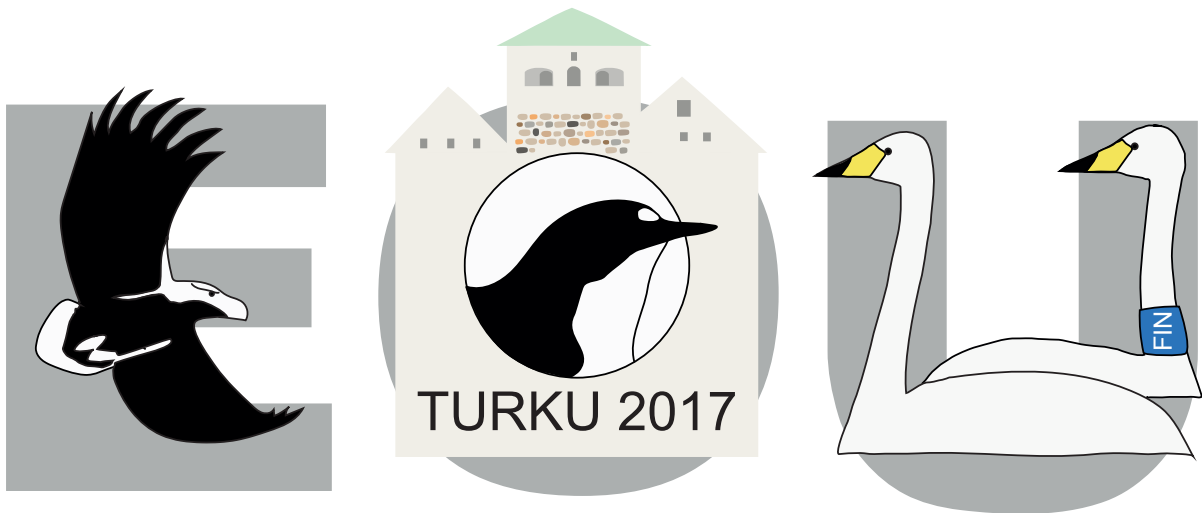


# Programme and Abstracts

Edited by Zoltán Barta



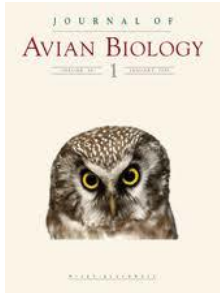
**11<sup>th</sup> Conference of the European Ornithologists'  
Union**

**18 – 22 August 2017  
Turku  
Finland**

SPONSORS:



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<https://eounion.org/turku2017/>

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*First printing, August 2017*



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### III

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## 1. Welcome from the President

It is a true pleasure to welcome delegates from across Europe and far beyond, to the 11th Conference of the European Ornithologists' Union to be held in Turku, Finland. From Badajoz in Spain, where we last convened in 2015, we are crossing much of the continent from South West to North East, visiting a community that is again vibrant and passionate about Ornithology: birds know no boundaries, and in their study, nor do we!

Looking through this abstract book I am fascinated to see the EOU take yet another growth step, evidenced by ever higher levels of ornithological research while staying young at heart. This is thanks to all those who instill their enthusiasm, so that we are becoming a community where young ornithologists come to meet their peers and seasoned ornithologists come to connect with them, sharing their own insights and getting inspired by new ideas.

According to records, the EOU will celebrate its 20th birthday in Turku – also marking 20 years of open borders in Europe for many of us. I hope that we can celebrate together, thankful for what we have achieved in these 20 years, while being mindful how precious these freedoms are. In this spirit, I wish you all exciting scientific experiences combined with an appreciation of socialising with others, from far and near.

Once again, the young ornithologists have organised special activities for networking with each other and for welcoming first-timers to mingle effortlessly. Our programme is again joined by a satellite symposium of the Migrant Landbird Study Group, which this time will last for two days. I cannot predict the many additional opportunities that will open up in Turku, but I'm confident that they will abound.

This conference is only possible because some people have given up much of their private time over the last two years to open Turku's doors to the EOU, from extending the invitation several years ago to compiling a programme packed with exciting events. In the first instance, it is Toni Laaksonen whom we all owe an enormous thank-you for his invitation, for his admirable organizational skills, and for his hard work to get everything prepared. Toni has been supported by Jon Brommer, and by a team of others who helped by dividing up many of the countless tasks amongst each themselves. Zoltán Barta has served as our Scientific Programme Chair in the most modest and thoughtful ways, handling hundreds of submissions, thousands of emails, and facing tough decisions. Zoltán, too, received support from members on the Scientific Programme Committee. Thank you very much for all your efforts.

On behalf of Council and Officers of the EOU, I wish you all an inspiring, invigorating and joyful meeting. Enjoy Finland!

Glasgow (Scotland), August 2017

Barbara Helm  
President of the EOU



## 2. Organisers

### 2.1 Local Organising Committee

- Toni Laaksonen, University of Turku (Chair)
- Jon E. Brommer, University of Turku
- Suvi Ruuskanen, University of Turku
- Aleksi Lehikoinen, University of Helsinki
- Local Volunteer Team (University of Turku): Fabio Balotari-Chiebao, Barbara Class, Camilla Ekblad, Bin-Yan Hsu, Pauliina Järvinen, Pauliina Järvistö, Elina Koivisto, Tuuli-Marjaana Koski, Tiia Kärkkäinen, Esa Lehikoinen, Giulia Masoero, Chiara Morosinotto, Sandra Ruiz, Pälvi Salo, Tom Sarraude, Martin Seltmann
- Aboa Congress and Event Services
- BirdLife Finland

### 2.2 Scientific Programme Committee

- Zoltán Barta, University of Debrecen (Chair)
- Tamer Albayrak, Mehmet Akif Ersoy Üniversitesi
- Elena Arriero Higuera, Universidad Complutense de Madrid
- Daniela Campobello, University of Palermo
- Jan O. Engler, University of Göttingen
- Arne Hegeman, Lund University
- Barbara Helm, University of Glasgow
- Susi Jenni, Swiss Ornithological Institute
- Toni Laaksonen, University of Turku
- Jan-Åke Nilsson, Lund University
- Arie J van Noordwijk, Netherlands Institute of Ecology
- Jim Reynolds, University of Birmingham
- Madeleine Scriba, University of Lausanne
- Judy Shamoun-Baranes, Universiteit van Amsterdam
- Matthias Weissensteiner, Uppsala University





### 3. Related events

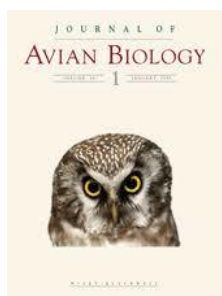
#### MIGRANT LANDBIRD STUDY GROUP SYMPOSIUM

- August 17th-18th, EOU2017 Turku, Finland
- <http://migrantlandbirds.org/index.php/meetings/future-meetings>

#### BIRD EVENING FOR THE LOCAL PUBLIC

- 21/08/2017, 18:00 – 20:00, Hall IX

#### EXHIBITORS



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# Programme

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## 4. Friday, 18/08/2017

### Registration open

15:00 | *Natura*

### Welcome reception

17:30 | *Agora*

### Opening of the Congress

18:30 | *Hall IX-X* |


### History of Finnish Ornithology

18:45 - | *Hall IX-X* | *Toni Laaksonen*

19:30

18:45 | **History of Finnish Ornithology**  
*Timo Vuorisalo, Esa Lehtikainen, Risto Lemmetyinen*  
FH, p. 130





## 5. Saturday, 19/08/2017

### Registration

8:00 | *Natura*

### Practical information

8:50 | *Hall IX-X*

#### 5.1 Plenary: Erkki Korpimäki

9:00 | *Hall IX-X* | *Alexandre Roulin*

9:00 | **Living in a variable environment: owls, kestrels and the high-amplitude northern vole cycle**  
*Erkki Korpimäki*  
Plenary.1, p. 38

### Coffee

10:00 | *Natura and Main building*

#### 5.2 Saturday, 19/08/17: Parallel symposia I

##### Symposium 1: Orientation and navigation of birds: recent advances

10:30 | *Hall IX* | *Nikita Chernetsov & Dmitry Kishkinev*

10:30 | **Introduction**  
*Nikita Chernetsov, Dmitry Kishkinev*  
Sym1.0, p. 41

10:35 | **Recent advances in the study of positioning cues used by migrating birds**  
*Dmitry Kishkinev, Nikita Chernetsov*  
Sym1.1, p. 41

11:00 | **The neural basis of avian navigation**  
*Dominik Heyers*  
Sym1.2, p. 42

- 11:15 | **Studying orientation in free-flying migrants**  
*Kasper Thorup, Victor Bulyuk, Mikkel Willemoes, Marta Lomas Vega, Katherine Snell*  
Sym1.3, p. 42
- 11:30 | **The ophthalmic branch of the trigeminal nerve provides magnetic map information in a migratory songbird**  
*Alexander Pakhomov, Anna Anashina, Dominik Heyers, Nikita Chernetsov, Henrik Mouritsen*  
Sym1.4, p. 43
- 11:45 | **How do juvenile soaring raptors find their way on their first autumn migration? Insights from life-long tracking studies in the Old and New World**  
*Wouter M.G. Vansteelant, Keith Bildstein, Bernd Meyburg, Patrik Byholm*  
Sym1.5, p. 43

## Symposium 2: Hot N cold: Ecophysiological adaptations of migrants and residents

- 10:30 | *Hall I* | *Andreas Nord, Arne Hegemann & Cas Eikenaar*
- 10:30 | **Introduction**  
*Andreas Nord, Arne Hegemann, Cas Eikenaar*  
Sym2.0, p. 44
- 10:35 | **Seasonal programmes along the migrant-resident spectrum**  
*Barbara Helm*  
Sym2.1, p. 44
- 11:00 | **Food, fat, and decision-making at stopover sites**  
*Leonida Fusani*  
Sym2.2, p. 45
- 11:15 | **Fuel for the pace of life: baseline blood glucose concentration co-evolves with life-history traits**  
*Lukáš Bobek, Oldřich Tomášek, Tereza Králová, Marie Kotasová Adámková, Tomáš Albrecht*  
Sym2.3, p. 45
- 11:30 | **Long-distance migrants and their gut microbiomes: stable or dynamic in response to novel environments?**  
*Alice Risely, David Waite, Beata Ujvari, Marcel Klaassen, Bethany Hoye*  
Sym2.4, p. 46
- 11:45 | **Seasonal immunosuppression in the High Arctic – challenges in a changing world?**  
*Andreas Nord, Arne Hegemann, Lars P. Folkow*  
Sym2.5, p. 46

## Symposium 3: Forest management and bird conservation: research advances and future directions

- 10:30 | *Hall XXI* | *Maris Strazds & Nico Arcilla*
- 10:30 | **Introduction**  
*Māris Strazds, Nico Arcilla*  
Sym3.0, p. 47
- 10:35 | **Forest management and bird conservation: international perspectives on problems, progress, and solutions**  
*Nico Arcilla, Māris Strazds*  
Sym3.1, p. 47
- 11:00 | **Birds as indicators of natural capital: states and trends of forests for wood production and biodiversity conservation in Europe's Baltic Sea Region**  
*Per Angelstam*  
Sym3.2, p. 48



- 11:15 | **Effect of logging on birds and local economy in the Białowieża Forest, Poland**  
*Dorota Czeszczewik, Wiesław Walankiewicz*  
 Sym3.3, p. 48
- 11:30 | **Putting forest raptor conservation into practice: guidelines for forest management and voluntary conservation**  
*Heidi Björklund, Jari Valkama*  
 Sym3.4, p. 49
- 11:45 | **Habitat selection, nest predation and nest predators of Rusty Blackbirds (*Euphagus carolinus*) in the Northeastern United States**  
*Shannon Luepold, Thomas Hodgman, Stacy McNulty, Jonathan Cohen, Carol Foss*  
 Sym3.5, p. 49

#### Symposium 4: Decoding Birds: Exploring avian genomes to reveal hidden secrets in ornithology

- 10:30 | *Hall XXII* | *Matthias Weissensteiner & Jan Engler*
- 10:30 | **Introduction**  
*Matthias Weissensteiner, Jan O. Engler*  
 Sym4.0, p. 50
- 10:35 | **Ornithology in the genomics era.**  
*Niclas Backström*  
 Sym4.1, p. 50
- 11:00 | **Studying the genetic basis of seasonal migration in a songbird**  
*Kira Delmore, Miriam Liedvogel*  
 Sym4.2, p. 51
- 11:15 | **Long-read genomics unravels the major histocompatibility complex of great reed warblers**  
*Helena Westerdahl, Maria Strandh, Jacob Roved, Bengt Hansson, Dennis Hasselquist*  
 Sym4.3, p. 51
- 11:30 | **Genomic architecture of parallel contact zones along the speciation continuum in Eurasian crows**  
*Matthias Weissensteiner, Nagarjun Vijay, Christen Bossu, Alexey Kryukov, Jelmer Poelstra, Alexander Suh*  
 Sym4.4, p. 52
- 11:45 | **Genes around the clock: Circadian rhythms of clock and immune gene expression in a wild great tit population**  
*Robyn Womack, Francesco Baldini, Jane Robinson, Peter O'Shaughnessy, Barbara Helm*  
 Sym4.5, p. 52

#### Symposium 5: Evolutionary consequences of social information use in birds

- 10:30 | *Hall X* | *Daniela Campobello & Damien Farine*
- 10:30 | **Introduction**  
*Daniela Campobello, Damien Farine*  
 Sym5.0, p. 53
- 10:35 | **The implications of information use between individuals and information transfer within groups on the evolution of social traits**  
*Daniela Campobello, Damien Farine*  
 Sym5.1, p. 53
- 11:00 | **Social information use and the organization of animal communities**  
*Deseada Parejo*  
 Sym5.2, p. 54

- |       |   |
|-------|---|
| 11:15 | <b>The importance of social information in winter flocks of black-capped chickadees</b><br><i>Julian Evans, Julie Morand-Ferron</i><br>Sym5.3, p. 54  |
| 11:30 | <b>The role of aggressiveness in modulating social information use in a wild population</b><br><i>Jennifer Morinay, Jukka Forsman, Grégory Daniel, Marion Germain, Lars Gustafsson, Blandine Doligez</i><br>Sym5.4, p. 54 |
| 11:45 | <b>Information use in wild zebra finches - the effect of brood size manipulation on breeding decisions</b><br><i>Hanja Brandl, Simon Griffith, Wiebke Schuett</i><br>Sym5.5, p. 55  |

**Lunch**

12:00 | Lunch restaurant Galilei

**5.3 Plenary: Jane Reid**

- |       |   |                |
|-------|---|----------------|
| 13:30 | Hall IX-X   | James Reynolds |
| 13:30 | <b>Linking life-history variation, population dynamics and evolution across multiple spatial scales</b><br><i>Jane Reid</i><br>Plenary.2, p. 38 |                |

**Coffee**

14:30 | Natura and Main building

**5.4 Saturday, 19/08/17: Parallel oral sessions I****Oral session 1: Migration I**

- |       |   |                        |
|-------|---|------------------------|
| 15:00 | Hall IX   | Susanne Jenni-Eiermann |
| 15:00 | <b>Feather microbiome in light of moulting and migratory strategies of passerine birds</b><br><i>Veronika Javurkova, Petr Procházka, Milica Požgayová, Peter Adamík, Petr Heneberg, Jakub Kreisinger</i><br>OS1.1, p. 70                            |                        |
| 15:15 | <b>Pathogens on the move: mechanistic approaches to investigate the consequences of infections on migratory behaviour</b><br><i>Simeon Lisovski, Silke Bauer</i><br>OS1.2, p. 71  |                        |
| 15:30 | <b>How immune function shapes avian migration</b><br><i>Arne Hegemann</i><br>OS1.3, p. 71   |                        |
| 15:45 | <b>Haematological parameters differ between spring and autumn migration in songbirds</b><br><i>Julia Loshchagina, Arseny Tsvey</i><br>OS1.4, p. 71  |                        |
| 16:00 | <b>Avian malaria: low parasitaemia does not reduce the aerobic performance in migratory hosts</b><br><i>Steffen Hahn, Silke Bauer, Dimitar Dimitrov, Tamara Emmenegger, Karina Ivanova, Pavel Zehntindjiev, William A. Buttemer</i><br>OS1.5, p. 72 |                        |

- 16:15 | **Migration and the evolutionary loss of immune gene diversity**  
*Emily O'Connor, Charlie Cornwallis, Jan-Åke Nilsson, Dennis Hasselquist, Helena Westerdahl*  
 OS1.6, p. 72

## Oral session 2: Distribution

15:00 | *Hall XXI* | *Verena Keller*

- 15:00 | **Climate change impacts on mountain birds: status and prospects**  
*Davide Scridel, Dan Chamberlain, Paolo Pedrini, Giuseppe Bogliani, Mattia Brambilla*  
 OS2.1, p. 73
- 15:15 | **Modelling mountain bird distributions - Model consistency and transferability across different Alpine regions**  
*Dan Chamberlain, Susanne Jähnig, Paolo Pedrini, Enrico Caprio, Antonio Rolando, Mattia Brambilla*  
 OS2.2, p. 73
- 15:30 | **Influence of device accuracy and choice of algorithm for species distribution modelling of seabirds: A case study using black-browed albatrosses**  
*Jan O. Engler, Petra Quillfeldt, Janet R.D. Silk, Richard A. Phillips*  
 OS2.3, p. 74
- 15:45 | **Weather effects on population dynamics of common birds in the northern and southern parts of their distribution range**  
*Juan Gallego Zamorano, Andreas Lindén, Ruud P.B. Foppen, Jiří Reif, Chris van Turnhout, Aleksi Lehikoinen*  
 OS2.4, p. 74
- 16:00 | **Changes over a quarter of century in the distribution of Palearctic migrants in southern Africa: revelations from the first and second bird atlas projects (SABAP1 & 2)**  
*Megan Loftie-Eaton, Les Underhill, Michael Brooks*  
 OS2.5, p. 75
- 16:15 | **European ornithology's greatest need: the African Bird Atlas Project**  
*Les Underhill, Michael Brooks*  
 OS2.6, p. 76

## Oral session 3: Conservation I

15:00 | *Hall XXII* | *Péter L. Pap*

- 15:00 | **Mediterranean cuisine explained by genomic tools: which Red-backed Shrikes end up on the plate?**  
*Liviu G. Pârâu, Michael Wink*  
 OS3.1, p. 76
- 15:15 | **Impacts of shipping traffic on seabirds in the Baltic Sea as investigated with the help of automatic identification system of ships**  
*Claudia Burger, Alexander Schubert, Ansgar Diederichs, Stefan Heinänen, Georg Nehls*  
 OS3.2, p. 76
- 15:30 | **Assessing the movements of post-fledging white-tailed eagles via satellite telemetry: conservation implications for a recovering population**  
*Fabio Balotari Chiebao, Toni Laaksonen, Jon Brommer, Hannu Tikkanen*  
 OS3.3, p. 77
- 15:45 | **Potential collision risk of harriers (*Circus* spp.) with wind turbines during the breeding season derived from high-resolution GPS-tracking**  
*Tonio Schaub, Raymond H. G. Klaassen, Willem Bouten, Almut E. Schlaich, Koks J. Ben*  
 OS3.4, p. 77

- 16:00 | **Do nitrogen deposition and forest management explain wood warbler occurrence patterns in Switzerland?**  
*Gilberto Pasinelli, Dominik Scheibler*  
OS3.5, p. 78
- 16:15 | **Lessons for life: enhancing individuals and habitats to increase re-introductions success**  
*Benjamin Homberger, Markus Jenny, Jérôme Duplain, Lukas Jenni*  
OS3.6, p. 79

#### Oral session 4: Physiology I

- 15:00 | *Hall I* | *Pat Monaghan*
- 15:00 | **Effect of interspecific brood parasitism on the hormonal state of hosts: a study with the common blackbird (*Turdus merula*).**  
*Francisco Ruiz-Raya, Manuel Soler, Teresa Abaurrea, Olivier Chastel, Gianluca Roncalli, Juan Diego Ibáñez-Álamo*  
OS4.1, p. 79
- 15:15 | **Oxidative stress markers and administration of antioxidants as tools to describe and treat a viral disease in magnificent frigatebirds**  
*Manrico Sebastiano, Marcel Eens, Olivier Chastel, David Costantini*  
OS4.2, p. 80
- 15:30 | **Measuring mitochondrial function in birds using red blood cells: a case study in the king penguin and perspectives in ecology and evolution**  
*Antoine Stier, Pierre Bize*  
OS4.3, p. 80
- 15:45 | **Transgenerational effects of prenatal testosterone exposure in the rock pigeons (*Columba livia*): potential pathways via influenced egg composition**  
*Bin-Yan Hsu, Bonnie de Vries, Ton Groothuis*  
OS4.4, p. 81
- 16:00 | **Environmental influence on yolk thyroid hormones in the Great Tit: a cross-population study**  
*Tom Sarraude, Tommi Anderson, Rute Costa, Marcel Eens, Tapio Eeva, Rita Hargitai, Bin-Yan Hsu, Ravio Mänd, Piia Pajunen, Luis Silva, Paulo Tenreiro, Robert Thomson, Jere Tolvanen, János Török, Barbara Tschirren, Irene Verhagen, Marcel Visser, Suvi Ruuskanen*  
OS4.5, p. 81
- 16:15 | **Artificial light at night leads to reduced energetic costs in breeding great tits (*Parus major*)**  
*Davide Dominoni, Marcel Visser, Kamiel Spoelstra, Natalie van Dis, Anouk Welbers*  
OS4.6, p. 82

#### Oral session 5: Life history

- 15:00 | *Hall X* | *Jon Brommer*
- 15:00 | **Habitat-specific build-up of temporal isolation in a young hybrid zone**  
*Päivi Sirkiä, S. Eryn McFarlane, William Jones, David Wheatcroft, Murielle Ålund, Jakub Rybinski, Anna Qvarnström*  
OS5.1, p. 82
- 15:15 | **Egg-laying by brood parasites of a cavity nesting host**  
*Robert Thomson, Michal Kysučan, Peter Samaš, Ryan Miller, Jarkko Rutila, Jere Tolvanen, Tomáš Grim*  
OS5.2, p. 83
- 15:30 | **The epigenetic basis of effects of early-life nutrition**  
*Hannah Watson, Juli Broggi, Caroline Isaksson, Johan Nilsson, Jan-Åke Nilsson*  
OS5.3, p. 83

- |       |  |
|-------|--|
| 15:45 | <b>Do environmental conditions experienced in early life affect recruitment age and performance at first breeding in common goldeneye females?</b><br><i>Hannu Pöysä, Robert Clark, Antti Paasivaara, Pentti Runko</i><br>OS5.4, p. 84 |
| 16:00 | <b>Sex-specific patterns of reproductive senescence in a long-lived reintroduced raptor</b><br><i>Megan Murgatroyd, Richard Evans, Staffan Roos, Alex Sansom, Phil Whitfield, Arjun Amar</i><br>OS5.5, p. 84                           |
| 16:15 | <b>Ageing in the city: telomere dynamics in an urbanisation context</b><br><i>Pablo Salmón, Hannah Watson, Johan Nilsson, Mariana Lapa, Staffan Bensch, Caroline Isaksson</i><br>OS5.6, p. 85  |

## 5.5 Saturday, 19/08/17: Parallel poster pitching I

### Poster pitching I

- |       |         |  |
|-------|---------|--|
| 16:40 | Hall IX | <i>Madeleine Scriba</i><br><br><b>Timing of migration of the Spotted Flycatcher (<i>Muscicapa striata</i>) to the south: departure from the Baltic coast and arrival in South Africa in relation to climate warming</b><br><i>Jacqueline Badenhorst, Magdalena Remisiewicz, Les Underhill</i><br>P.7, p. 134<br><br><b>Cold birds put more material in their nests</b><br><i>Sophie C. Edwards, Tanya Shoot, R. Jeff Martin, David F. Sherry, Susan Healy</i><br>P.25, p. 142<br><br><b>Improved sexing of <i>Phylloscopus</i> based on morphology</b><br><i>Oscar Gordo, José Luis Arroyo, Rubén Rodríguez, Antonio Martínez</i><br>P.33, p. 145<br><br><b>Sustainable forest management: bird community patterns and trends in a commercial forest planation in England.</b><br><i>Ian Henderson, Greg Conway, Neal Armour-Chelu</i><br>P.37, p. 146<br><br><b>Impacts of grazing on mountain bird populations: A meta-analysis</b><br><i>Susanne Jähnig, Antonio Rolando, Dan Chamberlain</i><br>P.43, p. 149<br><br><b>Migration ways and wintering areas of the greylag goose (<i>Anser anser</i>) from the Kuma-Manych Depression, southern European Russia</b><br><i>Natalia Lebedeva</i><br>P.65, p. 157<br><br><b>Tawny owls and roads: a 12-year study of road-kills and abundance</b><br><i>Rui Lourenço, Shirley Horst, Fernando Goytre, Pandora Pinto, Sara Santos, António Mira</i><br>P.71, p. 160<br><br><b>The early bird... considered its fuel? Timing of nocturnal departures is affected by a flexible reaction norm to fuel load</b><br><i>Florian Müller, Philip D. Taylor, Heiko Schmaljohann</i><br>P.85, p. 165<br><br><b>Effects of light-level geolocators on migratory birds: a meta-analysis</b><br><i>Petr Procházka, Vojtech Brlík, Jaroslav Koleček, Sanja Barišić, Davor Cikovic, Bohumír Chutný, Tamara Emmenegger, Kevin C. Fraser, Steffen Hahn, Diana L. Humple, Tosha Kelly, Dmitry Kishkinev, Kent McFarland, Václav Pavel, Makiko Takenaka, Dirk Tolkmitt</i><br>P.99, p. 170 |
|-------|---------|--|

**Not just a black and white issue: The role of *ASIP* expression in plumage colouration in the Black Sparrowhawk.**

*Edmund Rodseth, Robert Ingle, Arjun Amar*

P.107, p. 174

**Cost and benefits of elevated maternal thyroid hormone levels**

*Suvi Ruuskanen, Tom Sarraude, Bin-Yan Hsu*

P.111, p. 176

**Potential spatio-temporal mismatching in trophic relationships of Alpine Chough (*Pyrrhonorax graculus*) in North-Western Italy**

*Cristina Vallino, Enrico Caprio, Fabrizio Genco, Dan Chamberlain, Claudia Palestrini, Angela Roggero, Rolando Antornio*

P.135, p. 185

**Bird migration routes and waterfowl habitat protection in southwest China**

*Zhaolu Wu, Haotian Bai, Xuebing Zhao, Kang Luo*

P.147, p. 190

## Poster pitching 2

16:40 | Hall X | Arne Hegemann

**Finish with a sprint: long-distance migration of collared flycatchers is time-selected in both seasons, but to a different degree**

*Martins Briedis, Peter Adamík*

P.11, p. 135

**Landscape heterogeneity affects foraging behaviour in European Nightjars (*Caprimulgus europaeus*)**

*Ruben Evens, Natalie Beenaerts, Thomas Neyens, Nele Witters, Karen Smeets, Tom Artois*

