers, meanwhile have lower prevalence, but higher parasite diversity. Additionally, I have identified several malaria lineages that appear to have been able to cross the host-species barrier. I conclude by discussing the role on host-switching and the effect of parasites on interspecific interactions and the role it plays on the speciation process and hybrid-zone dynamics.

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Patterns of variation in haemoparasite infections in great tit fledglings

Presenting author: **Adam Krupski**
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Vector-transmitted haemoparasites commonly infect birds. While patterns of infection with these parasites in adult individuals are generally well explored, very little is known about their occurrence in young individuals. One of the reasons is a long pre-patent period in some parasite genera, such as *Plasmodium* and *Haemoproteus*, which precludes the detection of infections during the nesting period in many small cavity nesting passerines. Here, the occurrence of four genera of avian haemoparasites – *Plasmodium*, *Haemoproteus*, *Leucocytozoon* and *Trypanosoma* – was studied in hatch-year great tits (*Parus major*) during the post-fledging period. Data were collected during two years in the population characterized by high prevalence of *Plasmodium*, *Haemoproteus* and *Leucocytozoon* (over 60% in each genus) and low prevalence of *Trypanosoma* (5%) infections in adult birds. Mean annual prevalence in fledglings was 22%, 32%, 8% and 18% in the case of *Plasmodium*, *Haemoproteus*, *Leucocytozoon* and *Trypanosoma*, respectively. Male and female fledglings did not differ in infection rates in any of the considered parasite genera. The probability of infection was not associated with individual body size measured either shortly before fledging or during the post-fledging period. However, the presence of infection was related with sampling date in the case of *Plasmodium*, *Leucocytozoon* and *Trypanosoma* parasites. Specifically, the probability of manifesting infection in the blood with each of these three parasite genera increased with the progress of the season. Observed temporal variation in infection occurrence may be associated with differences among the vectors transmitting these parasites (different genera of blood-sucking arthropods) in their phenology and/or their degree of endophagy, i.e. attacking the host in enclosed places.

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Diet specialisation differs between dispersing and philopatric individuals in a wild pied flycatcher (*Ficedula hypoleuca*) population

Presenting author: **Marion Nicolaus**

Authors: **Marion Nicolaus¹, Solange C. Y. Barrault¹, Christiaan Both¹**

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It is well established that animal populations harbour individual repeatable differences in suites of correlated behaviours (so-called 'animal personality') and there is now burgeoning interest to understand the ecological and evolutionary implications of this variation. E.g. personality differences could cause individuals to use resources differently and therefore be an important factor affecting intraspecific competition and spatial segregation of behavioural types. The covariation between individual personality and 'diet specialisation' may also be selected if the combination of traits confers a selective advantage. Particularly, the dispersal literature suggests that a high degree of aggressiveness as well as high foraging activity/flexibility and large diet breadth may be beneficial for dispersing individuals that need to settle in new environments while the reverse is true for philopatric individuals. Using repeated measures of provisioning data of wild pied flycatchers, we tested if immigrants and philopatric individuals differ in diet specialisation and provisioning rates and if these differences covary with levels of aggression and annual fitness. Our results show that it is partly the case. Our population has a large diet breadth, but is in fact composed of more specialist and more generalist parents that differ mainly in the proportion of beetles and caterpillars used in their diet. These differences are not explained by local habitat structure. Immigrants have a more generalist diet and higher provisioning rates than 'philopatric' birds. Furthermore, feeding frequency tended to be higher for more generalist and more aggressive individuals. More 'generalist' males (but not females) and/or with higher provisioning rates fledged more young, which were of lower mass. Our results confirm that immigrants and philopatric individuals differ predictably in a suite of behavioural and life-history traits. We discuss the ecological and evolutionary relevance of our findings and highlight the need for future experiments to test the adaptive nature of such behavioural syndrome.

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Telomere dynamics of wild house sparrows under artificial body size selection

Presenting author: **Michael Pepke Pedersen**

Authors: **Michael Pepke Pedersen¹, Thomas Kvalnes¹, Henrik Jensen¹, Bernt Rønning¹, Jonathan Wright¹, Winnie Boner², Bernt-Erik Sæther¹, Pat Monaghan² and Thor Harald Ringsby¹**