P.29, p. 144

**Targeted sequence capture to resolve phylogenetic relationships of haemosporidian parasites**

*Xi Huang, Olof Hellgren, Staffan Bensch*

P.41, p. 148

**Inferring the intensity of territorial response from male Tawny Owl calls**

*Andreas Lindén, Patrik Korn*

P.69, p. 159

**Insights into the rock dove natural and artificial history gained from population genomics**

*George Pacheco, Thomas Gilbert, Filipe Vieira*

P.91, p. 167

**Dietary habits of four raptor species in Central Europe: the role of *Microtus voles* and *Apodemus* mice**

*Jan Riegert, Matej Lovy, Vaclav Luka, Markéta Zárybnická*

P.105, p. 173

**Where the European Robin *Erithacus rubecula* breeds in primeval forest (Białowieża National Park)?**

*Patryk Rowinski, Oliwia Karpinska, Katarzyna Kancłerska*

P.109, p. 175

**Vocalizations of *Notiocichla* reed warblers**

*Veronika Samotskaya, Irina Marova, Vladimir Ivanitskii*

P.113, p. 177

**Understanding variability in bird stress responses**

*Zulima Tablado, Yves Bötsch, Veronika Bókony, Ádám Zoltán Lendvai, Frédéric Angelier, Lukas Jenni*

P.131, p. 183

**BirdsOnline - A New Step for Citizen Science**

*Markéta Zárybnická, Petr Kubizňák, Jiří Šindelář, Vlastimil Osoba, Pavel Junek, Tomáš Kotek, Jan Bartoška, Michal Hruška, Václav Klapetek, Petr Sklenicka*

P.151, p. 191

**Poster session with refreshments I**

17:10 - | *Authors of posters with odd numbers (P.1, P.3, ...) are present at their posters.*

19:00



## 6. Sunday, 20/08/2017

### Practical information

8:50 | *Hall IX-X*

### 6.1 Plenary: Patricia Monaghan

9:00 | *Hall IX-X* | *Barbara Helm*

9:00 | **Environmental effects that shape individual life histories: time scales, trade-offs and mechanisms**  
*Pat Monaghan*  
Plenary.3, p. 39

### Coffee

10:00 | *Natura and Main building*

### 6.2 Sunday, 20/08/17: Parallel symposia II

#### Symposium 6: Advances in our understanding of hormonal regulation of migratory traits

10:30 | *Hall IX* | *Arseny Tsvey & Susanne Jenni-Eiermann*

10:30 | **Introduction**  
*Arseny Tsvey, Susanne Jenni-Eiermann*  
Sym6.0, p. 56

10:35 | **Hormonal regulation of fuel metabolism in migrating birds: An overview**  
*Susanne Jenni-Eiermann*  
Sym6.1, p. 56

11:00 | **Similar behavior, different regulation: plasma corticosterone concentration in European Robins during spring and autumn migration**  
*Arseny Tsvey, Julia Loshchagina, Sergey Naidenko*  
Sym6.2, p. 56



- 11:15 | **Corticosterone mediates between departure cues and timing of migratory departure in a songbird**  
*Cas Eikenaar, Florian Müller, Heiko Schmaljohann*  
 Sym6.3, p. 57
- 11:30 | **Ghrelin affects stopover decisions and food intake in a long-distance migrant**  
*Sara Lupi, Wolfgang Goymann, Hiroyuki Kaiya, Massimiliano Cardinale, Leonida Fusani*  
 Sym6.4, p. 57
- 11:45 | **Environmental conditions experienced at long-term migratory staging sites are associated with altered carry-over effects in a Palearctic-African migratory bird**  
*Marjorie C Sorensen, Graham D Fairhurst, Susanne Jenni-Eiermann, Jason Newton, Elizabeth Yohannes, Claire N Spottiswoode*  
 Sym6.5, p. 58

### Symposium 7: Co-infection in free-living avian systems: malaria and beyond

- 10:30 | *Hall XXII* | *Jenny Dunn & Alfonso Marzal*
- 10:30 | **Introduction**  
*Jenny Dunn, Alfonso Marzal*  
 Sym7.0, p. 58
- 10:35 | **Co-infection in free-living avian systems: what do we know and where are we going?**  
*Jenny Dunn*  
 Sym7.1, p. 59
- 11:00 | **Effects of haemosporidian mixed infections on wild birds**  
*Alfonso Marzal*  
 Sym7.2, p. 59
- 11:15 | **Detecting co-infection: trials and tribulations of Next-Generation Sequencing**  
*Rebecca Thomas, Jenny Dunn, Simon Goodman, Keith Hamer, Helen Hipperson*  
 Sym7.3, p. 60
- 11:30 | **Migration and parasitism: habitat use, not migration distance, influences helminth species richness in Charadriiform birds**  
*Jorge Gutiérrez, Theunis Piersma, David Thieltges*  
 Sym7.4, p. 60
- 11:45 | **How does coinfection with avian malaria influence disease caused by *Mycoplasma gallisepticum* in house finches?**  
*André Dhondt, Keila V. Dhondt, Sophie Nazeri, Andrew P. Dobson*  
 Sym7.5, p. 60

### Symposium 8: Plumage colour and behaviour

- 10:30 | *Hall I* | *Arjun Amar & Alexandre Roulin*
- 10:30 | **Introduction**  
*Arjun Amar, Alexandre Roulin*  
 Sym8.0, p. 61
- 10:35 | **The role of natural and sexual selection in colour traits and behaviour**  
*Alexandre Roulin*  
 Sym8.1, p. 61
- 11:00 | **Differential foraging behaviour of the polymorphic Black Sparrowhawk according to light levels and habitat**  
*Arjun Amar, Gareth Tate*  
 Sym8.2, p. 62

- 11:15 | **Melanin-based colouration and personality within a sibling competition context**  
*David López-Idiáquez, Juan Antonio Fargallo, Isabel López-Rull, Jesús Martínez-Padilla*  
Sym8.3, p. 62
- 11:30 | **Telomere dynamics of tawny owl colour morphs differ and depend on disease status**  
*Patrik Karell, Staffan Bensch, Kari Ahola, Muhammad Asghar*  
Sym8.4, p. 63
- 11:45 | **Plumage polymorphism covaries with life history in common buzzards**  
*Oliver Krüger, Nayden Chakarov*  
Sym8.5, p. 63

### Symposium 9: The form and function of birds' nests

- 10:30 | *Hall XXI* | **Mark C. Mainwaring, S. Jim Reynolds, Susan D. Healy & Lauren M. Guillette**
- 10:30 | **Introduction**  
*Mark Mainwaring, S. James Reynolds, Susan Healy, Lauren Guillette*  
Sym9.0, p. 63
- 10:35 | **Cognition and nest building: what does nest structure tell us?**  
*Susan Healy*  
Sym9.1, p. 64
- 11:00 | **The impacts of climate on incubation period in long-tailed tits (*Aegithalos caudatus*)**  
*Caitlin Higgott, Karl Evans, Ben Hatchwell*  
Sym9.2, p. 64
- 11:15 | **Tits as bryologists: patterns of moss use in nests by three species co-habiting primeval forest**  
*Tomasz Wesolowski, Sylwia Wierzcholska*  
Sym9.3, p. 65
- 11:30 | **Urbanisation and nest building in birds**  
*S. James Reynolds*  
Sym9.4, p. 65
- 11:45 | **Nest construction is a heritable trait in a wild bird**  
*Pauliina Järvinen, Edward Klun, Jon Brommer*  
Sym9.5, p. 65

### Symposium 10: Natal dispersal movements in resident bird species

- 10:30 | *Hall X* | **Martin U. Grüebler & Julien Fattebert**
- 10:30 | **Introduction**  
*Martin Grüebler, Julien Fattebert*  
Sym10.0, p. 66
- 10:35 | **Integrating more movement ecology into bird dispersal ecology**  
*Julien Fattebert, Martin Grüebler*  
Sym10.1, p. 66
- 11:00 | **Juvenile dispersal in the barn owl: rearing conditions affect timing and dispersal distances**  
*Bettina Almasi, Carolina Massa, Alexandre Roulin, Lukas Jenni*  
Sym10.2, p. 67
- 11:15 | **Individual, social and habitat factors influencing multiple behavioural stages of dispersal in the middle spotted woodpecker**  
*Hugo Robles, Zeno Porro, Carlos Ciudad*  
Sym10.3, p. 67
- 11:30 | **Natal dispersal behaviour in the polymorphic common buzzard: a case study in The Netherlands**  
*Elena Frederika Kappers, Christiaan Both, Bart Kempenaers*  
Sym10.4, p. 68

- 11:45 | **Albatrosses prospect before choosing a home: intrinsic and extrinsic sources of variability in visitation rates**  
*Letizia Campioni, Josè Pedro Granadeiro, Paulo Catry*  
 Sym10.5, p. 68

## Lunch

- 12:00 | *Lunch restaurant Galilei*

## 6.3 Plenary: Henri Weimerskirch

- 13:30 | *Hall IX-X* | *Judy Shamoun-Baranes*  
 13:30 | **The wandering albatross as an animal model: Combining long-term individual-based and tracking studies**  
*Henri Weimerskirch*  
 Plenary.4, p. 39

## Coffee

- 14:30 | *Natura and Main building*

## 6.4 Sunday, 20/08/17: Parallel oral sessions II

### Oral session 6: Migration II

- 15:00 | *Hall IX* | *Janne Ouweland*  
 15:00 | **Stopover niche use of East Asian buntings**  
*Wieland Heim*  
 OS6.1, p. 85  
 15:15 | **How to recover after an endurance flight? Rest patterns in migratory birds during stopover**  
*Andrea Ferretti, Niels Rattenborg, Scott R. McWilliams, Massimiliano Cardinale, Leonida Fusani*  
 OS6.2, p. 86  
 15:30 | **Energy for the road: Carbohydrates and water availability influences on fueling processes in autumn migrating passerines**  
*Adi Domer, Ofer Ovadia, Eyal Shochat*  
 OS6.3, p. 86  
 15:45 | **Intra- and interspecific variation in relative energy demands for trans-Sahara bird migrants**  
*Felix Liechti, Steffen Hahn, Silke Bauer*  
 OS6.4, p. 87  
 16:00 | **Barrier crossing in small long-distance migratory birds**  
*Will Cresswell, Emma Murray, Marina Xenophontos, Malcolm Burgess, Sam Ivande, Alice Risely, Arin Azang, Ben Freeman*  
 OS6.5, p. 87  
 16:15 | **Advancing the study of intra-African bird migration: ecology, conservation and policy**  
*Samuel Osinubi, Desire Dalton, Phoebe Barnard, Peter Ryan*  
 OS6.6, p. 88

### Oral session 7: Parasites and immunity

- 15:00 | *Hall XXII* | *Alfonso Marzal*  
 15:00 | **Effect of host-intrinsic vs environmental factors on gut microbiota of a brood parasite, the common cuckoo (*Cuculus canorus*)**  
*Lucie Kropackova, Jakub Kreisinger, Milica Požgayová, Marcel Honza, Petr Procházka*  
 OS7.1, p. 88

- 15:15 | **The higher prevalence of haemosporidian at lower altitude. Is it true?**  
*Tamer Albayrak, Tugba Tuncel*  
 OS7.2, p. 89
- 15:30 | **Avian malaria on Madagascar: prevalence and genetic diversity of haemosporidian parasites**  
*Sandrine Schmid, Anke Dinkel, Friederike Woog, Ute Mackenstedt*  
 OS7.3, p. 89
- 15:45 | **Avian evolution of adaptive immunity – comparative genomics of the major histocompatibility complex gene region**  
*Maria Strandh, Matthias Weissensteiner, Jochen Wolf, Helena Westerdahl*  
 OS7.4, p. 90
- 16:00 | **Major histocompatibility complex gene expression in Eurasian siskin (*Spinus spinus*) during an avian malaria infection**  
*Anna Drews, Olof Hellgren, Helena Westerdahl*  
 OS7.5, p. 90
- 16:15 | **Acquired immunity of a bird species and evolution of its pathogen as apparent mechanisms of population regulation**  
*Wesley Hochachka, Dana Hawley, André Dhondt*  
 OS7.6, p. 90

#### Oral session 8: Reproductive behaviour

- 15:00 | *Hall I* | *Daniela Campobello*
- 15:00 | **Nest as a signal in the Nuthatch *Sitta europaea***  
*Alejandro Cantarero, Jimena López-Arrabé, Mireia Plaza, Irene Saavedra-Garcés, Juan Moreno*  
 OS8.1, p. 91
- 15:15 | **The relationship between quality representation through plumage colouration and song in Yellowhammers**  
*Sharina van Boheemen, Ondra Kauzal, Magdalena Gajdošová, Ana Magalhães, Fabio Samperi, Lucia Heredero, Tereza Petruskova*  
 OS8.2, p. 91
- 15:30 | **How to estimate assortative mating for labile traits in the wild**  
*Barbara Class, Jon Brommer, Niels Dingemanse, Yimen Araya-Ajoy*  
 OS8.3, p. 92
- 15:45 | **Is divorce heritable? The quantitative genetic basis to divorce in a wild sparrow population**  
*Ryan Germain, Matthew Wolak, Jane Reid*  
 OS8.4, p. 92
- 16:00 | **Density dependence in space and time: Does staggered laying reduce effective breeding densities in an urban raptor species?**  
*Petra Sumasgutner, Ann Koeslag, Arjun Amar*  
 OS8.5, p. 93

#### Oral session 9: Breeding

- 15:00 | *Hall XXI* | *Davide Dominoni*
- 15:00 | **Fitness consequences of nest site depth for breeding blue tits (*Cyanistes caeruleus*): an experiment**  
*Rienk W. Fokkema, Richard Ubels, Joost M. Tinbergen*  
 OS9.1, p. 93
- 15:15 | **The effect of nest fleas on breeding behaviour and nest success of Arctic barnacle geese (*Branta leucopsis*)**  
*Margje E. de Jong, Maarten J.J.E. Loonen*  
 OS9.2, p. 94

- |       |  |
|-------|--|
| 15:30 | <b>Nestling development exhibits time rather than growth costs in response to predator exposure as mediated by parental behaviour</b><br><i>Devin de Zwaan, Kathy Martin</i><br>OS9.3, p. 94 |
| 15:45 | <b>Modelling avian growth with the Unified-Richards: As exemplified by wader-chick growth.</b><br><i>Kathleen M. C. Tjørve, Even Tjørve</i><br>OS9.4, p. 95                                  |
| 16:00 | <b>Egg movement within the clutch seems to compensate for asymmetries in heat transfer</b><br><i>David Diez Méndez, Samuel Rodríguez, Elena Álvarez, Emilio Barba</i><br>OS9.5, p. 95        |
| 16:15 | <b>Experimentally increased nest temperature affects growth and long-term survival in blue tit nestlings</b><br><i>Fredrik Andreasson, Andreas Nord, Jan-Åke Nilsson</i><br>OS9.6, p. 96     |

### Oral session 10: Agriculture and birds

- |       |   |
|-------|---|
| 15:00 | <i>Hall X</i>   <i>Nico Arcilla</i>   |
| 15:00 | <b>Habitat heterogeneity and its impact on population dynamics</b><br><i>Matthieu Paquet, Debora Arlt, Pär Forslund, Jonas Knape, Matthew Low, Tomas Pärt</i><br>OS10.1, p. 96  |
| 15:15 | <b>Hungry for more: Dietary changes, usage of bespoke habitat management options and implications for body condition in a rapidly declining species</b><br><i>Jenny Dunn, Jennifer Stockdale, Alexandra McCubbin, Rosemary Moorhouse-Gann, Helen Hipperson, Antony Morris, Philip Grice, William Symondson</i><br>OS10.2, p. 97 |
| 15:30 | <b>Effects of farmland practices on bird diversity conservation in North-West Spain</b><br><i>Sandra Goded, Johan Ekroos, Jesús Domínguez, José A. Guitián, Henrik G. Smith</i><br>OS10.3, p. 97  |
| 15:45 | <b>Visiting gardens in winter: impact of the surrounding intensive agricultural landscape on garden birds</b><br><i>Pauline Pierret, Frédéric Jiguet</i><br>OS10.4, p. 98   |
| 16:00 | <b>Long-term impacts of grazing management on breeding success of an upland insectivorous passerine</b><br><i>Lisa Malm, Nick Littlewood, Alison Karley, James Pearce-Higgins, Darren Evans</i><br>OS10.5, p. 98  |
| 16:15 | <b>Telemetric studies of individual Starlings' habitat use confirm the mechanisms behind their marked population decline across half a continent</b><br><i>Henning Heldbjerg, Anthony Fox, Peder Thellesen, Lars Dalby, Peter Sunde</i><br>OS10.6, p. 99  |

## 6.5 Sunday, 20/08/17: Parallel poster pitching II

### Poster pitching 3

- |       |  |
|-------|--|
| 16:40 | <i>Hall IX</i>   <i>Madeleine Scriba</i><br><b>Temperatures in early autumn in the wintering grounds affect birds' body condition during spring migration in three warbler species</b><br><i>Irith Aloni, Shai Markman, Yaron Ziv</i><br>P.2, p. 131 |
|-------|--|

**Integrating ecosystem services delivery and bird conservation into broader management strategies for farmland systems**

*Giacomo Assandri, Giuseppe Bogliani, Paolo Pedrini, Mattia Brambilla*

P.6, p. 133

**Genetic identity and mitochondrial DNA diversity of the chiffchaffs in northwestern Russia**

*Raisa Chetverikova, Olga Babushkina, Julia Bojarinova, Svetlana Galkina, Aleksandr Dyomin, Irina Dyomina, Regina Lubkovskaya*

P.14, p. 137

**Habitat selection of a dead wood specialist in managed forest: implications for forest management**

*Antonia Ettwein, Pius Korner, Gilberto Pasinelli*

P.28, p. 143

**Seasonal and annual variation in predation rates and predators of natural and artificial nests**

*Katrine Hoset, Magne Husby*

P.40, p. 148

**Geographic variation in throat colour pattern in males of a migratory game bird: the common quail (*Coturnix coturnix*).**

*Irene Jiménez-Blasco, Manel Puigcerver, Eduardo García-Galea, José Domingo Rodríguez-Teijeiro*

P.46, p. 150

**Visual cues of systemically herbivore-damaged pine branches attract insectivorous birds**

*Elina Mäntylä, Silke Kipper*

P.74, p. 161

**Breeding Lesser Spotted Eagles *Aquila pomarina* and windfarms - some insights from GPS tracking**

*Bernd Meyburg, Christiane Meyburg*

P.80, p. 163

**Short-term responses of bird populations to disturbance - forest management effects in low-land forests in Poland**

*Grzegorz Neubauer, Przemysław Chylarecki, Tomasz Chodkiewicz, Arkadiusz Sikora, Tomasz Wilk*

P.88, p. 166

**Timing of breeding of passerines in southern Lapland over the last 32 years**

*Dafne Ram, Erik Nyholm, Åke Lindström*

P.102, p. 171

**Breeding success depends on the total nest density in open-nesting passerines**

*Dmitry Shitikov, Tatiana Vaytina, Tatiana Makarova, Svetlana Fedotova, Vera Volkova, Stanislav Samsonov*

P.116, p. 178

**Phenotypic flexibility of digestive organs during staging in a long-distance migrant**

*Julia Slezacek, Tess Handby, Richard Inger, Stuart Bearhop*

P.120, p. 179

**Large scale variation in demography and population dynamics of a long-distance migratory bird – the Barn Swallow**

*Jan A.C. von Rönne, Ulrich Köppen, Heikki Lokki, Sönke Martens, Pertti Saurola, Michael Schaub, Martin Gruebler*

P.142, p. 188

**Poster pitching 4**

16:40 | Hall X | Arne Hegemann

**A case study: the comparison of persistent organochlorine pesticides levels in feathers of an aerial bird species (*Apus melba*) from Turkey and Switzerland**

*Kalender Arikan, Christoph M. Meier, Zeynep Yasar Arikan, Salih Levent Turan*

P.4, p. 132

**Busse's flat orientation cage vs. Emlen's funnel - methodical comparison**

*Przemyslaw Busse*

P.12, p. 136

**The role of urban scale: studying Great Tits *Parus major* along a quantified urbanisation gradient**

*Jacques de Satge, Frank Adriaensen, Erik Matthysen*

P.18, p. 139

**Trans-Saharan birds are establishing wintering populations in southern Europe**

*Oscar Gordo, María Ruiz, Luis García, Héctor Garrido, Fernando Ibáñez, José Luis Arroyo, Rubén Rodríguez, José Luis Del Valle, Antonio Martínez, Manuel Mániz*

P.34, p. 146

**Foraging in a poor environment: linking nestling diet, parental behaviour, and breeding success in urban and rural blue tits**

*Crinan Jarrett, Heather McDevitt, Rona McGill, Luke Powell, Barbara Helm*

P.44, p. 149

**EBBA2: New information on the distribution of breeding birds in Europe**

*Verena Keller, Marti Franch, Sergi Herrando, Marina Kipson, Pietro Milanese, Petr Vorisek*

P.54, p. 153

**Protected areas enhance expanding populations and mitigate declines on range edges under climate change**

*Petteri Lehikoinen, Andrea Santangeli, Kim Jaatinen, Ari Rajasärkkä, Alekski Lehikoinen*

P.68, p. 158

**Larders of pygmy owls for over-winter survival: inter-individual variation under fluctuating food conditions**

*Giulia Masoero, Chiara Morosinotto, Toni Laaksonen, Erkki Korpimäki*

P.76, p. 162

**Interspecific competition for breeding sites between gull and tern species on inland wetlands and consequences for conservation**

*Claudia Mueller*

P.82, p. 164

**Conservation genetics of the dwindling European roller (*Coracias garrulus*) population in Austria**

*Carina Nebel, Kerstin Kadletz, Anita Gamauf, Elisabeth Haring, Michael Tiefenbach, Peter Sackl, Hans-Christoph Winkler, Frank Zachos*

P.86, p. 166

**New data on Black Stork nest predators in Latvia.**

*Linda Ose, Māris Strazds*

P.90, p. 167

**Thermal impact of ospreys' wing color on their flight performance**

*Svana Rogalla, Matthew Shawkey, Liliana D'Alba*

P.108, p. 174

**Birds of the medieval Novgorod (Russia): diversity and economic value**

*Andrei Zinoviev*

P.152, p. 191

**Poster session with refreshments II**

17:10 - | *Authors of posters with even numbers (P.2, P.4, ...) are present at their posters.*

19:00





## 7. Monday, 21/08/2017

### Excursions

6:00 - | *City centre*  
8:30

For more information on excursions, see:

<http://www.utu.fi/en/sites/eou2017/Pages/Excursions.aspx>

### EOU Fledglings' programme

18:00 | *Hall I*

18:00 | **Fledglings' event**  
*Jan O. Engler, Madeleine F. Scriba*  
FE, p. 129



## 8. Tuesday, 22/08/2017

### Practical information

8:55 | Hall IX-X

### 8.1 Plenary: Peeter Hõrak

9:00 | Hall IX-X | Jan-Åke Nilsson

9:00 | **Psychoneuroimmunoecology: integrating research on health, behaviour and beauty**  
Peeter Hõrak  
Plenary.5, p. 40

### Coffee

10:00 | Natura and Main building

### 8.2 Tuesday, 22/08/17: Parallel oral sessions III

#### Oral session 11: Migration III

10:30 | Hall IX | Wouter Vansteelant

10:30 | **Stellar compass of European robins *Erithacus rubecula* is time-independent**  
Anna Anashina, Alexander Pakhomov, Nikita Chernetsov  
OS11.1, p. 100

10:45 | **Non-stop on the wing - migration patterns of the Common Swift *Apus apus* from two breeding colonies in Germany**  
Arndt Wellbrock, Christina Bauch, Axel Degen, Felix Liechti, Jan Rozman, Klaudia Witte  
OS11.2, p. 100

11:00 | **Complex behaviour in complex terrain. Modelling bird migration in high resolution wind field to explain observed behaviour in the Jura mountains**  
Annika Aurbach, Baptiste Schmid, Felix Liechti, Ndaona Chokani, Reza Abhari  
OS11.3, p. 101

- 11:15 | **Are migratory populations tracking the niche between seasons? A test with two partial migratory passerines**  
*Guillermo Fandos, José Luis Tellería*  
 OS11.4, p. 101
- 11:30 | **Diverse migration strategies with similar investments in movement**  
*Judy Shamoun-Baranes, Joseph Burant, Emiel van Loon, Viola Ross-Smith, Chris Thaxter, Eric Stienen, Willem Bouten, Kees Camphuysen*  
 OS11.5, p. 101
- 11:45 | **Advanced identification and analysis of biological targets in time series data from a radar wind profiler**  
*Nadja Weisshaupt, Mercedes Maruri, Volker Lehmann*  
 OS11.6, p. 102

## Oral session 12: Communities

- 10:30 | *Hall XXI* | *Jan Engler*
- 10:30 | **Linking species interactions with phylogenetic and functional distance in European bird assemblages at broad spatial scales**  
*Mikko Mönkkönen, Vincent Devictor, Jukka Forsman, Aleksi Lehikoinen, Merja Elo*  
 OS12.1, p. 103
- 10:45 | **Is degradation in matrix homogenizing bird communities in protected areas?**  
*Matti Häkkilä, Nerea Abrego, Otso Ovaskainen, Mikko Mönkkönen*  
 OS12.2, p. 103
- 11:00 | **Winter bird populations are changing faster in colder than in warmer communities under climate change**  
*Aleksi Lehikoinen, Lluís Brotons, Jaanus Elts, Ruud P.B. Foppen, Henning Heldbjerg, Sergi Herrando, Marc Herremans, Åke Lindström, Andrea Santangeli, Päivi Sirkiä, Tibor Szép, Chris van Turnhout*  
 OS12.3, p. 104
- 11:15 | **Effects of predator activity on wood warbler *Phylloscopus sibilatrix* nest survival in a primeval forest**  
*Marta Maziarz, Alex Grendelmeier, Tomasz Wesolowski, Raphaël Arlettaz, Gilberto Pasinelli*  
 OS12.4, p. 104
- 11:30 | **Acclimatisation history of birds in New Zealand (un)folded from newspapers**  
*Pavel Pipek, Petr Pyšek, Tim Blackburn*  
 OS12.5, p. 105
- 11:45 | **Waterbirds in a changing world: effects of climate, habitat and conservation policy on European waterbirds**  
*Diego Pavón-Jordán*  
 OS12.6, p. 105

## Oral session 13: Evolution

- 10:30 | *Hall X* | *Nayden Chakarov*
- 10:30 | **Migrant birds on their wintering grounds in the tropics have higher basal metabolic rate than tropical sedentary species**  
*Andrey Bushuev, Anvar Kerimov, Oleg Tolstakov, Ekaterina Zubkova, Eugenia Solovyeva*  
 OS13.1, p. 106
- 10:45 | **Evolution of iris coloration in owls**  
*Arianna Passarotto, Deseada Parejo, Jesús M. Avilés*  
 OS13.2, p. 106

- 11:00 | **Eavesdropping on interspecific alarm vocalizations: Maximizing information**  
*Katharina Mahr, Carlo Lutz Seifert, Bernhard Paces, Herbert Hoi*  
 OS13.3, p. 107
- 11:15 | **Varying environmental conditions at the wintering grounds induce sudden reversal in the relative quality of mates in a long-distance migratory passerine**  
*Pauliina Järvisistö, Sara Calhim, Wiebke Schuett, Päivi Sirkiä, William Velmala, Toni Laaksonen*  
 OS13.4, p. 107
- 11:30 | **Birds with longer lifespan and slower life-history pace are more resistant to oxidative stress**  
*Csongor I. Vágási, Orsolya Vincze, Laura Patras, Gergely Osváth, Janka Péntzes, Zoltán Barta, Péter László Pap*  
 OS13.5, p. 108

#### Oral session 14: Information and habitat use

- 10:30 | *Hall I* | *Julian Evans*
- 10:30 | **Interspecific social information use in habitat selection decisions among migrant songbirds differing in arrival phenology**  
*Jakub Szymkowiak, Robert Thomson, Lechoslaw Kuczynski*  
 OS14.1, p. 108
- 10:45 | **Competitor phenology as a social cue in breeding site selection**  
*Jelmer M. Samplonius, Christiaan Both*  
 OS14.2, p. 109
- 11:00 | **Nosy neighbours: do large broods attract more visitors? A brood size manipulation experiment in the pied flycatcher**  
*Wiebke Schuett, Pauliina Järvisistö, Sara Calhim, William Velmala, Toni Laaksonen*  
 OS14.3, p. 109
- 11:15 | **Search for different behavioral states in summer movements of the European honey buzzard**  
*Sanna Mäkeläinen, Heidi Björklund, Patrik Byholm*  
 OS14.4, p. 110
- 11:30 | **High resolution GPS tracking of European nightjars provides new evidence for breeding season home range size and foraging habitat use: implications for habitat creation and management**  
*Greg Conway, Ian Henderson, Thomas Bolderstone, Ruben Evens*  
 OS14.5, p. 110
- 11:45 | **Sex-specific dominance effects on resources use in an endangered vulture population**  
*Thijs van Overveld, Marina García Alfonso, Niels Dingemanse, Willem Bouten, Laura Gangoso, David Serrano, José Donázar*  
 OS14.6, p. 111

#### Oral session 15: Population ecology

- 10:30 | *Hall XXII* | *Gilberto Pasinelli*
- 10:30 | **Is tit survival enhanced by buckthorn berry consumption?**  
*Joost M. Tinbergen, Rienk W. Fokkema, Richard Ubels*  
 OS15.1, p. 111
- 10:45 | **Difference in the contour feather structure may explain the morph-specific winter survival of tawny owls**  
*Katja Koskenpato, Patrik Karell*  
 OS15.2, p. 112

- |       |  |
|-------|--|
| 11:00 | <b>Spatially thorough sampling reveals no survival consequences of natal dispersal but higher breeding dispersal rates among natal dispersers than non-dispersers in a migratory shore-bird</b><br><i>Veli-Matti Pakanen, Kari Koivula, Blandine Doligez, Lars-Åke Flodin, Angela Pauliny, Nelli Rönkä, Donald Blomqvist</i><br>OS15.3, p. 112 |
| 11:15 | <b>Immigration and reinforcement drive population dynamics in a long-lived bird: Implications for Eurasian crane conservation</b><br><i>Andrea Soriano-Redondo, Geoff M. Hilton, Leigh Lock, Andrew Stanbury, Stephen C. Votier, Stuart Bearhop</i><br>OS15.4, p. 113  |
| 11:30 | <b>Turnover and post-bottleneck genetic structure in a recovering population of Peregrine Falcons <i>Falco peregrinus</i></b><br><i>Suvi Ponnikas, Tuomo Ollila, Laura Kvist</i><br>OS15.5, p. 113   |
| 11:45 | <b>Negative influence of resource pulse driven apparent competition on bird reproduction</b><br><i>Alex Grendelmeier, Raphaël Arlettaz, Gilberto Pasinelli</i><br>OS15.6, p. 114   |

## Lunch

12:00 | Lunch restaurant Galilei

## 8.3 Plenary: Péter L. Pap

- |       |   |
|-------|---|
| 13:30 | Hall IX-X   Arjun Amar  |
| 13:30 | <b>‘Birds of a feather flock together’. How do feathers fulfil their functions in a diverse world?</b><br><i>Péter László Pap</i><br>Plenary.6, p. 40 |

## Coffee

14:30 | Natura and Main building

## 8.4 Tuesday, 22/08/17: Parallel oral sessions IV

### Oral session 16: Migration IV

- |       |  |
|-------|--|
| 15:00 | Hall XXII   Felix Liechti  |
| 15:00 | <b>A test of short- and long-term effects of geolocator attachment on Pied Flycatchers <i>Ficedula hypoleuca</i></b><br><i>Malcolm Burgess, Myriam El Harouchi, Chris Hewson, Sophie Bell</i><br>OS16.1, p. 114  |
| 15:15 | <b>What drives pied flycatchers to extreme and conserved detours in autumn, but population-specific wintering sites and spring routes?</b><br><i>Janne Ouweland, Carlos Camacho, Vladimir G. Grinkov, Jaime Potti, Helmut Sternberg, Christiaan Both</i><br>OS16.2, p. 115 |
| 15:30 | <b>Comparing individual migratory schedule of different alpine swift population with geolocators: Are food, survival and reproduction all that matter?</b><br><i>Christoph M. Meier, Raiül Aymí, Hakan Karaardıç, Strahil G. Peev, Felix Liechti</i><br>OS16.3, p. 115     |

- 15:45 | **Migratory routes and population structure in common cuckoo *Cuculus canorus* populations across Northern Europe**  
*Mikkel Willemoes, Chris Hewson, Raymond H. G. Klaassen, Frode Fossøy, Bård Stokke, Roine Strandberg, Yannis Vardanis, Paul Howey, Anders Tøttrup, Philip Atkinson, Kasper Thorup, Thomas Alerstam*  
 OS16.4, p. 116
- 16:00 | **Apparent resilience of a declining Afro-Palaeartic migrant to forest loss on the wintering grounds**  
*John Mallord, Chris Orsman, Japheth Roberts, Kwame Boafu, Roger Skeen, Danaë Sheehan, Juliet Vickery*  
 OS16.5, p. 117
- 16:15 | **Animal tracking across borders – automated radiotelemetry in Europe**  
*Sissel Sjöberg, Heiko Schmaljohann*  
 OS16.6, p. 117

### Oral session 17: Social behaviour

- 15:00 | *Hall X* | *Wiebke Schuett*
- 15:00 | **Social organization of free-living Eurasian tree sparrow (*Passer montanus*) flocks forming a fission-fusion society**  
*Attila Fülöp, Bianka Kocsis, Dóra Lukács, Zoltán Németh, Judit Bereczki, Zoltán Barta*  
 OS17.1, p. 117
- 15:15 | **Rank-dependent fattening strategies, group coherence and winter survival differ in ‘egalitarian’ and ‘despotic’ mixed-species groups of wintering birds**  
*Indrikis Krams, Tatjana Krama*  
 OS17.2, p. 118
- 15:30 | **Inland diplomacy: spatial segregation of lesser kestrels from neighbouring colonies**  
*Jacopo G. Cecere, Salvatore Bondi, Stefano Podofillini, Matteo Griggio, Egidio Fulco, Andrea Curcio, Delphine Ménard, Simona Imperio, Ugo Mellone, Nicola Saino, Lorenzo Serra, Maurizio Sarà, Diego Rubolini*  
 OS17.3, p. 118
- 15:45 | **Cooperative breeding in an Afrotropical songbird: a buffer against habitat disturbance?**  
*Dries Van de Loock, Liesbeth De Neve, Diederik Strubbe, Mwangi Githiru, Luc Lens, Erik Matthysen*  
 OS17.4, p. 119
- 16:00 | **Cooperative breeding biology of the African pygmy falcon**  
*Diana Bolopo, Anthony Lowney, Robert Thomson*  
 OS17.5, p. 120
- 16:15 | **Claudia’s leaf warblers (*Phylloscopus claudiae*) increase observed repertoire size and decrease entropy in response to simulated territorial intrusion**  
*Yulia A. Kolesnikova, Alexey S. Opaev, Liu Meishi, Zujie Kang*  
 OS17.6, p. 120

### Oral session 18: Physiology II

- 15:00 | *Hall XXI* | *Andreas Nord*
- 15:00 | **From auditory recognition to motivation underlying vocal production: a journey into unlearned calls of zebra finches**  
*Pietro D’Amelio, Lisa Trost, Milena Klumb, Nicolas Adreani, Manfred Gahr, Andries ter Maat*  
 OS18.1, p. 121
- 15:15 | **Different visual acuity for different behaviours in birds**  
*Mindaugas Mitkus, Robin Jonsson, Simon Potier, Almut Kelber*  
 OS18.2, p. 121



- 15:30 | **Insulin-like growth factor-1 decreases in response to stress in a free-living bird**  
*Zsófia Tóth, Orsolya Vincze, Ádám Zoltán Lendvai*  
 OS18.3, p. 121
- 15:45 | **Longterm variation in winter metabolism in a boreal passerine population**  
*Juli Broggi, Esa Hohtola, Kari Koivula, Jan-Åke Nilsson*  
 OS18.4, p. 122
- 16:00 | **Body temperature responses to winter stress in great tits**  
*Lucy Winder, Andreas Nord, Barbara Helm, Stewart White, Dominic McCafferty*  
 OS18.5, p. 122
- 16:15 | **Ontogenetic ultradian rhythmicity in sleep-wakefulness is colour-related in nestling barn owls**  
*Madeleine F. Scriba, Isabelle Henry, Alexei L. Vyssotski, Jakob C. Mueller, Niels Rattenborg, Alexandre Roulin*  
 OS18.6, p. 123

### Oral session 19: Conservation II

- 15:00 | *Hall IX* | *Dan Chamberlain*
- 15:00 | **Recreationists and trails: disentangling these two effects on forest birds**  
*Yves Bötsch, Daniel Scherl, Zulima Tablado, Roland Graf, Lukas Jenni*  
 OS19.1, p. 123
- 15:15 | **Native woodland creation is associated with increase in a black grouse *Lyrurus tetrix* population**  
*David Douglas, Davide Scridel*  
 OS19.2, p. 124
- 15:30 | **The impacts of human land-use on forest bird community beta diversity in northern USA**  
*Eric Le Tortorec, Matti Häkkilä, Edmund Zlonis, Gerald Niemi, Mikko Mönkkönen*  
 OS19.3, p. 124
- 15:45 | **The impact of invasive plant management and an introduced parasite on the breeding success of Darwin's finches**  
*Arno Cimarom, Paul Schmidt Yáñez, Julia Zarfl, Christian H. Schulze, Heinke Jäger, Sabine Tebbich*  
 OS19.4, p. 125
- 16:00 | **The reproductive success of urban and rural peregrine falcons: the effects of land-use and prey availability**  
*Esther Kettel, Richard Yarnell, John Quinn, Louise Gentle*  
 OS19.5, p. 126

### Oral session 20: Predation

- 15:00 | *Hall I* | *Petra Sumasgutner*
- 15:00 | **Do intraguild predators and supplementary food affect the food hoarding of pygmy owls?**  
*Elina Koivisto, Chiara Morosinotto, Giulia Masoero, Erkki Korpimäki*  
 OS20.1, p. 126
- 15:15 | **Short-term increase in predation risk affects the immune system of nestlings**  
*Gianluca Roncalli, Elisa Colombo, Manuel Soler, B. Irene Tieleman, Maaike A. Versteegh, Francisco Ruiz-Raya, Mercedes Gómez Samblas, Juan Diego Ibáñez-Álamo*  
 OS20.2, p. 127
- 15:30 | **Predation risk modifies the oxidative status of passerine birds in harsh environmental conditions**  
*Chiara Morosinotto, Miia Rainio, Suvi Ruuskanen, Erkki Korpimäki*  
 OS20.3, p. 127

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|-------|---|
| 15:45 | <p><b>Insect herbivory may cause changes in the visual properties of leaves and affect the camouflage of herbivores to avian predators</b><br/> <i>Tuuli-Marjaana Koski, Carita Lindstedt, Tero Klemola, Jolyon Troscianko, Elina Mäntylä, Esa Tyystjärvi, Martin Stevens, Marjo Helander, Toni Laaksonen</i><br/> OS20.4, p. 128</p> |
| 16:00 | <p><b>Does type of discrimination task affect learning about prey palatability in great tits?</b><br/> <i>Lucia Doktorovová, Alice Exnerová, Lenka Junová, Martina Kišlová, Aneta Kuncová</i><br/> OS20.5, p. 128</p>   |
| 16:15 | <p><b>Can bird predation affect polymorphism in aposematic prey populations?</b><br/> <i>Elena Zvereva, Katerina Hotová-Svádová, Lucia Doktorovová, Pavel Štys, Vitali Zverev, Dana Adamová-Ježová, Alice Exnerová</i><br/> OS20.6, p. 129</p>  |

### Leg stretcher

16:30 |

### EOU General assembly

16:45 | Hall IX-X | Barbara Helm

### Congress dinner

19:00 | Restaurant Koulu





# Abstracts

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## 9. Plenaries

9:00	SATURDAY, 19/08/2017	HALL IX-X	PLENARY.1
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### **Living in a variable environment: owls, kestrels and the high-amplitude northern vole cycle**

Erkki Korpimäki<sup>1</sup>

<sup>1</sup>*University of Turku, Turku, Finland*

Lack (1954) postulated that to prove that numbers of birds are limited by food supply, one must not only measure the abundance and availability of main foods and the quantity of each consumed, but to study interactions between the numbers of the bird and those of its prey over a period of years. This was the point of departure for my long-term studies on vole-eating birds of prey including Tengmalm's and pygmy owls and Eurasian kestrels. The high-amplitude northern 3-year population cycle of voles creates fat and lean periods for these birds of prey. Voles and lemmings have also been suggested to be "superabundant food" for birds of prey at peak densities of the population cycle (Lack 1946). In the talk, among-year variation in breeding density, parental body condition, reproductive success, breeding dispersal, turnover, recruitment rate and survival of owls and kestrels in relation to vole abundances are reviewed. In addition, spatial variation in habitat composition of forest-dwelling owls is induced by large-scale forestry. The lifetime reproductive success of Tengmalm's owl males is higher in home ranges with higher proportion of old-growth forest. To conclude, high-amplitude temporal variation in vole abundance is the main determinant of population dynamics and life-history traits of vole-eating birds of prey. On the basis of observational and experimental results, food abundance appears to limit reproductive success even in years of "superabundant food" (sensu Lack). Clear-cutting of old-growth forests is the main determinant of long-term declines of Tengmalm's owl populations in North European boreal forests.

13:30	SATURDAY, 19/08/2017	HALL IX-X	PLENARY.2
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### **Linking life-history variation, population dynamics and evolution across multiple spatial scales**

Jane Reid<sup>1</sup>

<sup>1</sup>*University of Aberdeen, Aberdeen, UK*

Fundamental ambitions in ecology and evolutionary biology are to understand patterns and causes of life-history variation within and among individual population members, and hence to understand and forecast resulting population and evolutionary dynamics. In general, population dynamics and evolution both stem from variation in individual reproduction and survival, which are in turn influenced by variation in individual movements: namely dispersal and seasonal migration. Restrictions on dispersal generate inbreeding and other kin interactions, while dynamic dispersal and migration allow rapid individual responses to spatio-temporal environmental variation. Understanding such life-history variation, and emerging population dynamic and evolutionary consequences, requires year-round life-history data from marked individuals spanning multiple years and generations. I use long-term individual-based data from song sparrows and European shags to quantify key forms of selection arising in the presence or absence of dispersal and seasonal migration, and to consider population dynamic and evolutionary consequences. Using the song sparrows, I show that inbreeding among philopatric individuals causes strong inbreeding depression in offspring fitness, but yet does not cause selection against inbreeding. These patterns help to explain why mating individuals do not avoid inbreeding despite the presence of genetic variation for pairing among relatives. Using the shags, I demonstrate substantial among-individual variation in seasonal migration versus year-round residence, and show how stabilizing selection on migration can result from the balance between reproduction and over-winter survival. By comparing the song sparrow and shag systems I illustrate how common processes and principles governing population and evolutionary dynamics can emerge across seemingly disparate systems.

9:00	SUNDAY, 20/08/2017	HALL IX-X	PLENARY.3
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### **Environmental effects that shape individual life histories: time scales, trade-offs and mechanisms**

Pat Monaghan<sup>1</sup>

<sup>1</sup>*University of Glasgow, Glasgow, UK*

It is now well recognised that the environment is not simply permissive of development, but can also shape the phenotype in ways that can be adaptive. These environmental effects can come about through both direct and indirect routes, and can span generations. In this talk, I will discuss how conditions in early life can influence subsequent life history, focusing particularly on ageing and longevity. I will discuss effects that operate over varying time scales, including effects of early growth, nutrition, stress exposure and parental age. I will present illustrative data from unmanipulated natural populations, and from a range of bird species in which conditions have been experimentally manipulated in both the lab and the field. I will also examine some potential mechanisms that might mediate effects that can occur over relatively long time scales, including changes in stress sensitivity, oxidative damage and telomere dynamics.

13:30	SUNDAY, 20/08/2017	HALL IX-X	PLENARY.4
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### **The wandering albatross as an animal model: Combining long-term individual-based and tracking studies**

Henri Weimerskirch<sup>1</sup>

<sup>1</sup>*CEBC-CNRS, Villiers en Bois, France*

Population dynamics and foraging ecology are two fields of the population ecology that are generally studied separately. Yet foraging determines allocation processes and therefore demography. Studies on Wandering albatrosses *Diomedea exulans* over the past 50 years have contributed to better understand the links between

population dynamics and foraging ecology. In my talk I will review how these two facets of population ecology have been combined to better understand ecological processes, but also have contributed fundamentally for the conservation of this long-lived threatened species. In particular I will focus on age-related variations in demographic parameters and foraging distribution through the life-time of individuals, and the role of body condition. I will also examine how long-term studies have allowed determining the sex specific and age specific demographic causes of population decline due to long line fisheries. Climate changes, diseases and fisheries constitute today the main threat for albatrosses worldwide, and I will examine how long-term studies and bio-logging can be used to improve the present situation.

9:00	TUESDAY, 22/08/2017	HALL IX-X	PLENARY.5
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### **Psychoneuroimmunoecology: integrating research on health, behaviour and beauty**

Peeter Hõrak<sup>1</sup>

<sup>1</sup>*Tartu University, Tartu, Estonia*

Immunoecology and animal personality research are nascent disciplines with expanding number of publications during recent 20 years. However, in the realm of evolutionary animal ecology, the research in these areas has progressed largely in isolation despite the well established knowledge that behaviour and immunity are highly integrated via the neuroendocrine system. This integration is expected to lead to covariation between behaviour and stress- and immune-associated diseases. I will demonstrate that such connections between behaviour, immune function and stress-related traits can be easily detected in an example of two model species, greenfinches and great tits, and discuss why and how melanin-based pigmentation is involved in the psychoneuroimmunoecological nexus.

13:30	TUESDAY, 22/08/2017	HALL IX-X	PLENARY.6
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### **‘Birds of a feather flock together’. How do feathers fulfil their functions in a diverse world?**

Péter László Pap<sup>1</sup>

<sup>1</sup>*Babes-Bolyai University, Cluj Napoca, Romania*

Bird feathers are amongst the best known biological structures; having feathers is what makes ‘a bird a bird’. However, what is much less well-known and understood is how the huge range of different feather types seen within birds are influenced by function. Birds differ in their flight styles, especially how much and how fast they beat their wings, and also exhibit a wide variety of different life history traits including the use of different habitats, moulting feathers at different times of the year, and migrating over long distances. Birds also don’t just have feathers on their wings that are used for flight, they also possess ‘body feathers’ that are used for insulation and water-proofing, amongst other functions. Although it seems obvious that birds that dive underwater need their body feathers to work in different ways to those that live in cold environments, the reasons underlying the evolution of these differences remain unclear. In this presentation, I outline some of our new results on the morphological adaptations and peculiarities of bird feathers that enable them to fulfil their functions in a diverse world. I also discuss new evidence regarding the function of the density of body feathers in thermal insulation and water repellence, emphasizing the unique feather traits of penguins among living birds. Although our initial results are tantalizing, more work will be required if we are to understand the factors underlying the evolution of the diverse range of feathers seen in living (and fossil) birds.



## 10. Symposia

### Symposium 1: Orientation and navigation of birds: recent advances

10:30	SATURDAY, 19/08/2017	HALL IX	SYM1.0
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#### Introduction

Nikita Chernetsov<sup>1</sup>, Dmitry Kishkinev<sup>2</sup>

<sup>1</sup>*St. Petersburg State University, St. Petersburg, Russia;* <sup>2</sup>*Bangor University, Bangor, Wales, UK*

Migrating birds annually perform movements for hundreds and thousands of kilometres, which allow them to efficiently exploit resources in different climatic zones. Many birds show breeding and wintering site fidelity, i.e. that they are able to return into an area with a radius of several kilometres after spending winter in hundreds and thousands of kilometres away. Considering the distance of migratory movements, recaptures of tens of percent of birds at the sites of their previous breeding obviously cannot result from random processes. The observed return rates in long-distance migratory birds can only be explained by true navigation, i.e. finding the goal of migration without direct sensory contact with it. More than 60 years ago, the map and compass concept has been suggested, which assumed that a migrating (or a homing) bird should first detect where it is located in respect to the goal (a map step) and then select and maintain the direction of movement towards the goal. The nature of compass and map cues as well as sensory and cognitive mechanisms allowing birds to navigate are currently attracting much attention from organismal biologists, sensory physiologists and biophysicists. We are trying to combine these lines of research and to present recent advances.

10:35	SATURDAY, 19/08/2017	HALL IX	SYM1.1
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#### Recent advances in the study of positioning cues used by migrating birds

Dmitry Kishkinev<sup>1</sup>, Nikita Chernetsov<sup>2,3</sup>

<sup>1</sup>*Bangor University, Bangor, Wales, UK;* <sup>2</sup>*Biological Station Rybachy, Rybachy, Russia;* <sup>3</sup>*St Petersburg State University, St Petersburg, Russia*

Migrating birds annually perform movements for hundreds and thousands of kilometres, which allow them to efficiently exploit resources in different climatic zones. Many birds show breeding and wintering site fidelity, i.e. that they are able to return to within several kilometres after spending time hundreds and thousands of kilometres away. That strongly suggest that many bird species are not just finding previous breeding sites by chance but rather can perform true navigation, i.e. find their migratory destinations without direct sensory contact with them. However, the sensory mechanisms involved in navigation and positioning remain poorly understood. Among several ideas explaining how birds can find their geographic position, two theories seem to have most experimental support: the magnetic map and the olfactory map hypotheses. Evidence for the former mainly comes from the studies on some songbird species, whereas the latter is strongly supported by the data obtained from homing pigeons and some seabirds and gulls. We argue that different bird groups might have specialized towards the use of magnetic or olfactory cues for navigation. However, the spatial accuracy of the magnetic map is insufficient to explain the accuracy of navigation known for songbirds, therefore the magnetic map alone cannot be the only positioning cue. We suggest that migrating birds most probably use different cues at different spatial scales.

11:00	SATURDAY, 19/08/2017	HALL IX	SYM1.2
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### The neural basis of avian navigation

Dominik Heyers<sup>1</sup>

<sup>1</sup>*University Oldenburg, Oldenburg, Germany*

The navigational abilities of migratory birds have fascinated humans for centuries and challenged scientists for decades. Among several natural cues, migratory birds have unequivocally shown to use the Earth's magnetic field as an orientational cue on their journeys between wintering and breeding grounds. But how do birds sense magnetic fields? How do they derive orientational information? How and where is this information processed and integrated in the brain? Interdisciplinary research using cellular, molecular biological, quantum-chemical and neurobiological approaches has given evidence for the existence of at least two magnetosensory systems in birds: (1) a magnetic "compass" embedded into the visual system based on radical-pair-forming molecules in the eyes and (2) a currently unknown magnetic sensor associated with the trigeminal system likely to provide positional information, i.e. a magnetic "map". This talk aims to provide a comprehensible overview on the sensory correlates likely to be involved in avian magnetoreception.

11:15	SATURDAY, 19/08/2017	HALL IX	SYM1.3
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### Studying orientation in free-flying migrants

Kasper Thorup<sup>1</sup>, Victor Bulyuk<sup>2</sup>, Mikkel Willemoes<sup>1</sup>, Marta Lomas Vega<sup>1</sup>, Katherine Snell<sup>1</sup>

<sup>1</sup>*University of Copenhagen, Copenhagen, Denmark;* <sup>2</sup>*Biological Station Rybachy of Zoological Institute RAS, Rybachy, Russia*

Every year, billions of inexperienced young birds travel without guidance on their first migration to successfully reach species-specific wintering grounds thousands of kilometres away while experienced adults pin-point the areas previously visited. Because of difficulties in study behaviour over longer distances, our understanding of orientation and navigation largely stems from lab-based research. Recent technological developments now enable tracking even long-distance solitary night migrants on the inter-continental migrations using satellite telemetry, enabling extending previous lab-based studies to free-flying migrants. Obviously, the orientation decisions and travels take place in a far more complex setting in the wild than in the lab. Migratory orientation



and navigation has been studied with satellite telemetry, for example, in ducks, gulls, raptors and cuckoos. Basic mapping of cuckoo migration has shown unexpected complexity in the annual migration programme and tracking of young birds demonstrate capacity of finding the appropriate wintering grounds on their own. Displacement studies are a core method for studying orientation and navigation and can be used in combination with sensory manipulations as was done in a large-scale study on gulls. In cuckoos, displacements have indicated that locations of sites learned earlier serve as goal areas during later migrations. Because the cuckoos rely on their innate migration programme there is great interest in continuing the study of migration in young. Furthermore, lifelong trackings will also allow studying the ontogeny of migration as well as potentially the evaluation of fitness consequences of different migratory decisions.