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Telomeres, the short repetitive DNA sequences at the ends of the chromosome, are degraded during cell division, but their length might also reflect the cumulative effects of oxidative stress associated with acquiring and maintaining a certain body size. Thus, the functional relationship between growth and telomere dynamics might play a role in determining optimal body size in wild species. In this study, artificial selection pressures for smaller and larger body size, respectively, were imposed in a parallel selection experiment lasting 4 years in two insular wild house sparrow populations. Relative telomere lengths were measured on the whole nestling population each year ($n = 564$) and were found to be shorter in females than in males and negatively correlated with tarsus lengths. This relationship increased in strength when selecting for *larger* tarsus size (when excluding the anomalous year 2003). However, this correlation was not significant in the population selected for *smaller* size, where we find a tendency for body condition in negatively predicting telomere length (excluding year 2003). In this short-lived species (< 5 years), first year mortality is very high and negatively predicted by body size or condition. Thus, we do not recover a trade-off between growth, telomere length and lifespan. However, telomere length might be an indicator of individual phenotypic quality reflecting a more subtle cost of growth. Ongoing studies including complete pedigrees will disentangle how the two selection regimes affected telomere length differently between populations, sexes and years of different climatic conditions and how these factors might interact in potential trade-offs between telomere dynamics and life-history traits.

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The female perspective of personality in great tits: repeatable aggressiveness relates to exploration behaviour

Presenting author: **Rianne Pinxten**

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Males often express traits that improve competitive ability, such as aggressiveness. Females also express such traits but our understanding about why is limited. During the breeding season, females behaving aggressively towards intruding females might prevent the latter from destroying the eggs and taking over the territory or nest site. Moreover, intruding females might settle nearby with another male thereby reducing food availability and increasing predation risk, or take over the mate of the resident female. Hence, intraspecific aggression between females might be used to gain access to reproductive resources but simultaneously incurs costs in terms of energy and time available for reproductive activities, resulting in a trade-off. Although consistent individual differences in female behaviour (i.e. personality) like aggressiveness are likely to influence these reproductive trade-offs, little is known about the consistency of aggressiveness in females. To quantify aggression we presented a female decoy to free-living female great tits (*Parus major*) during the egg-laying period, and assessed whether they were consistent in their response towards this decoy, which was placed on top of the female's nestbox. Moreover, we assessed whether female aggression related to consistent individual differences in exploration behaviour in a novel environment. We found that females consistently differed in aggressiveness, although first-year females were on average more aggressive than older females. Moreover, conform life history theory predictions, 'fast' exploring females were more aggressive towards the decoy than 'slow' exploring females. Given that personality traits are often heritable, and correlations between behaviours can constrain short term adaptive evolution, our findings highlight the importance of studying female aggression within a multivariate behavioural framework.

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Noise impairs the perception of the fine structure of bird song

Presenting author: **Giada Porcedda**

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It is well established that anthropogenic noise negatively affects the fitness of animals by masking vital vocal signals, and interfering with their transmission and detection. From the sender's perspective, birds are known to adapt to noise by increasing the frequency, delivery rate, and amplitude of their songs, presumably to limit the masking effect of noise. However, few field studies have investigated the receiver's perspective, and none has looked at the receiver's ability to discriminate between different songs under noisy conditions.

We tested whether song consistency, a song performance trait important in sexual selection, can be perceived under noisy conditions. To that end, we exposed male blue tits (*Cyanistes caeruleus*) to the same playback experiment in noisy and quiet settings. The aim of the experiment was to test whether the birds can discriminate between two song stimuli that differ only in their level of consistency. The blue tits showed a strong response to the playback of all songs under both quiet and noisy conditions. However, while they showed the ability to distinguish between different levels of consistency under quiet conditions, they failed to do so under noisy conditions.

This study shows that one of the mechanisms through which noise affects birds is by masking of the fine details of songs. The consequent loss of information that they convey, which plays an important role in sexual selection, can ultimately affect the fitness of birds.

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Offspring fitness and the optimal propagule size in a fluctuating environment

Presenting author: **Thor Harald Ringsby**

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Propagule size is an important maternal effect on offspring fitness and phenotype. The performance of propagules often increases with size, but a fluctuating environment may introduce temporal variation in the optimal phenotype. We investigated the interaction between propagule size and environmental conditions on offspring mortality and phenotype in a Norwegian house sparrow population. Increased propagule size reduced nestling mortality, with more pronounced effects under heavy precipitation. However, the lowest mortality until recruitment was found along the diagonal between large propagules at low temperature and small propagules at high temperature. Propagule size had no significant effect on nestling body mass and tarsus length. These results reveal a potential for eco-evolutionary dynamics in propagule size, as populations adapt to fluctuating environmental conditions. The ultimate outcome of this dynamic process will also depend on variation in parental fitness and interactions with other life-history traits.