11:30	SATURDAY, 19/08/2017	HALL IX	SYM1.4
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### **The ophthalmic branch of the trigeminal nerve provides magnetic map information in a migratory songbird**

Alexander Pakhomov<sup>1,2</sup>, Anna Anashina<sup>1,2</sup>, Dominik Heyers<sup>3</sup>, Nikita Chernetsov<sup>1,4</sup>, Henrik Mouritsen<sup>3</sup>

<sup>1</sup>*Biological Station Rybachy, Zoological Institute RAS, Rybachy, Kaliningrad Region, Russia;* <sup>2</sup>*Sechenov Institute of Evolutionary Physiology and Biochemistry RAS, St. Petersburg, Russia;* <sup>3</sup>*AG Neurosensorik (Animal Navigation), Institut für Biologie und Umweltwissenschaften (IBU), University of Oldenburg, Oldenburg, Germany;* <sup>4</sup>*St Petersburg State University, St Petersburg, Russia*

Migratory birds can use the Earth's magnetic field to derive directional ("compass") information for orientation on their biannual migratory journeys. Moreover, behavioural evidence indicates that geomagnetic information can also be used to derive positional ("map") information. For example, in previous studies, we could show that Eurasian reed warblers (*Acrocephalus scirpaceus*) were able to compensate for a 1000 km eastward displacement by switching their migratory orientation direction from NE to NW and that this behaviour required input from currently unknown magnetosensors innervated by the ophthalmic branches of the trigeminal nerves (V1). Later, virtual magnetic displacements simulating the identical geographical displacement showed that magnetic field information alone was sufficient to induce the reorientation response. To investigate, if V1 indeed carries magnetic "map" information, which the birds could have used to determine their position (and to reorient accordingly), in 2013-2015 we tested spring migratory Eurasian reed warblers on the Courish Spit (Kaliningrad region, Russia) under local magnetic field conditions with full access to all environmental cues. The birds showed a significant directional preference towards NE. After bilateral sectioning of V1, the birds were virtually displaced by constantly keeping and retesting them inside a Merritt 4-coil system simulating a 1000 km eastward displacement. In contrast to intact, reorienting birds, the V1-sectioned birds failed to compensate for the virtual magnetic displacement and instead further oriented towards NE as before the magnetic displacement. These results clearly indicate that the ophthalmic branch of the trigeminal nerve carries magnetic "map" information for global positioning in Eurasian reed warblers.

11:45	SATURDAY, 19/08/2017	HALL IX	SYM1.5
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### **How do juvenile soaring raptors find their way on their first autumn migration? Insights from life-long tracking studies in the Old and New World**

Wouter M.G. Vansteelant<sup>1,2</sup>, Keith Bildstein<sup>3</sup>, Bernd Meyburg<sup>4</sup>, Patrik Byholm<sup>5</sup>

<sup>1</sup>*Vansteelant Eco Research, Bennekom, The Netherlands;* <sup>2</sup>*Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, Amsterdam, The Netherlands;* <sup>3</sup>*Acopian Center for Conservation Learning, Hawk Mountain Sanctuary, Orwigsburg, Pennsylvania, USA;* <sup>4</sup>*NABU (BirdLife), Berlin, Germany;* <sup>5</sup>*R&D Unit and Coastal Zone Research Team, Novia University of Applied Sciences, Ekenäs, Finland*



How do juvenile migrating birds find their way on their first migration? To help address this long-outstanding question we present insights derived from life-long tracking studies of soaring raptors in the Old and the New World, including Turkey Vultures *Cathartes aura* in the Americas, and Lesser Spotted Eagles *Aquila pomarina* and European Honey Buzzards *Pernis apivorus* migrating from Europe to Africa. Having tracked all members of a Turkey Vulture family from Canada we show that juvenile vultures migrated separately from their parents, but initiated autumn migration around the same time as adults, enabling them to follow a narrow migration corridor on their first migration. Similarly, juvenile eagles tracked from their natal sites in Germany learned a narrow strategic migrator detour from adults if they departed around the same time as adult conspecifics. On the other hand, juvenile Lesser Spotted Eagles that were translocated from Latvia to Germany and departed too early to encounter adult conspecifics ended up starving at the northern shores of the Mediterranean. This stands in sharp contrast to the behaviour of juvenile Honey Buzzards from Finland that normally migrated two weeks later than adults, survived long sea-crossings and ended up in different parts of sub-Saharan Africa depending on stochastic wind conditions encountered on migration. Taken together these studies show that obligate soaring eagles and vultures, contrary to facultative flapping buzzards, must learn strategic detours early in life, that juveniles cannot learn these complex detours independently, and thus rely on adult guidance to survive their first migration.

## Symposium 2: Hot N cold: Ecophysiological adaptations of migrants and residents

10:30	SATURDAY, 19/08/2017	HALL I	SYM2.0
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### Introduction

Andreas Nord<sup>1</sup>, Arne Hegemann<sup>2</sup>, Cas Eikenaar<sup>3</sup>

<sup>1</sup>University of Tromsø, Tromsø, Norway; <sup>2</sup>Lund University, Lund, Sweden; <sup>3</sup>Institute of Avian Research, Wilhelmshaven, Germany

Throughout much of Europe, the life of birds is intimately associated with seasonal variation in photoperiod, precipitation, temperature and environmental productivity. This ranges from moderate fluctuations in the south to pronounced yearly variation at high latitudes. In Arctic environments it may require birds to accommodate yearly temperature fluctuations of some 80°C and a photoperiod varying > 20 h. The counter strategy to residency – migration – is an equally remarkable feature wherein birds undertake non-stop travel, sometimes for several thousand km, to subsequently winter in an environment that often differs dramatically from breeding areas. It comes as no surprise that both migration and residency are associated with a range of physiological changes (e.g. endocrine, immunological or metabolic) that prepare birds for the challenges inherent to their yearly schedule. While many such adaptations have been under study for some time, much still remains to be learned about their evolutionary causes, regulatory function, and ecophysiological consequences. Nor do we properly understand how increased investment in mechanisms improving migratory capacity or winter endurance trade off against other physiological systems, such as immune function, antioxidant capacity or telomere shortening. This symposium seeks to bring together those broadly interested in seasonal changes in birds, ranging from adaptations rendering residents better able to produce heat and withstand cold, to adaptations making migrants better equipped to meet the challenges of the migratory journey or local conditions at the overwinter site.

10:35	SATURDAY, 19/08/2017	HALL I	SYM2.1
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### Seasonal programmes along the migrant-resident spectrum

Barbara Helm<sup>1</sup>

<sup>1</sup>University of Glasgow, Glasgow, UK

Across environments in Europe, birds use movement strategies ranging from residency through facultative movements to regular long-distance migration to cope with challenging seasons. Regardless of strategy, birds generally prepare in advance before the habitats that had sustained breeding become adverse. To anticipate the challenges they will face, they use refined time-keeping programmes that integrate biological rhythms and environmental factors. In residents, such programmes can drive overwintering strategies like food storing or restructuring of morphology, whereas in migrants they drive the onset of migrations and associated physiological changes. In addition, species and populations with different movement strategies show also more subtle differences, for example in the ways the immune system is seasonally adjusted. Species can differ widely in the ways they use environmental information to time such adjustments. A particularly tricky situation is that of facultative migrants, which to a certain limit hold out at wintering sites, but may at some point initiate migration. These species must find a balance between preparing to overwinter while maintaining their ability to move on. In this overview, I will critically review the migrant-resident spectrum with a main focus on seasonal adjustments. I will then use a comparative study system, the Stonechat species complex (*Saxicola* spp.), to exemplify the ways seasonal programmes are maintained or modified across a gradient of migration strategies. The focus will be on Zugunruhe- "migratory restlessness" - as part of a comprehensive annual-cycle programme, but I will also touch on other aspects of physiology, such as immune traits and metabolic rates.

11:00	SATURDAY, 19/08/2017	HALL I	SYM2.2
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### Food, fat, and decision-making at stopover sites

Leonida Fusani<sup>1,2</sup>

<sup>1</sup>Konrad Lorenz Institute of Ethology, University of Veterinary Medicine, Vienna, Austria; <sup>2</sup>Department of Cognitive Biology, University of Vienna, Vienna, Austria

Among migratory birds, a number of species need to perform refuelling stopovers along the route, which in many cases make up most of the migratory period. At these sites, birds rest and refill their fat stores preparing for the next migratory flight. The duration of the stopover is a trade-off between the refuelling needs and the overall speed of migration, therefore birds have to make decisions based on a series of factors including weather conditions, position of the stopover along the migratory route, and internal physiological condition. We focused on the latter to understand the mechanisms underlying decision-making at stopover sites in small migratory passerines. The studies were conducted on the island of Ponza, an important stopover site off the western Italian coast that birds reach after crossing the Mediterranean Sea. We caught birds with mist-nets and studied how physiological factors such as fat stores, body mass, and circulating levels of hormones influenced migratory restlessness, a proxy of migratory disposition shown by migrants when temporarily hosted in recording cages. We also manipulated levels of hormones and food availability to test the role of these factors in controlling the duration of the stopover. Our results consistently showed that body condition, and in particular the extent of subcutaneous fat stores, is the best predictor of migratory disposition. Our most recent data in particular show that the hormone ghrelin is a good indicator of body condition and it influences the intensity of migratory restlessness.

11:15	SATURDAY, 19/08/2017	HALL I	SYM2.3
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### Fuel for the pace of life: baseline blood glucose concentration co-evolves with life-history traits

Lukáš Bobek<sup>1,2</sup>, Oldřich Tomášek<sup>1,3</sup>, Tereza Králová<sup>1,2</sup>, Marie Kotasová Adámková<sup>2</sup>, Tomáš Albrecht<sup>1,3</sup>

<sup>1</sup>Institute of Vertebrate Biology, Czech Academy of Sciences, Brno, Czech Republic; <sup>2</sup>Department of Botany and Zoology, Faculty of Science, Masaryk University, Brno, Czech Republic; <sup>3</sup>Department of Zoology, Faculty

of Science, Charles University, Prague, Czech Republic

Life-history theory posits that amount of energy available for growth, reproduction and survival is limited resulting in an allocation trade-off. As a consequence, life-histories vary along one major axis, so called 'fast-slow life-history continuum' where species with fast life-histories are characterised by high growth and reproductive rates with high reproductive output, but short life-spans, while species with slow life-histories show opposite characteristics. Recently, life-histories have been hypothesised to co-evolve with a suite of physiological and behavioural traits, leading to an emergence of so called pace-of-life syndromes. In this regard, the most studied physiological trait is the rate of energy metabolism with fast and slow pace-of-life shown to be associated with high and low metabolism, respectively. In vertebrates, glucose is an important source of energy, positively correlated with metabolic rates. Therefore, we hypothesize that basal blood glucose concentration ( $G_0$ ) might be a key component of pace-of-life syndromes. To evaluate this, we measured  $G_0$  concentrations of 38 passerine species (330 individuals) and tested whether  $G_0$  is related to different life-history traits. Our data revealed significant interspecific differences in  $G_0$  (range 9.8-15.4 mmol/L). After controlling for phylogeny, we found  $G_0$  to be negatively correlated with body mass and migration distance and positively with reproductive investment. Negative correlation with migration distance seems to be in line with some previous studies showing lower metabolic rates in long-distance migrants compared to residents. Our results indicate that blood glucose is an important component of pace-of-life syndromes.

11:30	SATURDAY, 19/08/2017	HALL I	SYM2.4
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### Long-distance migrants and their gut microbiomes: stable or dynamic in response to novel environments?

Alice Risely<sup>1</sup>, David Waite<sup>2</sup>, Beata Ujvari<sup>1</sup>, Marcel Klaassen<sup>1</sup>, Bethany Hoye<sup>1</sup>

<sup>1</sup>Deakin University, Geelong, Australia; <sup>2</sup>Australian Centre for Ecogenomics, Brisbane, Australia

Migratory birds encounter suites of novel microbes and potential pathogens as they move between disparate sites during their migrations. However, the susceptibility of migrants to infection may be dependent upon the capacity of their gut microbiota to resist invasion by foreign microbes encountered at each new site they visit. By combining longitudinal and cross-sectional sampling over two sites throughout the non-breeding season in Australia, we assess how the gut microbiota of a long distance migrant, the red-necked stint (*Caladris ruficollis*), responds to novel microbial environments. Overall, we found no difference in taxonomic composition nor diversity of the gut microbiome between recently migrated adults and 'resident' second year birds that had inhabited the site for one year, although adults had significantly higher abundances of Corynebacteria, a bacterial group linked to gut inflammation. Although weak seasonal shifts in the gut microbiome were observed, adults and second years did not homogenize nor become less diverse with time spent at a common location, with individuals belonging to both groups fluctuating considerably, but seemingly randomly, between months. Moreover, despite the foraging environments at each site having distinct microbial profiles, the gut microbiome profiles of stint differed only weakly between sites, and individuals shared less than 0.5% of their microbiome with the foraging environment. We conclude that although the gastrointestinal microbiome of migrants is highly flexible, it does not appear to be particularly susceptible to invasion from environmental microbes, and may resist invasion from novel microbes on arrival via an acute inflammatory response within the gut.

11:45	SATURDAY, 19/08/2017	HALL I	SYM2.5
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### Seasonal immunosuppression in the High Arctic – challenges in a changing world?

Andreas Nord<sup>1,2</sup>, Arne Hegemann<sup>1</sup>, Lars P. Folkow<sup>2</sup>

<sup>1</sup>*Department of Biology, Evolutionary Ecology, Lund University, Lund, Sweden;* <sup>2</sup>*Department of Arctic and Marine Biology, Arctic Animal Physiology Research Group, University of Tromsø, Tromsø, Norway*

Acclimatization to high latitude winters requires a general upregulation in the size and activity of metabolically active organs, which in turn increase energy demands. Because energy budgets are often environmentally constrained in winter, increased needs for staying warm might necessitate reduced allocation to other costly physiological processes, such as the immune system. We investigated if there is such a trade-off between thermoregulation and immune function by experimentally challenging the immune system in Svalbard ptarmigan, the world's northernmost landbird, under different ambient temperatures. We injected captive birds with a bacterial endotoxin when the winter phenotype was the most pronounced in mid-winter, and again when birds experienced benign conditions in spring. Following each immune challenge, we measured several metabolic and immunological markers. Infection never entailed fever, but was instead characterised by hypothermia and decreased metabolic rate. Moreover, complement activity (hemolysis) was suppressed year-round, and cold exposure suppressed natural antibodies. Immune-challenged birds reduced food intake for about one week in winter, but for up to two weeks in spring. Accordingly, depletion of body reserves was more severe after a spring infection, particularly at mild temperature where estimated fasting resistance was reduced by 40%. Our study is particularly relevant in light of climate change, because increasingly milder northern winters may expose resident birds to novel pathogenic threats to which they are not adapted. Such risks may be exacerbated by the counterintuitive observation of increased sensitivity to infection during benign environmental conditions, i.e. at the time when pathogen activity and diversity is nearing its peak.

### **Symposium 3: Forest management and bird conservation: research advances and future directions**

10:30	SATURDAY, 19/08/2017	HALL XXI	SYM3.0
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#### **Introduction**

Māris Strazds<sup>1</sup>, Nico Arcilla<sup>2</sup>

<sup>1</sup>*University of Latvia, Riga, Latvia;* <sup>2</sup>*Drexel University, Philadelphia, USA*

Nearly two-thirds of the world's bird species depend on forests for survival, but logging these forests has accelerated dramatically in recent decades. In this symposium we will present case studies and analyses of avian responses to logging in both temperate and tropical forests, address the negative consequences and conservation alternatives for birds, and identify responses to key drivers of the global extinction crisis.

10:35	SATURDAY, 19/08/2017	HALL XXI	SYM3.1
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#### **Forest management and bird conservation: international perspectives on problems, progress, and solutions**

Nico Arcilla<sup>1</sup>, Māris Strazds<sup>2,3</sup>

<sup>1</sup>*Crane Trust, Wood River, NE, USA;* <sup>2</sup>*Laboratory of Ornithology, Institute of Biology, University of Latvia, Riga, Latvia;* <sup>3</sup>*Latvian Ornithological Society, Riga, Latvia*

Nearly two-thirds of the world's bird species depend on forests for survival, yet many are threatened by logging. Here, we review avian responses to logging, address negative consequences and conservation alternatives using case studies from around the world. Crucial for global biodiversity conservation, tropical forests host over 50% of terrestrial species on fewer than 7% of the Earth's land, but satellite data indicate that

anthropogenic conversion of tropical forests is continuing at accelerated rates. Illegal logging accounts for an estimated 50-90% of tropical timber, and we thus highlight the impacts of this and other illegal activities on forest bird conservation. The land rights and tenure of indigenous forest peoples have major implications for conservation outcomes, and we thus explore bird community responses to forest management by indigenous peoples versus government and the private sector. We then turn to a case study from Latvia, where forestry is well-established but where the Soviet era conservation area network included only marginal coverage of the nation's forests. An alternative network was developed to protect important forest patches, called micro-reserves, and both networks were subsequently adapted to European Union requirements. We compare their efficiency for protection of threatened forest bird species in conditions of very intensive forestry, and ask whether conservation successes here can be extended to mitigating the negative impacts of logging on forest birds elsewhere. We also consider applications of other conservation tools, including reduced-impact logging, forest certification, land sharing versus land sparing, and direct payments for conservation and ecological services.

11:00	SATURDAY, 19/08/2017	HALL XXI	SYM3.2
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### **Birds as indicators of natural capital: states and trends of forests for wood production and biodiversity conservation in Europe's Baltic Sea Region**

Per Angelstam<sup>1</sup>

<sup>1</sup>*Swedish University of Agricultural Sciences, Skinnskatteberg, Sweden*

Birds are a tool to improve communication among stakeholders about evidence-based knowledge about state and trends of natural capital. The policy term green infrastructure highlights the need to maintain functional ecosystems as a base for sustainable societies. Because forests are the main natural ecosystems in Europe, it is crucial to understand the extent to which forest landscape management delivers functional green infrastructures. We used birds and their habitats in the steep West-East gradient in forest history, land ownerships and political culture within northern Europe's Baltic Sea Region to assess regional profiles of benefits delivered by forest landscapes. The aim is to propose, through birds, how policy-makers and regional level spatial planners can be provided with evidence-based knowledge about the current conditions for effective wood production vs. biodiversity conservation. First, we developed and modelled four indicators for sustained yield wood production and four for biodiversity conservation using public spatial data in representative regions of Sweden, Latvia, Belarus and NW Russia. Second, we matched these indicators with assemblages of resident focal bird species. The results clearly indicate that green infrastructures for wood production and biodiversity conservation are inversely related. This clearly matched the long-term trends of bird species that require near-natural forest habitats such as those recently disturbed by fire, wind and water, or habitats of cultural landscapes with open woodlands as well as dry and wet grasslands. Accommodating both wood production and biodiversity conservation requires systematic conservation planning based on evidence-based knowledge about what species' population require.

11:15	SATURDAY, 19/08/2017	HALL XXI	SYM3.3
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### **Effect of logging on birds and local economy in the Białowieża Forest, Poland**

Dorota Czeszczewik<sup>1</sup>, Wiesław Walankiewicz<sup>1</sup>

<sup>1</sup>*Siedlce University of Natural Sciences and Humanities, Siedlce, Poland*

Birds attract the attention of many people, and are often the main goal of nature tourism. Rare species of forest birds are found in well-preserved natural forests. Such forests are often threatened by intensive forest management. We present effects of long term forest management on birds in the Białowieża Forest (E Poland). We conducted study in two parts of the Białowieża Forest: commercial stands (CS) and primeval stands (BNP),

collecting density indices of woodpeckers, flycatchers, and whole bird's assemblies, amount of dead wood, density of old trees and tree cavities. All the characteristics mentioned above were significantly lower in CS than in BNP. Logging also decreases the attractiveness of the managed stands for birdwatchers. We assessed the economic value of the Białowieża Forest provided by birdwatchers focused on rare woodpeckers and flycatchers and compared it with income of State Forest. The income from the sale of timber by State Forest is very low compare to income from birdwatchers. Protection of the entire Białowieża Forest will improve habitat quality of bird species associated with old tree stands and dead wood. This will increase the attractiveness of the forest for birdwatchers and then the income of local communities. It follows that, enlargement of the Białowieża National Park would bring much more profits than logging.

11:30	SATURDAY, 19/08/2017	HALL XXI	SYM3.4
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### **Putting forest raptor conservation into practice: guidelines for forest management and voluntary conservation**

Heidi Björklund<sup>1</sup>, Jari Valkama<sup>1</sup>

<sup>1</sup>*Finnish Museum of Natural History Luomus, University of Helsinki, Helsinki, Finland*

Forest raptors indicate forest biodiversity as other species of conservation concern can be found in raptor nest sites. Many species also use old raptor nests for breeding. Therefore, it is alarming that hawks of boreal forests, the northern goshawk, common buzzard and honey buzzard, have declined for decades. They inhabit mature forest stands that are shortly logged. Furthermore, suitable nest trees may be scarce in managed forests where trees with straight trunks and thin branches are favoured. Such trees hold poorly heavy stick nests of the hawks. Our forest raptor project aims at supporting the breeding of hawks and hence biodiversity in managed boreal forests in Finland. The project is part of the national Forest Biodiversity Programme METSO and it is conducted in cooperation with raptor specialists, researchers and forest managers. We aim at our objective with three measures. Firstly, we create nation-wide guidelines on how to spare hawk nest-sites and keep them occupied despite logging. Usually only the nest tree with some adjacent trees are spared, leading to nest desertion. A larger forest area connected to younger forest should be retained. Secondly, we propose to leave as potential nest trees malformed (e.g. forked) trees that are otherwise routinely removed in thinning. These measures rely on voluntary conservation without monetary compensation, an option still underused in conservation. Finally, we create a hawk-forest identifier based on hawk nests and detailed forest data. Identifier aids in locating suitable forests for hawks and potential biodiversity areas at the landscape level.

11:45	SATURDAY, 19/08/2017	HALL XXI	SYM3.5
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### **Habitat selection, nest predation and nest predators of Rusty Blackbirds (*Euphagus carolinus*) in the Northeastern United States**

Shannon Luepold<sup>1</sup>, Thomas Hodgman<sup>2</sup>, Stacy McNulty<sup>1</sup>, Jonathan Cohen<sup>1</sup>, Carol Foss<sup>3</sup>

<sup>1</sup>*SUNY College of Environmental Science and Forestry, Syracuse, NY, USA;* <sup>2</sup>*Maine Department of Inland Fisheries and Wildlife, Bangor, ME, USA;* <sup>3</sup>*New Hampshire Audubon, Concord, NH, USA*

Rusty Blackbirds (*Euphagus carolinus*) have plummeted since the mid-20th century in North America. Recent research in northeastern United States suggested that an ecological trap, created through timber harvesting on the breeding grounds, may be implicated. Red squirrels were hypothesized to be the primary nest predator, but definitive identification was lacking. The potential for masting cone crops to affect Rusty Blackbird nest predation via trophic interactions also remained unexamined. Our objectives were to identify the mechanisms by which an ecological trap may be operating in New England through a multi-scale analysis of Rusty Blackbird

habitat selection and nest survival, as well as predator identification and quantification. Based on an analysis of 72 Rusty Blackbird nests in 2011 and 2012, we found that Rusty Blackbirds selected nest patches with high basal area of small conifers and low canopy closure. Nest survival was not reduced in harvested stands, but increased with increasing basal area. Wetland cover and young softwood stands were the best predictors of Rusty Blackbird selection at the home range scale. At the home range scale, we found that nests that were closer to a road were less successful in 2011, but not in 2012. Red squirrels were the most frequent predator of Rusty Blackbird nests in 2012, when they were abundant following a mast year in 2011. These results suggest dense cover of small softwoods is important for habitat selection and survival of Rusty Blackbird nests, and that pre-commercial thinning and possibly road-building could reduce habitat quality for the species.

## Symposium 4: Decoding Birds: Exploring avian genomes to reveal hidden secrets in ornithology

10:30	SATURDAY, 19/08/2017	HALL XXII	SYM4.0
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### Introduction

Matthias Weissensteiner<sup>1</sup>, Jan O. Engler<sup>2</sup>

<sup>1</sup>*Uppsala University, Uppsala, Sweden;* <sup>2</sup>*Ghent University, Ghent, Belgium*

Birds are among the most intensely studied groups of organisms and a plethora of scientific milestones in a variety of biological disciplines have been achieved using avian systems. With the dawn of the 'genomic' era, birds continue to serve as valuable study systems. The term 'genomic' comprises a broad array of research technologies and analytical tools, which all have in common the gathering and assessment of immense amounts of molecular data. Advances in the fields of for example speciation, behavior and ecology have been made by the application of these genomic tools, especially when combined with the large foundation of existing knowledge of avian biology. Recent examples of a fruitful combination of these two are provided by the genetic characterization of the hybrid zone between carrion and hooded crows, the identification of the genetic basis underlying phenotypic and behavioral polymorphism in ruffs or the revealing of a highly heterogeneous genetic differentiation across the genome in *Ficedula* flycatchers. In these example cases, the application of classical genetic methods did not provide the resolution necessary to reveal underlying mechanisms, illustrating the tremendous advantage of high-throughput sequencing technologies in resolving long standing biological questions. In this symposium we aim to pinpoint the usefulness of applying genomic tools in ornithology, reflect on current limitations and provide future prospects.

10:35	SATURDAY, 19/08/2017	HALL XXII	SYM4.1
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### Ornithology in the genomics era.

Niclas Backström<sup>1</sup>

<sup>1</sup>*Uppsala University, Uppsala, Sweden*

In ornithology, as well as in other fields of biological research, technological advancements repeatedly spark off new discoveries. Over the past 10-15 years, rapidly advancing DNA and RNA sequencing technologies and reduced costs have allowed for genomic approaches to study avian evolution in general and taxonomic relationships, adaptation, behavior and speciation in particular. The new technologies can be used to investigate genome-wide differences and similarities in birds as compared to other organisms as well as between different bird species and in that way pin down specific genes that may underlie lineage specific traits and/or adaptations. As has been illustrated using long-term ecological model systems, genomic data can also be used to study how



genomes evolve as lineages diverge, to detect candidate genes for reproductive isolation and to investigate if specific speciation events have been driven by adaptation or stochastic processes. In addition, recent efforts using extensive sets of samples from a wide variety of bird species have shown that genome-wide genetic marker sets make it possible to infer species relationships at a higher resolution than before and to assess potential gene-flow between different bird species/populations. Finally, large-scale DNA and RNA sequencing data can be used to associate ecologically and evolutionary relevant traits with specific genes or genetic pathways. In summary, the aim is to use recent example studies to illustrate how genomic approaches have been applied to understand avian ecology and evolution and to emphasize that the key to fruitful outcomes is joint efforts between multiple disciplines within ornithology.

11:00	SATURDAY, 19/08/2017	HALL XXII	SYM4.2
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### Studying the genetic basis of seasonal migration in a songbird

Kira Delmore<sup>1</sup>, Miriam Liedvogel<sup>1</sup>

<sup>1</sup>*Max Planck Institute for Evolutionary Biology, Ploen, Germany*

Understanding the genetic basis of phenotypic variation is a longstanding goal in evolutionary biology but is limited largely to morphological traits. Comparable knowledge is lacking for behavioural traits but is essential for a complete understanding of phenotypic variation as behavioural changes can precipitate morphological changes and there may be systematic differences in the regulation of behaviours. In this work we use dramatic differences in the migratory behaviour of European blackcaps to fill this void. We assembled a reference genome for the species and obtained whole genome shotgun resequencing data from its full distribution. Demographic analyses suggest that the ancestral state was migratory, with resident mainland and island populations deriving from migrants. Populations began diverging ~300,000 years ago when migratory populations underwent two cycles of expansion-retraction, likely reflecting glacial cycles. Island populations exhibit similar patterns until ~100,000 years ago at which point they underwent massive expansions, likely in response to the colonization of new habitats on islands. Analyses of population structure suggest that there is little differentiation between migratory populations, regardless of whether they migrate NW, SW or SE. Most differences occur between migrant and resident populations, with one region on Chromosome 11 accounting for most of these differences. Three genes overlap this region, including COX4I1 which is involved in the mitochondrial respiratory chain. The mitochondrial respiratory chain likely plays an important role in generating energy for migration and is a compelling candidate for adaptation to the resident condition and more generally understanding how complex behavioural traits may be controlled.

11:15	SATURDAY, 19/08/2017	HALL XXII	SYM4.3
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### Long-read genomics unravels the major histocompatibility complex of great reed warblers

Helena Westerdahl<sup>1</sup>, Maria Strandh<sup>1</sup>, Jacob Roved<sup>1</sup>, Bengt Hansson<sup>1</sup>, Dennis Hasselquist<sup>1</sup>

<sup>1</sup>*Biology, Lund, Sweden*

The major histocompatibility complex (MHC) encodes MHC proteins of central importance in the adaptive immunity of all vertebrates. A high diversity in MHC is thought to enable recognition of a wider range of pathogens and should hence be selected for in high pathogen areas. Moreover, a recent study on songbird MHC showed that there is a strong component of phylogeny in MHC diversity and that songbirds of the parv-order Passerida have particularly high MHC diversity. So far it has not been possible to characterize the MHC region in songbirds due to its high complexity, however recent advances in high throughput sequencing enables reads of long genomic regions. We used the PacBio technique for long reads in combination with segregation analyses to

unravel secrets about the putative ‘maximal MHC’ of songbirds of the parv-order Passerida. We used the great reed warbler *Acrocephalus arundinaceus* as our study species. The genomic data on MHC is very different to the ‘minimal essential MHC’ found in birds of the order Galliformes. The MHC genes of great reed warblers are, in contrast to galliform birds, highly duplicated and linked. Further analyses are in the pipeline to discover which MHC copies are expressed, an important next step towards understanding the high complexity of songbird MHC.

11:30	SATURDAY, 19/08/2017	HALL XXII	SYM4.4
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### Genomic architecture of parallel contact zones along the speciation continuum in Eurasian crows

Matthias Weissensteiner<sup>1,2</sup>, Nagarjun Vijay<sup>3</sup>, Christen Bossu<sup>4</sup>, Alexey Kryukov<sup>5</sup>, Jelmer Poelstra<sup>6</sup>, Alexander Suh<sup>1</sup>

<sup>1</sup>Evolutionary Biology Centre, Ecology and Genetics, Department of Evolutionary Biology, Uppsala, Sweden; <sup>2</sup>Division of Evolutionary Biology Faculty of Biology Ludwig-Maximilians-Universität München, München, Germany; <sup>3</sup>Lab of Molecular and Genomic Evolution, Department of Ecology and Evolutionary Biology, College of Literature, Science, and the Arts, University of Michigan, Ann Arbor, USA; <sup>4</sup>Department of Zoology, Population Genetics, Stockholm University, Stockholm, Sweden; <sup>5</sup>Institute of Biology and Soil Science, Far East Branch of the Russian Academy of Sciences, Laboratory of Evolutionary Zoology and Genetics, Vladivostok, Russia; <sup>6</sup>Department of Biology, University of North Carolina, Chapel Hill, USA

During population divergence, certain regions of the genome accumulate genetic differences more rapidly than others. However, the underlying evolutionary forces shaping heterogeneous differentiation landscapes are not yet fully understood. In particular, genomic signatures of divergent selection with gene flow promoting reproductive isolation are difficult to discern from other forces driving genetic differentiation. Here, we sequenced the genomes of 128 individuals across the speciation continuum of the crow superspecies complex (*Corvus [corone]* ssp.) which is characterized by parallel evolution of a sexually selected plumage phenotype (populations with all black versus black-and-grey plumage separated by narrow hybrid zones). For most genomic regions, patterns of genetic differentiation were shared by all populations, most likely as a result of reproductive isolation in allopatry. Yet, several regions in the genome exhibited signatures indicating divergent selection against gene flow. Despite an apparent parallelism in phenotype, these signatures differed across replicate hybrid zones, pointing towards context dependent selection.

11:45	SATURDAY, 19/08/2017	HALL XXII	SYM4.5
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### Genes around the clock: Circadian rhythms of clock and immune gene expression in a wild great tit population

Robyn Womack<sup>1</sup>, Francesco Baldini<sup>1</sup>, Jane Robinson<sup>1</sup>, Peter O’Shaughnessy<sup>1</sup>, Barbara Helm<sup>1</sup>

<sup>1</sup>University of Glasgow, Glasgow, UK

The circadian clock is a core feature of avian physiology, vital for the normal function of many biological processes such as innate immune responses, hormone release and metabolism. Central avian clock mechanisms are synchronised with daily fluctuations in the environment, such as the light-dark cycle, and in turn influence timing of behavioural activity and physiological changes occurring across a 24 hour day. However, despite the necessity of maintaining robust circadian rhythms for good health, clocks remain understudied in avian ecology. In this study, we used gene expression as a tool for investigating circadian mechanisms in a free-living population of great tits (*Parus major*). Field work was based at our forest nest-box system at the Scottish Centre for Ecology and the Natural Environment. Blood samples were taken from nestlings on day 13, at four different time points

throughout the day (06:00, 12:00, 18:00 and 00:00), in order to create a time profile of gene expression of core clock genes such as BMAL1, CLOCK and PER3, and immune genes such as IL-1, LY86 and TLR-4. In addition, we also investigated whether infection with a naturally occurring "circadian disease" avian malaria, is reflected in changes in the expression of core target genes for biological rhythms, immune responses and overall health. With this project, we aim to place studies of circadian rhythms in an environmental context, ultimately opening avenues for future research on the complex interactions of avian circadian physiology with the environment.

## Symposium 5: Evolutionary consequences of social information use in birds

10:30	SATURDAY, 19/08/2017	HALL X	SYM5.0
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### Introduction

Daniela Campobello<sup>1</sup>, Damien Farine<sup>2,3</sup>

<sup>1</sup>*University of Palermo, Palermo, Italy;* <sup>2</sup>*Max Planck Institute for Ornithology, Konstanz, Germany;*  
<sup>3</sup>*University of Oxford, Oxford, UK*

Acquiring information can change individual and social phenotypes, with important implications on community structure and its evolution. At the same time, social behaviour, and the patterns of connections among individuals arising from social interactions, can be shaped by individual phenotypes, and ultimately influence the spread of information through communities. Together, this synthesis will highlight the potential evolutionary implications of information use via feedbacks across different levels of social organization.

10:35	SATURDAY, 19/08/2017	HALL X	SYM5.1
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### The implications of information use between individuals and information transfer within groups on the evolution of social traits

Daniela Campobello<sup>1</sup>, Damien Farine<sup>2,3</sup>

<sup>1</sup>*University of Palermo, Palermo, Italy;* <sup>2</sup>*Max Planck Institute for Ornithology, Konstanz, Germany;*  
<sup>3</sup>*University of Oxford, Oxford, UK*

Social interactions, at intra- and inter-specific levels, have been lately the focus of new perspectives in examining the role of information use within communities. Acquiring information can change individual and social phenotypes, with important implications on community structure and its evolution. At the same time, social behaviour, and the patterns of connections among individuals arising from social interactions, can be shaped by individual phenotypes, and ultimately influence the spread of information through communities. Thus, the fingerprint of the evolutionary consequences of information use can be detected in both the mechanisms that determine responses to information at the individual level, and the mechanisms that drive broader patterns of interactions among individuals. Both conveners will provide background on common methods and approaches that have been used to elucidate various relationships (e.g. between individual behaviour and social structure, or between social structure and information acquisition). We will then discuss group-level consequences of individual information use, and their role in the emergence of information landscapes. Together, this synthesis will highlight the potential evolutionary implications of information use via feedbacks across different levels of social organisation.

11:00	SATURDAY, 19/08/2017	HALL X	SYM5.2
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## Social information use and the organization of animal communities

Deseada Parejo<sup>1</sup>

<sup>1</sup>*University of Extremadura, Badajoz, Spain*

The structure of natural communities has been proposed to be shaped by interspecific interactions. Classically, negative interactions, as competition or predation, have been considered as the main actors in the organization of ecological communities. However, since the end of the twentieth century there is a general claim to account for the effect of positive interactions, such as facilitation, as they may also influence the structure of ecological communities. The use of social information, which is information indirectly extracted from the interaction of others with the environment, is one of the positive mechanisms that may help explaining community structure. On the one hand, interacting individuals within a community limited by the same variables (e.g. food, nesting sites, mates or enemies) may share information on these limiting factors and hence gain advantages by social information use in their habitat selection decisions. Additionally, prey species of information providers may profit that social information to ascertain the welfare of their predators and make habitat selection decisions accordingly. During my talk, aiming to contribute to a better understanding of animal community organization, I will illustrate theoretical situations in which social information is more likely to be used, outlining factors influencing its value in the frame of habitat selection processes. Furthermore, I will provide examples of the changing value of social information for distinct receivers (competitors and prey of the information provider) under variable competitive pressure within a hole-nesting bird community.

11:15	SATURDAY, 19/08/2017	HALL X	SYM5.3
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### The importance of social information in winter flocks of black-capped chickadees

Julian Evans<sup>1</sup>, Julie Morand-Ferron<sup>1</sup>

<sup>1</sup>*University of Ottawa, Ottawa, Ontario, Canada*

Many animals form social groups, but the adaptive value of being gregarious is often unclear. In many cases subordinates will actively suffer fitness consequences when associating with more dominant individuals, leading to the question of why subordinates would accompany dominants. Possibly joining a group is mandatory to access resources in an area, or subordinates simply associate with groups with the aim of one day becoming a dominant themselves. In this case we predict that given the choice, individuals will associate only loosely with the group, perhaps strongly with a few preferred individuals while actively avoiding despotic individuals. Alternatively, all individuals may benefit from being in the group due to social information improving chances of avoiding predators or finding food. We would then predict individuals associating relatively equally with all members of the group, maintaining cohesive flocks even if alternative patches are available nearby. We test these predictions by analysing the social networks and foraging behaviours of winter flocks of black capped chickadees (*Poecile atricapillus*) in relation to experimental treatments; three feeders located 5m, 40m or 130m from one another. As distance increases, so might the potential trade-offs of leaving the main flock to gain access to food. The structure of social networks and changes in foraging behaviour at these different scales will give insight into how dependent birds are on social information about food and predators from other flock members.

11:30	SATURDAY, 19/08/2017	HALL X	SYM5.4
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### The role of aggressiveness in modulating social information use in a wild population

Jennifer Morinay<sup>1,2</sup>, Jukka Forsman<sup>3</sup>, Grégory Daniel<sup>1</sup>, Marion Germain<sup>1</sup>, Lars Gustafsson<sup>2</sup>, Blandine Doligez<sup>1</sup>

<sup>1</sup>Laboratory of Biometry and Evolutionary Biology LBBE - CNRS / University Lyon 1, Lyon, France;

<sup>2</sup>Department of Ecology and Evolution, Evolutionary Biology Centre, Uppsala University, Uppsala, Sweden;

<sup>3</sup>Department of Ecology and Genetics, University of Oulu, Oulu, Finland

Social information, i.e. information derived from the observation of other individuals and their interactions with the environment, is commonly used by individuals for making decisions about habitat choice because it allows them to reduce the uncertainty about habitat quality. To select their breeding site, collared flycatchers *Ficedula albicollis* have been shown to use social information (presence, density, or habitat preferences) collected from both conspecifics and great tits *Parus major*, their main competitors. Nevertheless, there is a high inter-individual variability in the propensity to use social information from competitors. Because gathering social information may increase the probability of agonistic interactions between competitors and thus the associated costs, such inter-individual variability may be expected to relate to individuals' ability to face competitive costs associated to information gathering. In other species, social information use has been shown to depend on personality traits, e.g. boldness for foraging decisions. We tested whether the propensity of collared flycatchers to use a heterospecific information source for breeding site selection depended on their level of aggressiveness. An aggressiveness score was measured for each focal pair during the response to a stimulated intrusion by a dummy competitor (flycatcher or great tit) attached to the nestbox during the nest building stage. We then tested whether this score was correlated to the probability of flycatchers to copy their competitors' nest site preference. These results will be presented and their potential consequences discussed within the framework of a non-random species assemblage at a small spatial scale.

11:45	SATURDAY, 19/08/2017	HALL X	SYM5.5
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### Information use in wild zebra finches - the effect of brood size manipulation on breeding decisions

Hanja Brandl<sup>1,2</sup>, Simon Griffith<sup>2</sup>, Wiebke Schuett<sup>1</sup>

<sup>1</sup>University of Hamburg, Hamburg, Germany; <sup>2</sup>Macquarie University, Sydney, NSW, Australia

In unpredictable environments and harsh conditions information about the surrounding can greatly help to improve an individual's fitness. However, very little is known about the mechanisms and significance of information use in unpredictable habitats, such as arid zones. We tested the hypothesis that perceived breeding success of conspecifics serves as cue for habitat quality and consequently influences breeding decisions, like nest site choice and investment in a brood. We conducted a brood size manipulation experiment in an opportunistic breeder, the zebra finch (*Taeniopygia guttata*) in Australia. Zebra finches often prospect on, i.e. visit and inspect the nests of conspecifics, likely to obtain social information. In six different areas, clutch sizes of almost 300 nests of breeding zebra finches were either all increased or reduced throughout one breeding season and reproductive decisions of subsequent breeders were monitored. The results show that the number of naturally laid eggs was not considerably affected by the brood size manipulation. Birds changing the breeding area between consecutive broods were rare, irrespective of the treatment. Our findings suggest that zebra finches employ high opportunism as a key strategy for reproduction in an unpredictable environment. Laying as many eggs as possible in their own inherent condition might pose a lower risk than to strongly rely on social information, which can be unreliable and lead to costly errors. Also, personal information obtained by experience appears to be important.

### Symposium 6: Advances in our understanding of hormonal regulation of migratory traits

10:30	SUNDAY, 20/08/2017	HALL IX	SYM6.0
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## Introduction

Arseny Tsvey<sup>1</sup>, Susanne Jenni-Eiermann<sup>2</sup>

<sup>1</sup>*Biological Station Rybachy, Kaliningrad, Russia;* <sup>2</sup>*Swiss Ornithological Institute, Sempach, Switzerland*

Yearly, migrants travel between locations for breeding and overwintering thereby covering sometimes extraordinary distances in non-stop flights. To meet the energetic demands of such endurance flights, birds have to build up energy stores before they start migration and en route and to break them down during flight efficiently. Moreover, migrants have to deal with unforeseen environmental challenges during their stay at resting sites and in their final winter quarters. In this symposium we will discuss novel data concerning the hormonal regulation of all phases of migration, the preparative, the flight and the resting phase. Understanding the regulation of migratory traits is especially important for long-distance migrants as many species/populations are under decline.

10:35	SUNDAY, 20/08/2017	HALL IX	SYM6.1
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## Hormonal regulation of fuel metabolism in migrating birds: An overview

Susanne Jenni-Eiermann<sup>1</sup>

<sup>1</sup>*Swiss Ornithological Institute, Sempach, Switzerland*

Every year, migrants travel between locations for breeding and overwintering thereby covering sometimes extraordinary distances in non-stop flights. Such endurance flights occur at a high metabolic rate and require physiological adaptations to meet the energetic demands. First of all, energy stores have to be built up before departure, a phenomenon well-known as pre-migratory fattening; however the physiological regulation, the question which hormones trigger an increased food intake and fuel deposition is still unresolved. Literature data will be summarized and discussed under the aspect why the available data might be so inconsistent. The second part of the talk will present the metabolic adaptations to endurance flights, i.e. the ability of migrants to push lipid catabolism to its maximum. Data of the fat metabolism during active flight from field studies and wind-tunnel experiments will be discussed and the scarce literature data about the hormonal regulation will be presented. A focus will be the question whether migratory strategy (long-distance versus short-distance) and diet might influence flight metabolism. Finally a short overview about the switch from active flight to the post-flight recovery phase will be given.

11:00	SUNDAY, 20/08/2017	HALL IX	SYM6.2
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## Similar behavior, different regulation: plasma corticosterone concentration in European Robins during spring and autumn migration

Arseny Tsvey<sup>1</sup>, Julia Loshchagina<sup>1,2</sup>, Sergey Naidenko<sup>3</sup>

<sup>1</sup>*Biological Station Rybachy, Zoological institute RAS, Saint-Petersburg, Russia;* <sup>2</sup>*Institute of Geography RAS, Moscow, Russia;* <sup>3</sup>*A.N. Severtsov Institute of Ecology and Evolution RAS, Moscow, Russia*

During spring and autumn migration, migratory birds cover similar distances and expend similar amounts of energy each way. However, photoperiod, environmental factors and reproductive state differ between the seasons. The glucocorticoid hormone corticosterone (CORT) seems to be involved in regulation of migratory behavior and physiology, but available data on CORT concentration in spring and autumn are equivocal. To test whether spring and autumn migrations are hormonally differently regulated, we analyzed more than 650

blood samples collected in European robins (*Erithacus rubecula*) during migratory seasons in 2013 -2016 on the Courish Spit on the Baltic Sea. We show that both baseline and stress-induced CORT concentrations in free-living robins in spring are nearly twice as high as in autumn. Therefore, our results corroborate earlier findings and demonstrate that the role of CORT differs between autumn and spring migratory periods. We briefly discuss the possible causes of seasonal variation in plasma CORT concentration. To investigate the mechanisms of seasonal difference in CORT concentration experimentally, we kept European robins (ER) and garden warblers (GW) for 10 months under photoperiodic conditions experienced by these species in the wild, holding all other conditions constant. In ER both baseline and stress-induced CORT concentration gradually decreased along the course of the experiment. In GW baseline and stress-induced CORT showed a distinct annual pattern with the tendency of increased levels in spring compared with autumn. The possible reasons of the observed species difference are discussed and the role of endogenous rhythms are highlighted.

11:15	SUNDAY, 20/08/2017	HALL IX	SYM6.3
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### Corticosterone mediates between departure cues and timing of migratory departure in a songbird

Cas Eikenaar<sup>1</sup>, Florian Müller<sup>1</sup>, Heiko Schmaljohann<sup>1</sup>

<sup>1</sup>*Institute of Avian Research, Wilhelmshaven, Germany*

Bird migration entails replenishing fuel stores at stopover sites. There, individuals make daily decisions whether to resume migration, and must also decide their time of departure. Variation in departure timing affects the total time required to complete a migratory journey, which in turn affects fitness through arrival time at the breeding and wintering grounds. It is well established that stopover departure decisions are based on cues from innate rhythms, intrinsic factors, and extrinsic factors. Yet, virtually nothing is known about the physiological mechanism(s) linking these cues to departure decisions. Here we show for a nocturnal migratory songbird, the northern wheatear (*Oenanthe oenanthe*), that corticosterone, at baseline levels, mediates between departure cues and the timing of departure from a stopover site. In a first study we caught wheatears at a stopover site and found that corticosterone increased both over the migratory season and with wind assistance towards the migratory destination. Corticosterone in turn predicted departure probability; individuals with high baseline corticosterone levels were more likely to resume migration on a given night. Corticosterone further predicted the departure time within the night, with high baseline levels being associated with early departures. In a second study we temporarily caged migrating wheatears and found that the change in their fuel stores predicted the change in their fecal glucocorticoid metabolite levels, which in turn predicted the change in migratory restlessness. These novel findings are a major step toward understanding the hormonal control of animal migration.

11:30	SUNDAY, 20/08/2017	HALL IX	SYM6.4
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### Ghrelin affects stopover decisions and food intake in a long-distance migrant

Sara Lupi<sup>1,2</sup>, Wolfgang Goymann<sup>3</sup>, Hiroyuki Kaiya<sup>4</sup>, Massimiliano Cardinale<sup>5</sup>, Leonida Fusani<sup>1,6</sup>

<sup>1</sup>*Konrad Lorenz Institute of Ethology, University of Veterinary Medicine, Vienna, Austria;* <sup>2</sup>*Department of Life Sciences and Biotechnology, University of Ferrara, Ferrara, Italy;* <sup>3</sup>*Department of Behavioural Neurobiology, Max Planck Institute for Ornithology, Seewiesen, Germany;* <sup>4</sup>*Department of Biochemistry, National Cardiovascular Center Research Institute, Suita, Osaka, Japan;* <sup>5</sup>*Swedish University of Agricultural Sciences, Department of Aquatic Resources, Marine Research Institute, Lysekil, Sweden;* <sup>6</sup>*Department of Cognitive Biology, University of Vienna, Vienna, Austria*



The phenomenon of migration involves billions of birds covering long distance flights every year to reach breeding territories or favorable wintering grounds. Most small birds need to alternate between non-stop flights and long stopovers to rest and refuel. To date, little is known about the physiological mechanisms signaling whether it is time to stop or resume the migratory flight. Fat reserves are the best predictors of stopover duration. However, how do birds know that the carried energy is enough to continue migrating? Ghrelin, a recently discovered gut peptide, acts synergically with other hormones to regulate appetite, food intake and fat metabolism in vertebrates. To study its role in migration, we caught wild garden warblers (*Sylvia borin*) on spring migration at a stopover site, the island of Ponza (Italy). We scored subcutaneous fat and the size of the pectoral muscles, and measured body mass. In a first study, we measured the levels of ghrelin upon capture. In a second study, we experimentally manipulated blood concentrations of ghrelin in caged birds to test its effects on food intake and migratory restlessness, which reflects the disposition of captive birds to migrate. We demonstrated that birds with larger fat scores show higher levels of acylated ghrelin in the blood compared to those without fat. Further, experimentally increased levels of unacylated ghrelin decreased food intake and enhanced migratory restlessness. Our results provide evidence that appetite-regulating hormones fine-tune stopover decisions based on body condition, revealing the physiological link between nutritional state and migratory behavior.

11:45	SUNDAY, 20/08/2017	HALL IX	SYM6.5
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### Environmental conditions experienced at long-term migratory staging sites are associated with altered carry-over effects in a Palearctic-African migratory bird

Marjorie C Sorensen<sup>1,2</sup>, Graham D Fairhurst<sup>3</sup>, Susanne Jenni-Eiermann<sup>4</sup>, Jason Newton<sup>5</sup>, Elizabeth Yohannes<sup>6</sup>, Claire N Spottiswoode<sup>1,7</sup>

<sup>1</sup>University of Cambridge, Cambridge, UK; <sup>2</sup>Goethe University, Frankfurt am Main, Germany; <sup>3</sup>University of Saskatchewan, Saskatoon, Canada; <sup>4</sup>Swiss Ornithological Institute, Sempach, Switzerland; <sup>5</sup>NERC Life Sciences Mass Spectrometry Facility, East Kilbride, UK; <sup>6</sup>University of Konstanz, Constance, Germany; <sup>7</sup>University of Cape Town, Cape Town, South Africa

An understanding of year-round habitat use is essential for determining how environmental conditions shape population dynamics in long-distance migratory songbirds. The use of long-term migratory staging sites in many species, prior to arrival at final wintering sites, adds complexity to efforts to decipher non-breeding habitat conditions and connections between sites. We investigated whether habitat conditions during migratory staging carry over to influence great reed warbler (*Acrocephalus arundinaceus*) body condition at final wintering sites in Zambia. We asked whether the presence/absence and strength of such carry-over effects were modified by contrasting rainfall conditions during 2 years. First, we found that individuals staging in a dry year had higher corticosterone (measured from feathers grown on the staging grounds; CORT<sub>f</sub>) and stable nitrogen isotope values (suggesting higher aridity) than birds staging in a wet year, indicating that regional weather affected staging conditions. Second, we found that carry-over effects from staging habitat conditions (measured via carbon and nitrogen isotopes) to final winter site body condition (measured via scaled mass index and  $\beta$ -hydroxybutyrate) were only present in a dry year, suggesting that the environmental conditions experienced during staging have consequences for the strength of carry-over effects. This work provides a first insight into the connections between long-term migratory staging sites and final wintering sites, and suggests that local environmental factors can modify the strength of carry-over effects for long-distance migratory birds.

### Symposium 7: Co-infection in free-living avian systems: malaria and beyond

10:30	SUNDAY, 20/08/2017	HALL XXII	SYM7.0
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#### Introduction

Jenny Dunn<sup>1</sup>, Alfonso Marzal<sup>2</sup>

<sup>1</sup>*University of Lincoln, Lincoln, UK;* <sup>2</sup>*Universidad de Extremadura, Badajoz, Spain*

Co-infections are widespread in avian systems. However, despite their importance for immunity, infection outcome and impacts on individuals and populations, investigations of co-infections are rare. At the cellular level, co-infections can promote parasite transmission and alter susceptibility or response to additional infections. Recently, research has expanded to incorporate environmental drivers of co-infection, such as individual host behaviour, the biology of disease vectors for vector-transmitted parasites, and climatic conditions for environmentally-transmitted parasites. Mixed infections of closely related parasite species, such as haemosporidians, can be difficult to distinguish, restricting the ease with which co-infections can be studied. This symposium will draw together a range of disease ecologists working on disparate avian systems, highlighting the importance of, and novel methods for, investigating co-infecting parasites.

10:35	SUNDAY, 20/08/2017	HALL XXII	SYM7.1
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### **Co-infection in free-living avian systems: what do we know and where are we going?**

Jenny Dunn<sup>1</sup>

<sup>1</sup>*University of Lincoln, Lincolnshire, UK*

Co-infections are widespread in avian systems. However, despite their importance for immunity, infection outcome and impacts on individuals and populations, investigations of co-infections are rare. At the cellular level, co-infections can promote parasite transmission and alter susceptibility or response to further infections. Recently, research has expanded to incorporate environmental drivers of co-infection, such as individual host behaviour, the biology of disease vectors for vector-transmitted parasites, and the influence of climatic conditions on environmentally-transmitted parasites. I will review the existing literature, focussing on co-infections involving vector-transmitted haemosporidian parasites, and suggest avenues for future research with the aim of promoting further discussion and collaboration beyond the focal symposium.

11:00	SUNDAY, 20/08/2017	HALL XXII	SYM7.2
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### **Effects of haemosporidian mixed infections on wild birds**

Alfonso Marzal<sup>1</sup>

<sup>1</sup>*University of Extremadura, Badajoz, Spain*

Mixed infections of different species or genetic lineages of malaria and related haemosporidian parasites (Haemosporida) are abundant in many wild bird species all over the world, with some studies reporting prevalence of mixed haemosporidian infections between 6% and over 80% in wildlife. Besides this abundance, few studies have investigated the impact of haemosporidian co-infections on their avian hosts, probably because the low sensitivity in detection of mixed infections with PCR-based tools. Because parasite lineages or genera can compete with each other for space and nutritional resources within the host, co-infection could severely impact the fitness of their hosts. However, studies on the effects of haemosporidian co-infections on their avian hosts are scarce and they have yielded mixed and inconclusive results. Here I will review the outcomes of recent studies analysing the presence of bird hemoparasite mixed infections and their effects on different host traits (i.e. survival, body condition, reproduction, host behaviour).