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Maternal egg hormones in the mating context: the effect of pair personality

Presenting author: **Suvi Ruuskanen**

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Animal personality traits emerge developmentally from the interaction of genetic and early environmental factors. Maternal hormones, such as androgens (testosterone, T and androstenedione, A4), transferred to embryos and egg yolks may simultaneously organize multiple behavioural and physiological traits. Whereas previous studies demonstrated an association between the mother's personality and yolk androgen levels, the independent effects of the male partner's personality and pair combination are unknown. We test this association using an ecological model species for personality research, the great tit (*Parus major*) using multiple approaches: 1) a wild population, 2) a randomly-mated captive population, and 3) an experimental study with (dis)assortatively mated pairs from lines selected for fast exploration/boldness or slow exploration/shyness. Egg androgen concentrations were associated with variation in female personality traits, and the experimental data suggested that this is independent of male personality: experimental females from slow-shy line tended to have higher egg T concentrations than females from the fast-bold line, with no effect of male personality. Shy females from the wild population had higher egg A4 concentration than bold females. However, in the correlative data yolk hormones were linked with male personality, as well as the interaction between female and male traits and yolk androgen levels: Male handling responsiveness correlated negatively with egg A4 concentration in wild birds. In randomly-mated birds, pairs that were mated assortatively for personality had lower egg T concentrations than disassortatively mated pairs. Given that egg androgens are known mediators of avian personality, our results suggest that maternal hormones might contribute to the heritability of personality, may be sensitive to the social context of mating, and act as key drivers of individual differences.

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Genetic assignment of dispersers and patterns of dispersal in a house sparrow metapopulation

Presenting author: **Dilan Saatoglu**

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Since dispersers only contribute to genetic variation if they reproduce, it is important to distinguish the ecological and genetic dynamics of dispersal. In the present study, we will use 200K SNP genotype data on more than 3000 individuals from a long-term study of an insular house sparrow metapopulation at the coast of Northern Norway, to quantify genetic differentiation among the insular sub-populations across more than 10 years, and assign individuals genetically to their natal island. This is going to provide information which will constitute a valuable supplement to existing ecological data on dispersal in the study metapopulation.

According to preliminary results from ongoing analyses, we expect the number of correctly identified dispersers to increase, and their origin to be more reliable. We expect that this in turn will result in increased statistical power in subsequent analyses where the high-quality dispersal data will be used to test key hypotheses regarding causes for dispersal in the house sparrow metapopulation, such as whether dispersal probability has a genetic basis, and/or whether it is related to avoidance of competition with kin and/or inbreeding. Furthermore, to get a better understanding of the ecological causes and consequences of dispersal, dispersal patterns in the house sparrow metapopulation will be examined to determine for example whether there is any source-sink dynamics. We believe our analyses will give a better understanding of the importance of dispersal for eco-evolutionary dynamics in metapopulations in general.

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Challenging a textbook example of the status signalling hypothesis: the house sparrow

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Bird plumage is one of the most striking examples of colour and pattern diversity, and has attracted a large amount of research. The status signalling hypothesis explains variation in plumage between individuals of a species by suggesting that certain plumage traits are used to signal individual dominance status. The house sparrow (*Passer domesticus*) is a classic model species, where the size of a male's black bib is expected to signal dominance rank. However, the evidence is mainly from low-powered studies, mostly on captive birds. Here, we use multilevel meta-analytic (multi-regression) models to test if the status signalling hypothesis explains variation in bib size in male house sparrows. We tested the prediction that bib size is positively correlated with dominance rank. We identified studies testing this prediction in house sparrows, collected the estimates, and contacted authors to obtain the primary data used in published studies, and if available, unpublished data. Primary data allowed us to standardize the methodology for estimating dominance rank and bib size across studies. We obtained primary data for 7 of 13 previously published studies, together with data for 6 unpublished studies. The mean effect size was much lower and overlapped zero when unpublished studies were added ($Z_r = 0.16$, 95%CrI: [-0.01, 0.41], $N = 87$ estimates) compare to when only published studies were analysed ($Z_r = 0.45$, 95%CrI: [0.14, 0.68], $N = 53$ estimates). Additionally, we found evidence of time-lag bias as the mean effect size decreased with year of publication. Our results suggest that house sparrows may not constitute the best model species for the status signalling hypothesis. We discuss methodological issues (e.g. non-standardized methodology) that may have explained previous higher estimates, and urge more researchers to test this hypothesis experimentally, and to share unpublished data to avoid the file drawer problem (i.e. narrow-sense publication bias).