11:15	SUNDAY, 20/08/2017	HALL XXII	SYM7.3
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### Detecting co-infection: trials and tribulations of Next-Generation Sequencing

Rebecca Thomas<sup>1</sup>, Jenny Dunn<sup>2</sup>, Simon Goodman<sup>1</sup>, Keith Hamer<sup>1</sup>, Helen Hipperson<sup>3</sup>

<sup>1</sup>University of Leeds, Leeds, UK; <sup>2</sup>University of Lincoln, Lincoln, UK; <sup>3</sup>University of Sheffield, Sheffield, UK

The majority of research focuses on single host- parasite interactions when in reality, most parasites co-occur with other parasites. Research into co-infections may be hindered by the effort involved in detecting multiple pathogens in a host. Parasite identification by DNA sequencing is more reliable than traditional methods such as microscopy. However, it is still difficult to distinguish between multiple DNA sequences amplified by the same primer set, but representing different parasites, without the use of cloning. Next Generation Sequencing (NGS) allows the simultaneous identification of multiple parasites in one sample and therefore has great potential for pathogen surveys and disease surveillance. There are important considerations however, such as the library preparation of samples prior to sequencing and analysing the vast amount of data produced before implementing such a protocol and in this talk we will summarise the benefits and considerations of this approach.

11:30	SUNDAY, 20/08/2017	HALL XXII	SYM7.4
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### Migration and parasitism: habitat use, not migration distance, influences helminth species richness in Charadriiform birds

Jorge Gutiérrez<sup>1,2</sup>, Theunis Piersma<sup>2</sup>, David Thieltges<sup>2</sup>

<sup>1</sup>University of Hull, Hull, East Riding of Yorkshire, UK; <sup>2</sup>NIOZ Royal Netherlands Institute for Sea Research and Utrecht University, Texel, North Holland, The Netherlands

Habitat use and migration strategies of animals are often associated with spatial variation in parasite pressure, but how they relate to one another is not well understood. Here we use a large dataset on helminth species richness of Charadriiform birds to test whether higher habitat diversity and seasonal migration increase parasite richness in avian hosts. We compiled a global dataset on helminth species richness, habitat use strategies (marine/freshwater/mixed wintering and osmotic generalist/specialist) and various ecological/life-history traits (migration distance, geographic range size, diet, body mass, sampling latitude) of Charadriiform birds. To test if hosts with different habitat use strategies encounter different parasite pressures, we used comparative methods that correct for shared ancestry and phylogenetic uncertainty. Habitat generalists (mixed wintering habitats and osmotic generalists) harboured more parasite species than habitat specialists; marine- and freshwater-restricted hosts had similar helminth species richness. Contrary to previous results, we found no association between parasite species richness and migration distance. Overall helminth species richness also increased with diet diversity, with no effects of other ecological/life-history traits. We suggest that birds exploiting diverse habitats and diets are exposed to a more diverse parasite fauna and conclude that distribution patterns and habitat use, rather than migration distance, shape parasite diversity within host populations. Overall, these results demonstrate the significant role of habitat use in explaining how migration may indirectly affect parasite richness in host populations.

11:45	SUNDAY, 20/08/2017	HALL XXII	SYM7.5
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### How does coinfection with avian malaria influence disease caused by *Mycoplasma gallisepticum* in house finches?

André Dhondt<sup>1</sup>, Keila V. Dhondt<sup>1</sup>, Sophie Nazeri<sup>1</sup>, Andrew P. Dobson<sup>2</sup>

<sup>1</sup>Cornell University, Ithaca NY, USA; <sup>2</sup>Princeton University, Princeton NJ, USA

In 1994 a new disease caused by the poultry bacterium *Mycoplasma gallisepticum* emerged in North American House Finches *Haemorrhous mexicanus*. As it spread across the range of the new host *Mycoplasma gallisepticum* evolved. To test the hypothesis that interaction between this new pathogen and chronic infection with avian malaria, a widespread avian pathogen that is found throughout the House Finches' range, played a role in the House Finch - *Mycoplasma gallisepticum* system we tested experimentally if co-infection with *Plasmodium* sp. Influences the response of House Finches to *Mycoplasma gallisepticum*. Supported by NIH grant R01GM085232 to Dana M. Hawley, EEID Program.

## Symposium 8: Plumage colour and behaviour

10:30	SUNDAY, 20/08/2017	HALL I	SYM8.0
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### Introduction

Arjun Amar<sup>1</sup>, Alexandre Roulin<sup>2</sup>

<sup>1</sup>University of Cape Town, Cape Town, South Africa; <sup>2</sup>University of Lausanne, Lausanne, Switzerland

Several studies across different avian taxa have shown covariation between plumage colour and behaviour. In this respect, colour polymorphic species may be particularly useful study subjects to explore the mechanisms that drive these associations and the fitness benefits associated with them. Behavioural differences can range from differences in levels of aggression or parental care to differences in habitat and prey choice. These differences can have profound effects on productivity, on mate choice and on spatial distribution of differently coloured individuals. For some species, such behavioral differences are known to be heritably associated with plumage colour polymorphism, and recent research suggests they may be important in driving disruptive selection and the maintenance of genetic variation within species. This symposium will review some of the main associations between plumage colours and behaviours. It will explore generalities and seek to understand the mechanisms driving these differences and their selective benefits.

10:35	SUNDAY, 20/08/2017	HALL I	SYM8.1
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### The role of natural and sexual selection in colour traits and behaviour

Alexandre Roulin<sup>1</sup>

<sup>1</sup>University of Lausanne, Lausanne, Switzerland

The aim of this keynote is to highlight how natural/sexual selection can explain the evolution of a link between colour traits and behaviour. An important issue is whether associations between specific colour traits (e.g. carotenoid- or melanin-based traits) and behaviour are recurrently found across animals. Does specific behaviour (e.g. aggressiveness, boldness, sexual activity) covary with coloration in the same way across animals and if yes which proximate mechanism can account for this observation?

11:00	SUNDAY, 20/08/2017	HALL I	SYM8.2
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## Differential foraging behaviour of the polymorphic Black Sparrowhawk according to light levels and habitat

Arjun Amar<sup>1</sup>, Gareth Tate<sup>1,2</sup>

<sup>1</sup>*FitzPatrick Institute, Cape Town, South Africa;* <sup>2</sup>*Endangered Wildlife Trust, Johannesburg, South Africa*

Detectability of different colour morphs under varying light conditions has been proposed as an important driver in the maintenance of colour polymorphism. No studies have tested whether different morphs have selective advantages under differing light conditions. We tested this hypothesis in the black sparrowhawk, a polymorphic raptor exhibiting a discrete white and dark morph, and found that prey provisioning rates and foraging rates differ between the morphs depending on light conditions. Dark morphs delivered more prey in duller conditions, while white morphs provided more prey in brighter conditions. Additionally, using GPS tracking we found that dark morphs foraged more often in duller conditions whereas white morphs did not vary in their foraging behaviours according to light levels. These results therefore suggest that white morphs have higher hunting success in brighter conditions, but dark morph hunting success may be proportional to the amount of time they spend hunting, where they favour hunting in duller conditions. Furthermore, we found that dark morphs showed a greater degree of selection for closed habitats, such as forests, when compared with white morphs. The species shows clinal variation in morph ratios across South Africa, and we found support for the role of breeding season light level in explaining the spatial distribution of morphs across the species range in South Africa. Our results provide the first empirical evidence supporting the hypothesis that polymorphism in a species, and the spatial structuring of morphs across its distribution, may be driven by differential selective advantage under varying light conditions.

11:15	SUNDAY, 20/08/2017	HALL I	SYM8.3
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## Melanin-based colouration and personality within a sibling competition context

David López-Idiáquez<sup>1</sup>, Juan Antonio Fargallo<sup>1</sup>, Isabel López-Rull<sup>1</sup>, Jesús Martínez-Padilla<sup>2</sup>

<sup>1</sup>*Museo Nacional de Ciencias Naturales (MNCN-CSIC), Madrid, Spain;* <sup>2</sup>*Research Unit of Biodiversity (OU, CSIC, PA). Oviedo University, Mieres, Spain*

Animal personality is defined as the inter-individual differences in behaviour consistent across time and contexts. The most common way to study individual differences in behaviour is the shy-bold axis, in which bold individuals are characterized to be more aggressive and prone to risk than shy individuals. Variation in personality has been associated with differential expression of different coloured traits, particularly melanin-based traits. This relationship has been explained by the effect of testosterone on both the synthesis of melanin and on aggressiveness. However, the great majority of studies exploring individual personality in relation to colour have been done in adult individuals, despite the fact that offspring also show melanin-pigmented traits and have variation in their aggressive levels. Here, we explored the association of personality and melanin-based coloration in 148 common kestrel nestlings. We measured 5 personality traits that were combined in a principal component analysis that resulted in a single axis representing a gradient of shy and bold behaviour that was associated with plumage blackness. Our results show that personality and colouration are better integrated in females than in males, where there is a positive relationship between boldness and plumage blackness. These results suggest that offspring's colouration is a signal of personality that may be working within a sibling competition context. The expression of this trait may be modulating the access to limited resources, like parental care, during both the nestling and fledgling periods.

11:30	SUNDAY, 20/08/2017	HALL I	SYM8.4
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## Telomere dynamics of tawny owl colour morphs differ and depend on disease status

Patrik Karell<sup>1,2</sup>, Staffan Bensch<sup>2</sup>, Kari Ahola<sup>3</sup>, Muhammad Asghar<sup>4</sup>

<sup>1</sup>*Novia University of Applied Sciences, Ekenäs, Finland;* <sup>2</sup>*Lund University, Lund, Sweden;* <sup>3</sup>*Tornihaukantie 8, Espoo, Finland;* <sup>4</sup>*Karolinska Institute, Stockholm, Sweden*

Parasites are expected to exert long-term costs on host fecundity and longevity. Understanding the consequences of heritable polymorphic variation in disease defence in wild populations is essential in order to predict evolutionary responses to changes in disease risk. Telomeres have been found to shorten faster in malaria-diseased individuals compared to healthy ones with negative effects on longevity and thereby fitness. Here we study the impact of haemosporidian blood parasites on telomere dynamics in tawny owls, which display a highly heritable plumage colour polymorphism. Blood parasites have previously been found to have morph-specific impact on body mass maintenance. We show that telomeres shortened faster in individuals with shorter breeding life span. Telomere length was negatively associated with the degree of pheomelanic brown colouration and shorter in infected than uninfected individuals. The rate of telomere shortening between breeding seasons was faster in darker pheomelanic individuals and suppression of parasite intensity between seasons was associated with faster telomere shortening in the paler grey individuals but not in darker pheomelanic ones. We discuss the potential pathways leading to this morph-specific variation in telomere dynamics in tawny owls and the implications of disease and telomere dynamics in the evolution and maintenance of genetic colour polymorphism.

11:45	SUNDAY, 20/08/2017	HALL I	SYM8.5
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## Plumage polymorphism covaries with life history in common buzzards

Oliver Krüger<sup>1</sup>, Nayden Chakarov<sup>1</sup>

<sup>1</sup>*Bielefeld University, Bielefeld, Germany*

The evolution and maintenance of phenotypic polymorphism has challenged evolutionary biologists for centuries. Phenotypic polymorphism is particularly common among birds of prey and owls and one species where the plumage varies from almost all white to almost completely dark brown is the common buzzard (*Buteo buteo*). One population in Germany has been studied in great detail for 30 years and has revealed a complex mosaic of selection pressures that affect the plumage morphs differently. Across many different life history traits, from breeding phenology, ecto- and endoparasite infection, aggressive behaviour, to survival and lifetime reproductive success, the plumage polymorphism is associated with profound differences. Here, we will show potential underlying genetic and genomic mechanisms for both the polymorphism and the trait differences, and will explore the behavioural differences and their consequences in greater detail. The results will reinforce the notion that an integrative approach to the evolution and maintenance is needed to advance our understanding and that this is possible now even in non-model avian systems.

## Symposium 9: The form and function of birds' nests

10:30	SUNDAY, 20/08/2017	HALL XXI	SYM9.0
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### Introduction

Mark Mainwaring<sup>1</sup>, S. James Reynolds<sup>2</sup>, Susan Healy<sup>3</sup>, Lauren Guillette<sup>3</sup>

<sup>1</sup>Lancaster University, Lancaster, UK; <sup>2</sup>Birmingham University, Birmingham, UK; <sup>3</sup>University of St Andrews, St Andrews, UK

There has been a marked increase in research examining the form and function of birds' nests over the past decade. Studies have shown, for example, the sophisticated cognitive abilities associated with nest building, the role of nesting behaviours as honest signals of the builder's body condition and their role in providing shelter from inclement weather conditions. Avian nests are increasingly being viewed as an important investment on the part of the breeding bird because the environmental conditions experienced by embryos within nests can profoundly influence offspring fitness. This symposium will present research examining the importance of form and function of nests in reproductive outcomes, while also linking with broader themes of, for example, animal cognition, natural selection and sexual selection.

10:35	SUNDAY, 20/08/2017	HALL XXI	SYM9.1
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### **Cognition and nest building: what does nest structure tell us?**

Susan Healy<sup>1</sup>

<sup>1</sup>University of St Andrews, St Andrews, UK

The nests that birds build are familiar: they have been raided for eggs and have appeared in artwork for centuries. What determines the structure of a nest, however, is only relatively recently begun to be addressed. Thus far, the focus is largely on the role that the physical environment might play, for example, the importance of the form of the structure, or its constituent materials, for the insulation of eggs, chicks and incubator. But how does a bird 'know' what nest to build? As there is increasing evidence that birds build a nest that is a response to their local environment (weather conditions and access to appropriate material) and that birds use their own experience when making building decisions, it seems that it might be useful to investigate building itself (the material choices, how animals manipulate material and so on) and not just the resulting structure. In this talk, I will ask how much we can learn of the decisions of a builder from detailed examination of nest structure.

11:00	SUNDAY, 20/08/2017	HALL XXI	SYM9.2
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### **The impacts of climate on incubation period in long-tailed tits (*Aegithalos caudatus*)**

Caitlin Higgott<sup>1</sup>, Karl Evans<sup>1</sup>, Ben Hatchwell<sup>1</sup>

<sup>1</sup>University of Sheffield, Sheffield, UK

Climatic factors can have a significant effect on breeding season phenology in birds, with profound consequences for productivity. However, most studies have focused only on the onset of egg-laying, even though the duration of the incubation period may also be a key factor that determines chick hatching dates and hence the synchrony between the nestling period and peak food availability. Variation in the duration of incubation will influence the cost to parents of incubating their eggs, and affect offspring mortality risk through the likelihood of nest predation. The length of the incubation period may also be affected by nest quality, and especially its capacity to mitigate environmental variability. Here we use the long-tailed tit *Aegithalos caudatus* as a case study to address two objectives. First, we use data from a 23-year study to test the hypothesis that the duration of the incubation period is a function of ambient temperature and rainfall. We then report results of field observations and lab experiments to test how nest structure and rainfall influence the insulating properties of long-tailed tit nests. This study provides unique insights into how changing climatic conditions can influence a critical but somewhat neglected aspect of breeding behaviour.



11:15	SUNDAY, 20/08/2017	HALL XXI	SYM9.3
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### **Tits as bryologists: patterns of moss use in nests by three species co-habiting primeval forest**

Tomasz Wesołowski<sup>1</sup>, Sylwia Wierzcholska<sup>1</sup>

<sup>1</sup>*Laboratory of Forest Biology Wrocław University, Wrocław, Poland*

‘Green moss’ is used as nest material by many tits, it can make up to 80% of their nest mass. Ornithologists usually do not try to identify bryophyte species used, nor consider their biological features. Therefore it is unknown how choosy are the birds, and if their decisions to use particular species are related to biological features of the bryophytes involved. To answer these questions we studied use of bryophytes in nests of Blue *Cyanistes caeruleus*, Great *Parus major* and Marsh *Poecile palustris* tits breeding side by side in the same primeval broadleaved forest in Białowieża National Park (Poland). Tree holes are superabundant there and bryophyte flora diversified, so the birds may choose both their preferred nest sites and which bryophytes to use. We expect that the tits would appear selective, that they would use bryophytes with appropriate characteristics: high water absorbing capacity, forming dense mats of interwoven stems, providing sufficient mechanical support for the nests. We also predict, that smaller Marsh and Blue Tits would be similar in their use of bryophytes, whereas Great Tits, which build largest nests, would use more robust species. We gathered data on composition of bryophytes in 81 tits nests, as well as, assessed availability of bryophytes in surroundings of their hole trees. We use these data to see whether the tits are indeed competent ‘bryologists’.

11:30	SUNDAY, 20/08/2017	HALL XXI	SYM9.4
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### **Urbanisation and nest building in birds**

S. James Reynolds<sup>1</sup>

<sup>1</sup>*University of Birmingham, Birmingham, West Midlands, UK*

The world is urbanising rapidly such that by 2050 66% of the global population is predicted to live in urban areas. Urbanisation is accompanied by land use changes to accommodate residential housing and businesses, increased infrastructural development and habitat fragmentation which create barriers to movement for some animal taxa. Over the last two decades we have grown ever more interested in how urbanisation influences fundamental aspects of avian biology such as life-history strategy, vocal and non-vocal communication, survival and breeding performance. Here, I will show that our understanding of nesting biology of urban birds has lagged behind that of other traits. I will review what we currently know about structure and function of nests of birds in cities, and in so doing I will identify research objectives that need to be prioritised. Specifically, I will set these within the context of land cover along urban gradients, and I will stress the importance of considering in concert extrinsic factors such as food availability, parasite load, nest microclimate and predation risk. I will end the presentation by suggesting ways that we can better work with the general public to use citizen science to make major advances in our understanding of this long neglected aspect of the reproductive biology of birds.

11:45	SUNDAY, 20/08/2017	HALL XXI	SYM9.5
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### **Nest construction is a heritable trait in a wild bird**

Pauliina Järvinen<sup>1</sup>, Edward Klun<sup>2,3</sup>, Jon Brommer<sup>1,4</sup>

<sup>1</sup>*University of Turku, Turku, Finland;* <sup>2</sup>*University of Helsinki, Helsinki, Finland;* <sup>3</sup>*Finnish Museum of Natural History, Helsinki, Finland;* <sup>4</sup>*Novia University of Applied Sciences, Ekenäs, Finland*

Nests are primarily built for reproduction; yet their shape, size and composition vary drastically across taxa and even within species. A plethora of hypotheses have been forwarded to explain intraspecific variation in nest construction. These include local variation in thermal conditions, precipitation, predation and brood parasitism, as well as parasite and bacteria avoidance, sexual and status signalling and individual preference. These hypotheses are, however, largely built on the putative adaptive value of nest construction. Nest construction may respond to selection only if it is a property of the individual and has a heritable basis. Very few studies have documented repeatability (upper limit of heritability) in avian nest construction and fewer yet have estimated heritability. Based on data on blue tit nest height and nest composition gathered since 2008, we demonstrate repeatable variation in both nest height and in the composition of material used in the nest. We use pedigree information to show that nest height is heritable and also find evidence that nest composition is a heritable trait. Despite the general consensus that female blue tit constructs the nest, we find that males have a small effect on nest height. Height and composition of blue tit nests may thus adaptively respond to any selection acting upon it.

## Symposium 10: Natal dispersal movements in resident bird species

10:30	SUNDAY, 20/08/2017	HALL X	SYM10.0
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### Introduction

Martin Grüebler<sup>1</sup>, Julien Fattbert<sup>1</sup>

<sup>1</sup>*Swiss Ornithological Institute, Sempach, Switzerland*

Natal dispersal is a fundamental process that links demography to space, and is pivotal to functional landscape connectivity and metapopulation dynamics. In birds, most of the information on dispersal comes from ringing studies, but ringing data can introduce biases into estimates of dispersal distances and give most limited information about factors affecting the three phases of natal dispersal: emigration, transience, and settlement. Tracking movements is a key component of research on dispersal, since trajectories and habitat use during dispersal influence an individual's survival, its settlement success, and ultimately its contribution to demographic and spatial processes. Recent developments in radio- and satellite-tracking technologies enabled tracking of smaller organisms for increasing time periods and over increasing distances. In birds, the new devices were mainly used in studies of range use in breeding birds or in studies of migration routes in long-distant migrants. However, research on the patterns and mechanisms of natal dispersal in resident bird species based on movement trajectories remains limited. In particular, investigation of the mechanisms that shape the numerous traits of dispersal strategies is still at the beginning.

10:35	SUNDAY, 20/08/2017	HALL X	SYM10.1
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### Integrating more movement ecology into bird dispersal ecology

Julien Fattbert<sup>1,2</sup>, Martin Grüebler<sup>1</sup>

<sup>1</sup>*Swiss Ornithological Institute, Sempach, Switzerland;* <sup>2</sup>*School of Life Sciences, University of KwaZulu-Natal, Durban, South Africa*

Natal dispersal is a fundamental process that links demography to space, and is pivotal to functional landscape connectivity and metapopulation dynamics. In birds, most of the information on dispersal comes from ringing studies, and therefore give limited information about factors affecting the three phases of natal dispersal: emigration, transience, and settlement. Tracking movements is a key component of research on dispersal, since trajectories and habitat use during dispersal influence individuals' survival, settlement success, and ultimately

their contribution to demographic and spatial processes. However, research on the patterns and mechanisms of natal dispersal in birds based on movement trajectories remained limited by technical constraints. Moreover, tracking devices were mainly used in studies of breeding or migrating birds. Investigation of the mechanisms that shape the numerous traits of dispersal strategies is still at the beginning, but recent developments in radio- and satellite-tracking technologies now enable tracking smaller organisms for increasing time periods, and over increasing distances. We will give an overview of cutting-edge studies of dispersal in birds, focusing on the following main points: Methodologically, how fine-scale resolution of movement data can be used to discern dispersal phases? Ecologically, which factors determine the timing and duration of these phases, movement paths, and survival? We borrow examples extensively from our own case study on natal dispersal in the little owl (*Athene noctua*), and will show how integrating concepts from movement ecology has the potential to greatly improve our understanding of dispersal in birds.

11:00	SUNDAY, 20/08/2017	HALL X	SYM10.2
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### **Juvenile dispersal in the barn owl: rearing conditions affect timing and dispersal distances**

Bettina Almasi<sup>1</sup>, Carolina Massa<sup>2,1</sup>, Alexandre Roulin<sup>2</sup>, Lukas Jenni<sup>1</sup>

<sup>1</sup>Swiss Ornithological Institute, Sempach, Switzerland; <sup>2</sup>University of Lausanne, Lausanne, Switzerland

Natal dispersal is a key process in population biology and ecology. Individual dispersal decisions can depend on both extrinsic and intrinsic factors. Extrinsic factors include among others, population density, sex ratio, predator abundance or food availability, while sex, body condition, developmental effects and plumage coloration belong to intrinsic factors. In the present study, we explored in the barn owl *Tyto alba* the individual dispersal decision during the first eight month of their life focusing on two intrinsic factors: developmental effects of stressful rearing conditions and melanin-based coloration. Stressful rearing conditions were mimicked by a short-term corticosterone treatment within physiological range during the juvenile growth phase and resulted in a period of reduced growth and shorter wing length around fledging. The coloration in the barn owl is mainly genetically determined and correlates with many fitness-related traits. We found that corticosterone-treated individuals left the nest of rearing later than the placebo group but then dispersed further. Individuals with many eumelanic spots on the plumage and individuals with longer tarsi also dispersed further. Siblings stayed closer together when they experienced stressful than relaxed rearing conditions. This indicates that dispersal behaviour is related to a genetically-inherited plumage trait and is modified by the conditions experienced during post-natal growth.

11:15	SUNDAY, 20/08/2017	HALL X	SYM10.3
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### **Individual, social and habitat factors influencing multiple behavioural stages of dispersal in the middle spotted woodpecker**

Hugo Robles<sup>1</sup>, Zeno Porro<sup>2</sup>, Carlos Ciudad<sup>2</sup>

<sup>1</sup>University of Antwerp, Antwerp, Belgium; <sup>2</sup>Technical University of Madrid, Madrid, Spain

Natal dispersal is assumed to be a multi-stage (emigration / departure, transfer / exploration, immigration / settlement) process, but the identification of the multiple behavioural stages of dispersal is often arbitrary due to the limited information between departure and settlement areas. We address this issue by radio-tracking juvenile middle spotted woodpeckers dispersing through novel environments. Using Behavioural Change Point Analysis, we found that dispersal can be seen as a number of consecutive "exploration waves" where a first primary exploratory phase is followed by temporal settlements and/or a number of secondary explorations. Woodpeckers reduced search rates and areas, and increased thoroughness of search, when moving on areas

with high proportions of potential breeding habitat (old oak forest) at any dispersal stage, which support the hypothesis that habitat loss/fragmentation may promote dispersal as a behavioural mechanism to escape adverse conditions. Light nestlings moved short distances and experienced high predation rates early after fledging, which may suggest that poor conditions in the nest have a carry-over effect on mortality by reducing mobility. Unlike females, dispersing males born in high-populated areas moved shorter distances from the natal nest during the transfer stage. Thus, while heavier males may have used conspecific attraction as a behavioural mechanism during habitat selection, lighter females kept on moving away from high-populated areas, which may lead to the typical female-biased natal dispersal pattern of many bird species. Incorporating movement ecology to better understand the secretive life of dispersers is, therefore, essential to provide new insights into the mechanisms driving natal dispersal.

11:30	SUNDAY, 20/08/2017	HALL X	SYM10.4
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### **Natal dispersal behaviour in the polymorphic common buzzard: a case study in The Netherlands**

Elena Frederika Kappers<sup>1,2</sup>, Christiaan Both<sup>1</sup>, Bart Kempenaers<sup>2</sup>

<sup>1</sup>Conservation Ecology Group, Groningen Institute for Evolutionary Life Sciences, University of Groningen, Groningen, The Netherlands; <sup>2</sup>Department of Behavioural Ecology and Evolutionary Genetics, Max Planck Institute for Ornithology, Seewiesen, Germany

Natal dispersal, the movement of an individual from its birthplace to the site of first reproduction, is of critical ecological and evolutionary importance for individuals and populations. Despite its importance, there is still little known about this behavioral trait. How birds decide where to settle and how great the distance they will fly before settling depends on many factors. Individual strategies and environmental factors can explain interindividual variation in dispersal distances. The common buzzard is a raptor with polymorphic melanic coloration: the extremes go from very dark to almost completely white individuals. Colour polymorphism is often correlated with a whole range of behavioural and physiological traits, due to pleiotropic effects of genes acting on the melanocortical axis. The colour polymorphism could be associated with behavioral traits such as habitat choice, raising the possibility that the coloration is also related to dispersal. Polymorphic species are able to utilise a diverse range of habitats because different morphs are often adapted to different microhabitats. We studied the natal dispersal behaviour of common buzzards *Buteo buteo* in a Dutch population, where we tagged 73 juveniles of different colour morphs with GSM/GPS-transmitters during the breeding seasons of 2015 and 2016. The dispersal process involved first departure from the natal population, exploratory movements, temporary settlements and often returns to the natal population. The aim of the study is to understand the dispersion behavioural differences between colour morphs and different habitat use during early life.

11:45	SUNDAY, 20/08/2017	HALL X	SYM10.5
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### **Albatrosses prospect before choosing a home: intrinsic and extrinsic sources of variability in visitation rates**

Letizia Campioni<sup>1</sup>, José Pedro Granadeiro<sup>2</sup>, Paulo Catry<sup>1</sup>

<sup>1</sup>ISPA-IU, Lisbon, Portugal; <sup>2</sup>Universidade de Lisboa, Lisbon, Portugal

Ringling and tracking pre-breeder black-browed albatrosses, *Thalassarque melanophris*, from the Falkland Islands showed that most individuals start prospecting ashore when 4-5 years old and that the majority of the younger individuals prospect more than one breeding colony. Some individuals prospecting up to 5 colonies in just 9 days. Prospecting rapidly declined as pre-breeders aged, by which time individuals likely had already

selected their future nesting site. Prospecting activity did not differ between males and females, in accordance with similar philopatry of both sexes at the study colony. Nestling body mass at 60-days of age and hatching date did not influence prospecting behaviour during pre-breeding. Prospecting was mostly directed at colonies within 10km distance from the natal place, but occurred regularly up to 55-65km distance (exceptionally it can occur at least up to 600km in this population). While distance from the natal place was a strong predictor of the probability of a colony being prospected, colony size and trend were not. Breeding adults currently brooding eggs and rearing chick rarely engaged in prospecting. Results show that even for highly philopatric birds, recruitment to the natal colony (or to another nesting site) has the potential to be informed, not done blindly.



## 11. Oral sessions

### Oral session 1: Migration I

15:00	SATURDAY, 19/08/2017	HALL IX	OS1.1
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#### Feather microbiome in light of moulting and migratory strategies of passerine birds

Veronika Javurkova<sup>1,2</sup>, Petr Procházka<sup>2</sup>, Milica Požgayová<sup>2</sup>, Peter Adamík<sup>3</sup>, Petr Heneberg<sup>4</sup>, Jakub Kreisinger<sup>1</sup>

<sup>1</sup>Charles University, Faculty of Science, Department of Zoology, Prague, Czech Republic; <sup>2</sup>Czech Academy of Sciences, Institute of Vertebrate Biology, Brno, Czech Republic; <sup>3</sup>Palacký University of Olomouc, Department of Zoology and Anthropology, Olomouc, Czech Republic; <sup>4</sup>Charles University, 3rd Faculty of Medicine, Prague, Czech Republic

In past decades, studies on microorganisms harbouring birds' feathers have mostly been focused on feather-degrading bacteria. To date, however, there is no study considering the complex microbiome community structure of feathers and comparing of how the different migratory and moult strategies may affect both bacterial diversity and overall feather bacterial load. Here we present deep 16S rRNA pyrosequencing and flow cytometry data to compare bacterial diversity, overall bacterial load and proportion of viable bacteria in feathers of 18 passerines with different moult and migratory strategies. We found moult strategies as the main predictor of viable and overall feather bacterial loads in passerines. Overall bacterial load was significantly the highest in passerines with one complete post-breeding moult per year. These species had also slightly higher viable bacterial load in feathers compared to passerines with one complete and one partial moults per year during either post-breeding or wintering period. Lowest overall bacterial load were found in species with two complete moults per year represented by willow warbler (*Phylloscopus trochilus*) whose feathers, on the contrary, harboured highest proportion of viable bacteria. Surprisingly, we found no differences in overall and viable bacterial loads in feathers of resident and/or long-distance migrants. Furthermore, feather bacterial diversity was affected neither by migratory nor moult strategies. Instead, host species identity and sampling locality were the main predictors of diversity in feather bacterial community structure. Our results suggest host-parasite coevolution of feather microorganisms and birds and consider microorganisms as the important players in evolution of different moult strategies in passerine birds.

15:15	SATURDAY, 19/08/2017	HALL IX	OS1.2
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## **Pathogens on the move: mechanistic approaches to investigate the consequences of infections on migratory behaviour**

Simeon Lisovski<sup>1</sup>, Silke Bauer<sup>1</sup>

<sup>1</sup>*Swiss Ornithological Institute, Sempach, Switzerland*

Migratory birds are well known hosts to a variety of parasites and it is speculated that their live-style makes them more susceptible to infections as trade-offs between e.g. immune investment and investment in energetically challenging migration may exist. Furthermore, by visiting otherwise disparate locations, migrants may encounter a greater variety of parasites than residents. However, the transient nature of migrants makes it difficult to follow them throughout their annual life-cycle hampering our ability to investigate the consequences of parasite exposure and infection on their hosts and ultimately their migratory behavior. In this talk we discuss the application and results of a state-dependent optimality modeling approach to evaluate how malaria infections may alter migratory behavior and to identify the mechanistic links between the consequences of pathogen infections at various time scales ranging from days, weeks, years and entire life-spans. Furthermore, we discuss the ability of different modeling approaches to evaluate hypothesis about the spread of pathogens and what empirical data is necessary to generate more conclusive and reliable model predictions.

15:30	SATURDAY, 19/08/2017	HALL IX	OS1.3
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## **How immune function shapes avian migration**

Arne Hegemann<sup>1</sup>

<sup>1</sup>*Lund University, Lund, Sweden*

The immune system protects the body against harmful pathogens. It is fundamentally important for self-maintenance and promotes survival by reducing the probability of disease-related mortality. However, it simultaneously incurs costs in terms of its production, maintenance and activation. Therefore, it has been hypothesised that trade-offs with other behavioural and physiological activities make immune function a powerful driver of individual differences in many evolutionary and ecological processes. So far much research has focussed on trade-offs between immune function and reproduction. Only recently evolutionary biologists and ecologists started to investigate the role of immune function in shaping animal migration. It has been hypothesised that migrants need to reduce immune function during the physiologically demanding migration seasons. A contrasting hypothesis proposes that migrants need to boost immune function because they encounter more and/or different pathogens during their journey. In this talk, I will summarise results from my recent work on different bird species that evaluates these hypotheses and sheds light on how immune function influences animal migration. I will show how immune function differs between migrants and residents, how migrants adjust immune function during migration and how immune function influences stopover decisions. Furthermore, I will present first evidence for a trade-off between immune function and antioxidant defences; this trade-off becomes only apparent during the physiologically demanding migration seasons. The presented data will enhance our understanding of the physiological mechanisms that drive bird migration and ultimately help us to better understand the ecology and evolution of migration.

15:45	SATURDAY, 19/08/2017	HALL IX	OS1.4
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## **Haematological parameters differ between spring and autumn migration in songbirds**

Julia Loshchagina<sup>1,2</sup>, Arseny Tsvey<sup>1</sup>

<sup>1</sup>*Biological Station Rybachy, Zoological Institute RAS, Rybachy, Kaliningrad region, Russia;* <sup>2</sup>*Institute of Geography RAS, Moscow, Russia*

White blood cells (WBC) are part of the immune system and provide information on physiological condition in birds. Total WBC count and heterophil:lymphocyte (H:L) ratio depend on a number of internal and external factors. Spring and autumn migrations are similar in aspects of mobility, energetics, and physiology. However, they are different in many aspects that might cause physiological differences including variation of leukocyte profile but our knowledge on this question is still limited. To test whether the haematological parameters differ between spring and autumn migrations, we analyzed 74 blood smears from European robin, collected on the Curonian Spit on the Baltic Sea during spring (n=30) and autumn (n=44) migratory seasons in 2016. In spring total WBC count was significantly lower and H:L ratio was almost twice as high than in autumn. Lower total WBC count in spring might reflect lower activity of immune system associated with higher energetic demands in this season. The increase of corticosterone level in spring could be a physiological mechanism of increase of H:L ratio. To investigate seasonal differences in haematological parameters experimentally, we kept European robins (ER) and garden warblers (GW) for 10 months under photoperiodic conditions experienced by these species in the wild, holding all other conditions constant. There were no differences in total WBC count between migratory seasons in both species. H:L ratio showed seasonal pattern with increase in spring comparing with autumn in ER, but not in GW. We discuss how these results could be connected with migratory strategies of the species studied.

16:00	SATURDAY, 19/08/2017	HALL IX	OS1.5
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#### **Avian malaria: low parasitaemia does not reduce the aerobic performance in migratory hosts**

Steffen Hahn<sup>1</sup>, Silke Bauer<sup>1</sup>, Dimitar Dimitrov<sup>2</sup>, Tamara Emmenegger<sup>1</sup>, Karina Ivanova<sup>2</sup>, Pavel Zehindjiev<sup>2</sup>, William A. Buttemer<sup>3</sup>

<sup>1</sup>*Swiss Ornithological Institute, Department of Bird Migration, Sempach, Switzerland;* <sup>2</sup>*Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, Sofia, Bulgaria;* <sup>3</sup>*School of Biological Sciences, University of Wollongong, Wollongong, Australia*

Haemosporidian parasites, the causative agents of avian malaria in its broader sense are thought to impair the aerobic performance of their hosts, but this has not been examined in free-living bird populations. We measured resting metabolic rates, i.e. the minimum O<sub>2</sub> consumption during overnight rest, peak metabolic rates, i.e. the maximum O<sub>2</sub> consumption, as well as endurance during intense exercise in free-ranging non-infected and chronically infected Great reed warblers (*Acrocephalus arundinaceus*) over consecutive life-history stages. In addition, we quantified the aerobic performance of captive birds during subsequent stages of an experimental infection with *Plasmodium relictum* lineage GRW04, a common avian malaria strain. Both aerobic performance and exercise endurance were not affected by parasitaemia level (the relative number of infected erythrocytes in the blood) in either free-living or experimentally treated captive birds. Importantly, phenotypic changes associated with preparation for migration were similarly unaffected by parasitaemia. Consequently, birds experiencing low levels of parasitaemia typical for chronic infections are not expected to differ from uninfected birds in their migration capacity and, thus, have significant potential to spread malaria pathogens.

16:15	SATURDAY, 19/08/2017	HALL IX	OS1.6
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#### **Migration and the evolutionary loss of immune gene diversity**

Emily O'Connor<sup>1</sup>, Charlie Cornwallis<sup>1</sup>, Jan-Åke Nilsson<sup>1</sup>, Dennis Hasselquist<sup>1</sup>, Helena Westerdahl<sup>1</sup>



<sup>1</sup>Lund University, Lund, Sweden

Twice a year millions of long-distance migratory birds travel thousands of miles between their temperate breeding and tropical wintering grounds. Surviving exposure to pathogens in both of these environments presents a major challenge for the immune system. How migratory birds have adapted to cope with this high diversity of pathogens is currently unknown. Here we address this issue in a phylogenetic framework by testing whether Afro-Palearctic migratory Passerine birds have more diverse major histocompatibility compatibility (MHC) genes, allowing a wider range of pathogens to be recognised, than resident species in either Africa or the Palearctic. We found that, although most Afro-Palearctic migratory passerines originated from resident African species, their MHC diversity now more closely resembles that of Palearctic residents, suggesting that the migratory birds have evolved lower MHC diversity than their African ancestors. This initially surprising result may reflect the cost of high MHC diversity in terms of an increased risk of immuno-pathology. By enabling species to escape tropical pathogens during the breeding season, migration appears to have relaxed selection for high MHC diversity. Overall, our results underscore the potential role of pathogen avoidance in the evolution of migration.

## Oral session 2: Distribution

15:00	SATURDAY, 19/08/2017	HALL XXI	OS2.1
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### Climate change impacts on mountain birds: status and prospects

Davide Scridel<sup>1,2</sup>, Dan Chamberlain<sup>3</sup>, Paolo Pedrini<sup>1</sup>, Giuseppe Bogliani<sup>2</sup>, Mattia Brambilla<sup>1,4</sup>

<sup>1</sup>Museo delle Scienze (Sezione Zoologia dei Vertebrati), Trento, Italy; <sup>2</sup>Università di Pavia (Dipartimento di Scienze della Terra e dell'Ambiente), Pavia, Italy; <sup>3</sup>Università di Torino, Torino, Italy; <sup>4</sup>Fondazione Lombardia per l'Ambiente (Settore Biodiversità e Aree Protette), Seveso, Italy

Although considered globally important areas for birds and biodiversity, mountain regions remain poorly studied despite their renowned susceptibility to climatic alterations. Basic knowledge of species inhabiting these regions is scarce, and even a univocal definition for mountain regions is debatable as interpretations vary across countries and institutions. These ambiguities may prevent the definition of effective large-scale conservation strategies, and it is urgent to define "mountain birds" and investigate the potential impact of climate change on such species. Here, we propose a definition of mountain birds, summarise reported impacts and discuss predictions of changes in species distribution according to climate scenarios. We introduce for the first time an objective classification of mountain bird specialists and generalists, present the results of a systematic review and meta-analysis of the effects of climate change on Holarctic mountain and upland birds, quantifying the general responses to climate change including altitudinal shifts, changes in life history traits and assessment of mitigation actions. Using Italy as a case-study, we then demonstrate how climate change has already affected patterns of bird distribution in the last 30-years by comparing a range of cold-adapted and closely related control species. Finally, we show how climate change will increase the potential conflict between anthropogenic activities and the conservation of high-elevation birds and habitats in the Alps and examine the potential future impacts of climate change on both broad distribution and fine-scale habitat suitability for a mountain specialist.

15:15	SATURDAY, 19/08/2017	HALL XXI	OS2.2
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### Modelling mountain bird distributions - Model consistency and transferability across different Alpine regions

Dan Chamberlain<sup>1</sup>, Susanne Jähnig<sup>1</sup>, Paolo Pedrini<sup>2</sup>, Enrico Caprio<sup>1</sup>, Antonio Rolando<sup>1</sup>, Mattia Brambilla<sup>2,3</sup>

<sup>1</sup>University of Turin, Turin, Italy; <sup>2</sup>Museo delle Scienze di Trento, Trento, Italy; <sup>3</sup>Fondazione Lombardia per l'Ambiente, Seveso, Italy

Conservation actions are often based on studies carried out in fairly restricted areas, yet these actions may be applied to much wider areas beyond the location of research. The extent to which birds respond to habitat in a consistent way across different regions may limit the efficacy of any conservation initiative that is intended to be applied over broad geographical areas. We address this issue in an Alpine context, considering (i) existing evidence of differences in environmental requirements (habitat, climate, topography) in different areas of the Alps and (ii) formally analysing consistency of climate and habitat associations and trends in altitudinal occurrence rates for Alpine species using data from bird surveys of altitudinal transects carried out in two separate Alpine regions, Piedmont and Trentino. Forest and grassland species showed a reasonable level of consistency in previously published models, although model outcomes were less consistent for forest-shrub ecotone species. Distributions of the majority of species along altitudinal gradients were consistent across regions. Furthermore, the environmental drivers were similar across regions for a given species. However, the magnitude of the effects of individual drivers varied. Cross-validation found good model performance for forest species, suggesting high model transferability, but poor model performance for grassland and especially forest-shrub ecotone species. These findings suggest that broad-scale models can be used to predict montane forest species occurrence across Alpine regions, but that a greater understanding of environmental requirements of higher altitude species is needed in order to develop more widely applicable predictive models.

15:30	SATURDAY, 19/08/2017	HALL XXI	OS2.3
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#### **Influence of device accuracy and choice of algorithm for species distribution modelling of seabirds: A case study using black-browed albatrosses**

Jan O. Engler<sup>1</sup>, Petra Quillfeldt<sup>2</sup>, Janet R.D. Silk<sup>3</sup>, Richard A. Phillips<sup>3</sup>

<sup>1</sup>Dept. of Biology, Terrestrial Ecology Unit, Ghent University, Ghent, Belgium; <sup>2</sup>Dept. of Animal Ecology and Systematics, Justus-Liebig-University, Giessen, Germany; <sup>3</sup>British Antarctic Survey, Natural Environment Research Council, Cambridge, UK

Species distribution models (SDM) based on tracking data from different devices are used increasingly to explain and predict seabird distributions. However, different tracking methods provide different data resolutions, ranging from <10m to >100km. To better understand the implications of this variation, we modeled the potential distribution of black-browed albatrosses *Thalassarche melanophrys* from South Georgia that were simultaneously equipped with a Platform Terminal Transmitter (PTT) (high resolution) and a Global Location Sensor (GLS) logger (coarse resolution), and measured the overlap of the respective potential distribution for a total of nine different SDM algorithms. We found slightly better model fits for the PTT than for GLS data (AUC values  $0.958 \pm 0.048$  vs.  $0.95 \pm 0.05$ ) across all algorithms. The overlaps of the predicted distributions were higher between device types for the same algorithm, than among algorithms for either device type. Uncertainty arising from coarse-resolution location data is therefore lower than that associated with the modeling technique. Consequently, the choice of an appropriate algorithm appears to be more important than device type when applying SDMs to seabird tracking data. Despite their low accuracy, GLS data appear to be effective for analyzing the habitat preferences and distribution patterns of pelagic species.

15:45	SATURDAY, 19/08/2017	HALL XXI	OS2.4
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#### **Weather effects on population dynamics of common birds in the northern and southern parts of their distribution range**

Juan Gallego Zamorano<sup>1,2</sup>, Andreas Lindén<sup>3</sup>, Ruud P.B. Foppen<sup>4,5</sup>, Jiří Reif<sup>6</sup>, Chris van Turnhout<sup>4,5</sup>, Aleksi Lehikoinen<sup>1</sup>

<sup>1</sup>*The Helsinki Lab of Ornithology, Finnish Museum of Natural History, Helsinki, Finland;* <sup>2</sup>*Czech University of Life Science, Faculty of Environmental Sciences, Department of Ecology, Prague, Czech Republic;* <sup>3</sup>*Novia University of Applied Sciences, Ekenäs, Finland;* <sup>4</sup>*Sovon Dutch Centre for Field Ornithology, Nijmegen, The Netherlands;* <sup>5</sup>*Department of Animal Ecology, Institute for Water and Wetland Research, Radboud University, Nijmegen, The Netherlands;* <sup>6</sup>*Institute for Environmental Studies, Faculty of Science, Charles University, Prague, Czech Republic*

Weather can influence populations of species differently depending on where the population is situated within the species distribution range. However, large-scale studies investigating drivers of population dynamics are scarce. We investigated how variation in several weather variables affect population dynamics of small-sized passerine birds in the northern (Finland) and southern (the Czech Republic, and the Netherlands) parts of their range. We tested the following hypotheses: a) Warmer winter temperatures improve survival and thus increases populations sizes, especially among residents and short-distance migrants; b) Higher temperatures during spring migration (species-specific time interval) prolong their migration, leading to population increase in the northern parts of their range and decrease in the south; c) High thermal sum during spring of the previous year leads to population declines, due to mismatch between the food availability and the brood rearing period, and hence lower number of recruits; d) low temperatures and high rainfall during brood rearing period adversely affects survival of young, decreasing the number of recruits next year and leading to a population decline. We use monitoring data of 49 species from all three countries during 1985-2014 to test these hypotheses using linear mixed effect models. The preliminary findings support hypothesis a) and d) (winter and summer temperature hypotheses) but found no evidence for b) and c) (migration prolongation and mismatch hypotheses). Further analysis will be conducted to clarify this preliminary results.

16:00	SATURDAY, 19/08/2017	HALL XXI	OS2.5
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### **Changes over a quarter of century in the distribution of Palearctic migrants in southern Africa: revelations from the first and second bird atlas projects (SABAP1 & 2)**

Megan Loftie-Eaton<sup>1</sup>, Les Underhill<sup>1</sup>, Michael Brooks<sup>1</sup>

<sup>1</sup>*University of Cape Town, Cape Town, South Africa*

This presentation is based on a subset of the 18 million records of bird distribution from SABAP1 (1987-91) and SABAP2 (2007-). Records were collected throughout the year, including the arrival and departure periods of the migrants, using similar (but not identical) protocols for both projects. We consider changes in the range and phenology of the more common Palearctic migrants to southern Africa. For many of these species, the breeding area lies in eastern Europe and western Asia. Many of the range changes, especially for the small insectivorous and frugivorous passerines, are expansions, and are attributed to bush encroachment, a phenomenon which has occurred not only in the non-breeding grounds, but also on the breeding grounds, where scrub has overrun abandoned collective farms since the collapse of the Soviet era. Analyses of the timing of arrival and departure of Palearctic migrants show that there have been changes for many species between the two projects. The leading species here is the Barn Swallow *Hirundo rustica*; this species shows results which are inconsistent geographically. The confusing pattern is explained by the fact that the Barn Swallows spending the southern summer in South Africa are not a complete admixture of swallows from the entire breeding range from Ireland to western Asia; but each region has varying proportions of swallows from different parts of the breeding range. It is clear that change in the timing of the start of spring shows complex variation across Eurasia.

16:15	SATURDAY, 19/08/2017	HALL XXI	OS2.6
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## European ornithology's greatest need: the African Bird Atlas Project

Les Underhill<sup>1</sup>, Michael Brooks<sup>1</sup>

<sup>1</sup>*Animal Demography Unit, University of Cape Town, Cape Town, South Africa*

From an African perspective, the fundamental conservation priority for birds in Africa is a proper understanding of the distributions of each species, and how these are changing. Without these distribution maps, conservation is guesswork. For example, up-to-date maps are the first ingredient needed for the Red List process, in which species are classified into threat categories. There is a massive need for an African Bird Atlas Project. Similarly, from a European perspective, a key conservation research priorities for ornithology a knowledge of where each migrant species currently spends the northern winter when it migrates to Africa. This need was a sub-theme that ran through many of the presentations at the conference of the European Bird Census Council in Halle, Germany, in September 2016. In other words, there is a massive need for an African Bird Atlas Project. At the Pan-African Ornithological Congress in Dakar, Senegal, in October 2016, it was acknowledged that the protocols developed for the Second Southern African Bird Atlas Project were appropriate for the African Bird Atlas Project. The talk reports on progress made in southern, eastern and western Africa. By February 2017, most countries of southern Africa were involved, plus Kenya in eastern Africa and Nigeria in western Africa. The talk will present a series of relevant examples of results obtained so far.

## Oral session 3: Conservation I

15:00	SATURDAY, 19/08/2017	HALL XXII	OS3.1
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### Mediterranean cuisine explained by genomic tools: which Red-backed Shrikes end up on the plate?

Liviu G. Pârau<sup>1</sup>, Michael Wink<sup>1</sup>

<sup>1</sup>*Institute of Pharmacy and Molecular Biotechnology, Heidelberg University, Heidelberg, Germany*

Although a long-standing practice, only in the last decades the trapping of migratory birds in the Mediterranean basin emerged as a significant threat for European breeding birds. Increasing evidence reveals the large scale of trapping, the non-selective methods used and the difficulties in approaching this issue. The Red-backed Shrike *Lanius collurio*, a carnivorous passerine, is widely distributed as a breeding bird in Europe and Western Asia and as a migrant in Southern Africa. In the last decades, European populations have declined, partly because of hunting along migration routes, habitat loss, extensive agriculture and climate change e.g. severe droughts in Africa. Within this context, functional connectivity through individual exchange and gene flow becomes critically important, but we still lack an overview on the genetic diversity of the species. Therefore, using our unique collection comprised of <1000 samples from 24 different countries, covering the entire breeding range, we aim to address this knowledge gap. Our initial sequences of cytochrome b gene from mitochondrial DNA revealed high genetic diversity and multiple haplotypes among populations from close territories. Our results are unexpected according to the actual taxonomy, calling into question whether more subspecies exist. Finally, we will discuss the origin of shrikes trapped along the Mediterranean Basin. This project is supported by a grant from the German Ornithologists' Society (<http://do-g.de/>).

15:15	SATURDAY, 19/08/2017	HALL XXII	OS3.2
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### Impacts of shipping traffic on seabirds in the Baltic Sea as investigated with the help of automatic identification system of ships

Claudia Burger<sup>1</sup>, Alexander Schubert<sup>1</sup>, Ansgar Diederichs<sup>1</sup>, Stefan Heinänen<sup>2</sup>, Georg Nehls<sup>1</sup>

<sup>1</sup>BioConsult SH, 25813 Husum, Germany; <sup>2</sup>DHI, Hørsholm 2970, Denmark

Shipping traffic is a major anthropogenic factor in coastal and offshore waters of Europe. Many seabird species are known to respond to shipping traffic, by either avoidance or attraction, but detailed information on species and their specific response is still rare. This knowledge is important as temporal and spatial responses can result in habitat loss and thus might incur fitness costs for some species. Here, we explored the possibilities of using automatic identification system (AIS) data for studying seabird responses to shipping traffic. Seabird data were obtained by digital aerial surveys in an area of high traffic volume in the Baltic Sea. AIS-data provided information on ship type, presence, status or speed at sea. We aimed to investigate the effects of these parameters on the small-scale distribution of seabird species. Furthermore, we aimed to quantify the temporal and spatial scale of the displacement or attraction effect. We studied effects in Common Eiders, a species known to be sensitive to disturbance by ships, and for Larus-gulls, which often follow ships to feed on discards. As expected, the presence of sea ducks was negatively related to the presence of ships, whereas gulls reached higher densities around vessels, especially fishing vessels. In addition, AIS-data revealed spatial and temporal effects of shipping traffic on the distribution of both species. The utilization of detailed vessel data could help to better explain seabird distributions and will add to our understanding of the impacts of shipping traffic on seabird populations.

15:30	SATURDAY, 19/08/2017	HALL XXII	OS3.3
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#### **Assessing the movements of post-fledging white-tailed eagles via satellite telemetry: conservation implications for a recovering population**

Fabio Balotari Chiebao<sup>1</sup>, Toni Laaksonen<sup>1</sup>, Jon Brommer<sup>1</sup>, Hannu Tikkanen<sup>2</sup>

<sup>1</sup>University of Turku, Turku, Finland; <sup>2</sup>University of Oulu, Oulu, Finland

Human-induced changes in the natural habitat pose a threat to animal populations worldwide, including the often vulnerable raptor species. Driven to the brink of extinction in the 1970s, mainly due to environmental contaminants, the Finnish white-tailed eagle population has recovered fast in the last decades. Nonetheless, anthropogenic threats still constitute an important cause of mortality and disturbance. A recent concern among conservationists is the construction and expansion of wind farms, which are expected to play a considerable role in electricity generation in the near future. Here, we used satellite telemetry to study the movements of white-tailed eagles during the period between fledging and dispersal from the natal area. Our main objectives included estimating individual home ranges, calculating the probability of a fledgling visiting the vicinity of a wind turbine hypothetically placed at various distances to the nest, and understanding the relative importance of various habitats and landscape attributes to habitat selection. Our results show great individual variation in home range estimates (1.3-21 km<sup>2</sup>). The probability of a fledgling approaching a turbine decreases considerably as deployment is done farther from the nest; this pattern reflects a greater use of space in the proximity of the nest. Additionally, preliminary results suggest that the eagles tended to use areas along waterbodies, with lower elevation, away from roads, while also avoiding human settlement. In view of increasingly complex environmental landscapes, our study, which discusses current and future threats to the natural expansion of the Finnish white-tailed eagle population, provides useful information for conservation purposes.

15:45	SATURDAY, 19/08/2017	HALL XXII	OS3.4
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#### **Potential collision risk of harriers (*Circus* spp.) with wind turbines during the breeding season derived from high-resolution GPS-tracking**

Tonio Schaub<sup>1,2</sup>, Raymond H. G. Klaassen<sup>1,3</sup>, Willem Bouten<sup>4</sup>, Almut E. Schlaich<sup>1,5</sup>, Koks J. Ben<sup>1</sup>

<sup>1</sup>Dutch Montagu's Harrier Foundation, Scheemda, The Netherlands; <sup>2</sup>Animal Ecology Group, Institute for Biochemistry and Biology, University of Potsdam, Potsdam, Germany; <sup>3</sup>Conservation Ecology Group, Groningen Institute for Evolutionary Life Sciences, University of Groningen, Groningen, The Netherlands; <sup>4</sup>Computational Geo-Ecology, Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, Amsterdam, The Netherlands; <sup>5</sup>Centre d'Études Biologiques de Chizé, UMR 7372, CNRS and Université de la Rochelle, Villiers-en-Bois, France

Raptors have been shown to be especially vulnerable to collision with wind turbines, but knowledge on flight behaviour characteristics affecting collision risk remains limited. In this context, high-resolution GPS-tracking represents a promising but hitherto seldom applied technique. We used UvA-BiTS GPS-tracking data to investigate flight heights and turbine avoidance behaviour of adult male Montagu's *Circus pygargus* (n=22), Hen *C. cyaneus* (2) and Western Marsh Harriers *C. aeruginosus* (3) breeding in the Netherlands and Germany. The vast majority of flights occurred below 45m, the minimum rotor tip height for an "average wind turbine" (86%, 85% and 95% for the three species, respectively). For Montagu's Harriers, the probability of flying at rotor height was greatest in warm and calm weather, around noon and close to the nest, whereas no difference was found between flights inside and outside wind farms. Harriers flew significantly less often close to turbines than expected from a null model of random flight trajectories. This horizontal turbine avoidance was more pronounced when flying at rotor height compared to below rotor height. Our results suggest that harriers face a relatively low collision risk. However, the fact that harriers fly more often at rotor height close to their nests indicates that care must be taken in developing wind farms in core breeding areas. Finally, the tendency to build larger turbines with a lower minimum rotor tip height might be detrimental to harriers as the time flying at rotor height, and thus collision risk, increases exponentially with decreasing minimum rotor tip height.

16:00	SATURDAY, 19/08/2017	HALL XXII	OS3.5
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### **Do nitrogen deposition and forest management explain wood warbler occurrence patterns in Switzerland?**

Gilberto Pasinelli<sup>1</sup>, Dominik Scheibler<sup>2</sup>

<sup>1</sup>Swiss Ornithological Institute, Sempach, Switzerland; <sup>2</sup>Eawag, Dübendorf, Switzerland

European forest ecosystems have been exposed to atmospheric nitrogen deposition and forest management for a long time. However, the consequences of these two processes are not well understood for most forest-dependent species. The migratory wood warble *Phylloscopus sibilatrix* breeds on sparsely vegetated forest floors of middle-aged forests with a closed canopy, and the populations of this species have declined in Western Europe in the last 30 years. We evaluated whether atmospheric nitrogen deposition, forest management, site quality and elevation might have contributed to patterns of wood warbler occurrence by comparing data recorded in 1993-1996 and 2011-2014 in 114 km-squares in Switzerland. Km-squares occupied in 2011-2014 had significantly lower nitrogen deposition than km-squares abandoned in 2011-2014, and the critical loads of nitrogen deposition were significantly less exceeded in the former than in the latter. Moreover, km-squares abandoned in 2011-2014 showed more and closer forest management than km-squares occupied in 1993-1996 and 2011-2014 and also than km-squares newly occupied in 2011-2014. Neither site quality nor elevation explained occurrence patterns of wood warblers over the 20 years. Collectively, these findings suggest a possible role of both excess nitrogen deposition and forest management in explaining occurrence patterns of the wood warbler and perhaps partly population declines observed at the Western European scale.

16:15	SATURDAY, 19/08/2017	HALL XXII	OS3.6
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## Lessons for life: enhancing individuals and habitats to increase re-introductions success

Benjamin Homberger<sup>1</sup>, Markus Jenny<sup>1</sup>, Jérôme Duplain<sup>1</sup>, Lukas Jenni<sup>1</sup>

<sup>1</sup>Swiss Ornithological Institute, Sempach, Switzerland

Re-introductions are important tools for conservation but fitness of released birds is often low. Factors such as physiological condition, behaviour and local knowledge determine who is going to prevail after release. For a re-introduction project of grey partridges into Switzerland we reared more than 2000 birds in captivity and monitored their post-release fitness. We explored how behaviour and food availability during rearing were related to post-release survival. Furthermore, we investigated breeding success in relation to habitat characteristics and nest protection. Birds subjected to unpredictable feeding during rearing had increased post-release survival as compared to birds fed ad libitum. Likewise, individuals of rather bold and explorative nature survived longer than shy birds. Grey partridges preferred ecologically enhanced habitats for breeding. Increasing proportions of heterogenous cover vegetation around the nest and active nest protection by fencing supported hatching success. Our results show that a suit of simple measures can increase post-release fitness and re-introduction success of grey partridge and potentially other threatened ground nesting birds.

## Oral session 4: Physiology I

15:00	SATURDAY, 19/08/2017	HALL I	OS4.1
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### Effect of interspecific brood parasitism on the hormonal state of hosts: a study with the common blackbird (*Turdus merula*).

Francisco Ruiz-Raya<sup>1</sup>, Manuel Soler<sup>1</sup>, Teresa Abaurrea<sup>2</sup>, Olivier Chastel<sup>3</sup>, Gianluca Roncalli<sup>1</sup>, Juan Diego Ibáñez-Álamo<sup>4,5</sup>

<sup>1</sup>Departamento de Zoología, Universidad de Granada, Granada, Spain; <sup>2</sup>School of Psychology & Neuroscience, University of St Andrews, St Andrews, UK; <sup>3</sup>Centre d'Etudes Biologiques de Chizé (CEBC), UMR7372-CNRS/Univ. La Rochelle, Villiers-en-Bois, France; <sup>4</sup>Groningen Institute for Evolutionary Life Sciences, University of Groningen, Groningen, The Netherlands; <sup>5</sup>Department Wetland Ecology, Estación Biológica de Doñana, Sevilla, Spain

Brood parasites exploit the parental care that other birds provide to their offspring and impose high fitness costs on hosts. Despite the important role of corticosterone and prolactin in modulating individual responses to unpredictable perturbations and parental care, respectively, the effect of egg recognition on host physiology and the hormonal mechanisms underlying host responses to parasitic eggs remain unknown. We assessed the effect of brood parasitism on the hormonal and physical state of hosts; as well as their hormonal response to a standardized stressor. To do this, we experimentally parasitized blackbird (*Turdus merula*) nests with non-mimetic eggs and examined both the corticosterone and prolactin profiles of control and parasitized females. We found an increase of baseline corticosterone levels in parasitized females, which showed a poorer body condition compared to control females; meanwhile, baseline prolactin levels remained unaffected. Corticosterone stress response was robust both in control and parasitized females. Standardised stress protocol resulted in a more pronounced decrease of prolactin levels for parasitized females. Our results suggest that the parasitized nest becomes a stressful environment for hosts, which may negatively affect the physical state of parasitized females. Unaffected baseline prolactin levels showed that parasitized individuals tended to maintain their parental effort, which could explain the absence of nest desertion found in this species in response to parasitism. Parasitized females reduced their parental investment as revealed by a more pronounced prolactin stress-induced response. Therefore, the combined study of both hormones provides important information on the physiological mechanism underlying anti-parasitic host responses.

15:15	SATURDAY, 19/08/2017	HALL I	OS4.2
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### **Oxidative stress markers and administration of antioxidants as tools to describe and treat a viral disease in magnificent frigatebirds**

Manrico Sebastiano<sup>1</sup>, Marcel Eens<sup>1</sup>, Olivier Chastel<sup>2</sup>, David Costantini<sup>3</sup>

<sup>1</sup>*Behavioural Ecology and Ecophysiology group, Department of Biology, University of Antwerp, Wilrijk (Antwerp), Belgium;* <sup>2</sup>*Centre d'Etudes Biologiques de Chizé (CEBC), UMR7372- CNRS/University of La Rochelle, Chizé, France;* <sup>3</sup>*Muséum National d'Histoire Naturelle, Paris, France*

Herpesvirus-induced infectious diseases are common in wild animals, but little is known about their effects on the physiological condition and survival. Some clinical studies have suggested that oxidative stress might be one additional physiological mechanism that promotes herpesvirus activation and the occurrence of clinical signs. However, the relationship between oxidative stress and herpesvirus infection has never been addressed in wild animals, nor have the effects of herpesvirus outbreaks on the physiology and survival of wild animals been tested so far. Furthermore, we lack of studies that address the effectiveness of antioxidant administration in reducing herpes-induced oxidative stress and viral load in wild animals. The aims of this study are to provide (i) the first data on the association among oxidative stress markers, clinical signs, and survival perspectives in a wild seabird and (ii) to assess whether the oral administration of antioxidants is a valuable tool to treat the viral disease. To this end, we took advantage of a population of magnificent frigatebirds *Fregata magnificens*, a seabird breeding in French Guiana, whose chicks experience annually severe viral outbreaks due to an herpesvirus infection.

15:30	SATURDAY, 19/08/2017	HALL I	OS4.3
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### **Measuring mitochondrial function in birds using red blood cells: a case study in the king penguin and perspectives in ecology and evolution**

Antoine Stier<sup>1</sup>, Pierre Bize<sup>2</sup>

<sup>1</sup>*University of Glasgow, Glasgow, UK;* <sup>2</sup>*University of Aberdeen, Aberdeen, UK*

Mitochondria are the powerhouse of animal cells. They produce through oxidative phosphorylation more than 90% of the cellular energy (ATP) required for organism's growth, reproduction and maintenance. Hence, information on mitochondrial function is expected to bring important insights in animal ecology and evolution. Unfortunately, the invasiveness of the procedures required to measure mitochondrial function (e.g. sampling of liver or muscles) has limited its study in wild vertebrate populations so far. Here, we capitalize on the fact that bird red blood cells (RBCs) possess functional mitochondria to describe a minimally-invasive approach to study mitochondrial function using blood samples. In the king penguin, we present a protocol using a high-resolution respirometry system and specific agonists and antagonists enabling the assessment of mitochondrial function in RBCs. The different measures of RBC mitochondrial function were significantly repeatable, were not affected by the handling time of the bird prior to blood sampling (*i.e.* stress response), and only minimally affected by the storage time of the sample at 4°C up to 24h. We showed that mitochondrial parameters measured in RBCs moderately correlated to those measured in the pectoral muscle and were influenced by the sex of the bird. The present study sheds light on the use of RBCs in birds as a valuable and minimally-invasive source of information on mitochondrial function. This approach opens new opportunities to study mitochondrial function in free-living animals and could bring knowledge gains in ecology and evolution since mitochondria are increasingly recognized as key drivers of animal performances and evolution.

15:45	SATURDAY, 19/08/2017	HALL I	OS4.4
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## Transgenerational effects of prenatal testosterone exposure in the rock pigeons (*Columba livia*): potential pathways via influenced egg composition

Bin-Yan Hsu<sup>1,2</sup>, Bonnie de Vries<sup>1</sup>, Ton Groothuis<sup>1</sup>

<sup>1</sup>University of Groningen, Groningen, The Netherlands; <sup>2</sup>University of Turku, Turku, Finland

During the past two decades, maternal hormones have been widely recognized as a crucial source of maternal effects and resultant phenotypic plasticity. Extensive studies in birds have also reported a wide range of offspring traits that can be influenced by the exposure of maternal androgens, especially testosterone, in egg yolks. Hormone deposition in egg yolks, despite of its genetic basis, has also been shown to possess a certain degree of plasticity in response to environmental variables. Nevertheless, whether or not such environment-induced variation of egg yolk hormones can bring about effects across generations remains elusive. Here we report our new data in the rock pigeons (*Columba livia*) that exposure to exogenously elevated prenatal yolk testosterone (T) within the range of natural variation can influence the composition of the eggs in the next generation and thus has a great potential to cause transgenerational effects: 1) Females exposed to elevated prenatal T (T-females) laid smaller eggs. Since egg size generally correlates with offspring quality strongly, higher levels of prenatal T may insert significant costs in lowering the quality of the next generation. 2) T-females in an older age laid eggs containing lower levels of yolk T, suggesting that maternal age as a mediator of hormone-mediated maternal effects. 3) T-females laid eggs with comparatively lower within-clutch T difference, which might modulate the outcome of hatching asynchrony and sibling competition.

16:00	SATURDAY, 19/08/2017	HALL I	OS4.5
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## Environmental influence on yolk thyroid hormones in the Great Tit: a cross-population study

Tom Sarraude<sup>1</sup>, Tommi Anderson<sup>1</sup>, Rute Costa<sup>2</sup>, Marcel Eens<sup>3</sup>, Tapio Eeva<sup>1</sup>, Rita Hargitai<sup>4</sup>, Bin-Yan Hsu<sup>1</sup>, Ravio Mänd<sup>5</sup>, Piia Pajunen<sup>1</sup>, Luis Silva<sup>6</sup>, Paulo Tenreiro<sup>7</sup>, Robert Thomson<sup>1,8</sup>, Jere Tolvanen<sup>9</sup>, János Török<sup>4</sup>, Barbara Tschirren<sup>10</sup>, Irene Verhagen<sup>11</sup>, Marcel Visser<sup>11</sup>, Suvi Ruuskanen<sup>1</sup>

<sup>1</sup>University of Turku, Turku, Finland; <sup>2</sup>Universidade do Minho, Braga, Portugal; <sup>3</sup>University of Antwerp, Antwerp, Belgium; <sup>4</sup>Eötvös Loránd University, Budapest, Hungary; <sup>5</sup>University of Tartu, Tartu, Estonia; <sup>6</sup>University of Coimbra, Coimbra, Portugal; <sup>7</sup>Institute for Nature Conservation and Biodiversity, Lisbon, Portugal; <sup>8</sup>University of Cape Town, Rondebosch, South Africa; <sup>9</sup>University of Oulu, Oulu, Finland; <sup>10</sup>University of Exeter, Penryn, UK; <sup>11</sup>Netherlands Institute of Ecology, Wageningen, The Netherlands

Maternal effects are all the non-genetic influences of the mother on its offspring. In birds, for example, parental food provisioning will affect nestling growth, survival and ultimately fitness. The adaptiveness of maternal effects has been reviewed for the first time in 1998, and has received a growing attention ever since. Maternal hormones present in avian eggs can also impact offspring phenotype. So far, research on hormone-mediated maternal effects has mainly focused on androgens and corticosterone. However, eggs contain several other important developmental signals, including thyroid hormones. Thyroid hormones (THs) present in avian eggs play an essential role in embryo's early life. Indeed, they accelerate embryo development and participate to the differentiation and maturation of many tissues (e.g., brain and skeletal system). THs plasma concentrations are influenced by environmental conditions, such as food availability and ambient temperature. For the first time, we recently reported the negative correlation between ambient temperature during egg formation and yolk THs levels in Great Tits. This study aims at investigating this relationship across several Great Tit populations in Europe. Populations differ in various aspects, including timing of breeding, season length, food availability and ambient temperature. These parameters will be considered as covariates of yolk TH variation. Thanks to our collaborative network we collected one egg per clutch from 10 populations across Europe. In total, we collected 210 eggs from which we will analyse the yolk TH content. The study can improve our knowledge on the potential transgenerational effects of the environment on individuals and ultimately on populations.

16:15	SATURDAY, 19/08/2017	HALL I	OS4.6
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### Artificial light at night leads to reduced energetic costs in breeding great tits (*Parus major*)

Davide Dominoni<sup>1,2</sup>, Marcel Visser<sup>1</sup>, Kamiel Spoelstra<sup>1</sup>, Natalie van Dis<sup>1</sup>, Anouk Welbers<sup>1</sup>

<sup>1</sup>Netherlands Institute of Ecology, Wageningen, The Netherlands; <sup>2</sup>University of Glasgow, Glasgow, UK

The impact of artificial light at night (ALAN) on ecological and behavioural processes is increasingly recognized but we have limited knowledge on the impact of ALAN on wild species. In birds, previous works have suggested that birds exposed to white ALAN showed higher levels of provisioning and nocturnal activity, suggesting that white ALAN increases daily energy expenditure (DEE). We tested this hypothesis using an experimental setup where four previously unlit transects were illuminated with either white, green, or red LED light, or left dark as a control treatment. This setup was replicated in eight locations across the Netherlands. We measured DEE of our focal species, the great tit (*Parus major*), using a novel doubly labelled water technique that uses breath rather than blood samples. Contrary to our expectations, birds feeding their offspring under white and green ALAN showed lower levels of DEE compared to birds in the control dark treatment. Differences in chick provisioning activity levels did not explain this result, as neither visit rates nor daily activity timing was affected by light treatment. However, food availability under white and green light was much higher compared to red light and the dark control. This difference strongly suggests that the lower DEE under white and green ALAN sites is a consequence of higher food availability in these treatments. This result shows that there can be positive, indirect effects of ALAN for breeding song birds which may balance again out the negative direct effects shown in previous studies.

### Oral session 5: Life history

15:00	SATURDAY, 19/08/2017	HALL X	OS5.1
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### Habitat-specific build-up of temporal isolation in a young hybrid zone

Päivi Sirkkiä<sup>1,2</sup>, S. Eryn McFarlane<sup>2</sup>, William Jones<sup>2</sup>, David Wheatcroft<sup>2</sup>, Murielle Ålund<sup>2</sup>, Jakub Rybinski<sup>2</sup>, Anna Qvarnström<sup>2</sup>

<sup>1</sup>Finnish Museum of Natural History, Helsinki, Finland; <sup>2</sup>Animal Ecology/Department of Ecology and Genetics, Uppsala, Sweden

Global warming is altering interspecific interactions in several ways. Many bird species are responding to warming temperatures by advancing timing of breeding. Differences in phenological responses between species may for example facilitate co-existence by reducing competition between similar species and by reducing the risk of hybridization. We investigated whether there has been a build-up of temporal isolation between two closely related species, pied (*Ficedula hypoleuca*) and collared flycatchers (*F. albicollis*), within a young hybrid zone on Öland island in Sweden across the last fourteen years. We compared temporal segregation between the two species in different habitat types varying from rich broadleaved deciduous forest with highly seasonal food peak to poor mixed forest with lower but more stable food abundance. Both species have advanced their timing of breeding during the last 14 years. However, pied flycatchers advanced the onset of breeding less than collared flycatchers, meaning that temporal segregation has increased, especially among birds breeding within habitats with lower food availability. Late breeding pied flycatchers did not experience significantly reduced reproductive success (regardless of habitat type) but enjoyed a reduced risk of hybridization suggesting that temporal isolation could become further strengthened through selection against hybridization. We conclude that the observed fast build-up of temporal isolation most likely was facilitated by a broader spatial and temporal niche use in one species (here pied flycatcher), but that there is opportunity for selection against hybridization to strengthen temporal segregation through reinforcement in the future.

15:15	SATURDAY, 19/08/2017	HALL X	OS5.2
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### Egg-laying by brood parasites of a cavity nesting host

Robert Thomson<sup>1,2</sup>, Michal Kysučan<sup>3</sup>, Peter Samaš<sup>3</sup>, Ryan Miller<sup>4</sup>, Jarkko Rutila<sup>5</sup>, Jere Tolvanen<sup>6</sup>, Tomáš Grim<sup>3</sup>

<sup>1</sup>FitzPatrick Institute of African Ornithology, University of Cape Town, Cape Town, South Africa; <sup>2</sup>Section of Ecology, University of Turku, Turku, Finland; <sup>3</sup>Department of Zoology and Laboratory of Ornithology, Palacký University, Czech Republic; <sup>4</sup>12 Coltsfoot Way, Thetford, Norfolk, UK; <sup>5</sup>Kannelkatu 5, Lappeenranta, Finland; <sup>6</sup>Department of Ecology and Genetics, University of Oulu, Oulu, Finland

Egg laying is inherent in birds, and almost all birds lay eggs into their own nests. Avian obligate brood parasites, in contrast, never build their own nests, but deposit their eggs into host nests. The methods used by brood parasites to lay into host nests have been a discussed topic in natural history for centuries. Five different egg-deposition modes are mentioned in the historical literature but only one has ever received reliable empirical support: direct laying while sitting on the host nest cup. However, all previous work studying egg-laying techniques of brood parasites were done in host-parasite systems where the brood parasite lays into open-cup nesting passerine nests. This precludes testing for some of the alternative egg-deposition modes suggested. Here we explored a host-parasite system that may feature alternative hypothesized egg-deposition modes by video-recording the laying behaviour of the common cuckoo *Cuculus canorus* in nests of its only regular cavity-nesting host, the common redstart *Phoenicurus phoenicurus*. We recorded 63 cuckoo laying events and found that some cuckoos, in addition to direct laying, laid from nest entrances either by projecting their eggs through the nest box entrance hole or by protruding their cloaca into the cavity and dropping their eggs. Laying modes differed in their fitness prospects, defined by the trade-off between cuckoo laying success and host nest desertion risk. Projecting was more successful than dropping but matched direct laying in fledging success. Projecting may therefore be a novel adaptation for cuckoos in the peculiar co-evolutionary arms race against the redstart.

15:30	SATURDAY, 19/08/2017	HALL X	OS5.3
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### The epigenetic basis of effects of early-life nutrition

Hannah Watson<sup>1</sup>, Juli Broggi<sup>1</sup>, Caroline Isaksson<sup>1</sup>, Johan Nilsson<sup>1</sup>, Jan-Åke Nilsson<sup>1</sup>

<sup>1</sup>Lund University, Lund, Sweden

The environment experienced by, not only offspring themselves, but also by the mother, has been shown to have profound impacts on offspring phenotype. In particular, maternal prenatal diet can have marked effects on various phenotypic traits of young and, in humans, has been linked to an increased occurrence of metabolic disorders and disease in later life. In humans, prenatal nutrition has been shown to have stable (i.e. persistent) effects on gene expression in offspring. Epigenetic mechanisms are an obvious candidate for mediating these trans-generational effects and indeed gestational diet has been shown to affect DNA methylation and subsequent gene expression in humans and laboratory rodents. Anthropogenic sources of food, such as sunflower seeds and peanuts, have a different nutritional composition compared with foods that are naturally available to birds; in particular, they differ in the composition of fatty acids, which are essential for many physiological processes, particularly during early-life growth and development. A high dietary intake of omega-6, relative to omega-3, polyunsaturated fatty acids (PUFA) increases inflammatory responses and oxidative stress. Yet, we know little about the contribution of diet to inflammation and oxidative stress physiology in birds. Through the manipulation of dietary intake of PUFA of both adult and nestling wild great tits *Parus major*, we examine the role of dietary PUFA in inflammatory responses and lipid metabolism. We quantify the direct response to an immuno-stimulant and changes in underlying gene expression. Furthermore, we examine the evidence for early-life nutritional effects being mediated by epigenetic mechanisms.

15:45	SATURDAY, 19/08/2017	HALL X	OS5.4
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### Do environmental conditions experienced in early life affect recruitment age and performance at first breeding in common goldeneye females?

Hannu Pöysä<sup>1</sup>, Robert Clark<sup>2</sup>, Antti Paasivaara<sup>3</sup>, Pentti Runko<sup>4</sup>

<sup>1</sup>Natural Resources Institute Finland (Luke), Joensuu, Finland; <sup>2</sup>Prairie and Northern Wildlife Research Center, Environment and Climate Change Canada, Saskatoon, Canada; <sup>3</sup>Natural Resources Institute Finland (Luke), Oulu, Finland; <sup>4</sup>Maaninka, Maaninka, Finland

Environmental conditions experienced early in life may have long-term impacts on life history traits and reproductive performance. We investigated whether ambient temperature experienced during the first two to four weeks of life and weather severity during the first two winters affected recruitment age and relative timing of breeding in the year of recruitment in female common goldeneyes (*Bucephala clangula*). Our sample consisted of 141 female recruits hatched in a study population in central Finland between 1985 and 2013 and captured later as breeders. About 56% of the recruited females bred for the first time when 2 years old (range 2-6 years). Individuals facing colder ambient temperatures during the first two to four weeks posthatch or more severe winter conditions during the first two winters did not recruit at an older age. Nor did maternal characteristics, relative hatch date or nest site availability affect recruitment age. The date of first breeding was usually late relative to the population mean that year (mean difference 6.9 days). The magnitude of the delay in the timing of breeding was not affected by maternal characteristics or the climatic conditions faced by these individuals during the first two to four weeks posthatch but tended to increase with harshness (measured with the North Atlantic Oscillation index) of the two winters before the first breeding attempt. Our results suggest developmental buffering enables female goldeneye ducklings to mitigate the impacts of adverse environmental conditions experienced during the first weeks of life, at least in terms of first breeding.

16:00	SATURDAY, 19/08/2017	HALL X	OS5.5
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### Sex-specific patterns of reproductive senescence in a long-lived reintroduced raptor

Megan Murgatroyd<sup>1</sup>, Richard Evans<sup>2</sup>, Staffan Roos<sup>2</sup>, Alex Sansom<sup>2</sup>, Phil Whitfield<sup>3</sup>, Arjun Amar<sup>3</sup>

<sup>1</sup>FitzPatrick Institute of African Ornithology, Cape Town, South Africa; <sup>2</sup>The Royal Society for the Protection of Birds, Edinburgh, UK; <sup>3</sup>Natural Research, Banchory, UK

For many species there is evidence that breeding performance can change as individuals age. In vertebrates, breeding performance often increases in early life and is expected to level out or even decline (senesce) later in life. Furthermore, an individual's sex and conditions experienced in early life can impact breeding performance and how this changes with age. Due to logistical challenges these trends have rarely been explored in long-lived free-ranging animals. We explore these questions using a unique dataset from a reintroduced population of white-tailed eagles *Haliaeetus albicilla* in Scotland, which has been intensively monitored since the start of their reintroduction in 1975. These data provide information on breeding performance from known individuals ranging in age from 3 to 26 years old. We explore changes in breeding performance with age and whether this differed between sexes. Breeding performance increased with age in early life in a similar manner for both sexes. We found strong evidence for senescence in breeding performance in later life in males but not females. This is the first time that sex-specific patterns of senescence have been explored in a long-lived raptor. This difference may suggest a linked sexual difference in survival rates or the possibility of proactive partner change by females in later life in this typically monogamous bi-parental species.

16:15	SATURDAY, 19/08/2017	HALL X	OS5.6
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## Ageing in the city: telomere dynamics in an urbanisation context

Pablo Salmón<sup>1</sup>, Hannah Watson<sup>1</sup>, Johan Nilsson<sup>1</sup>, Mariana Lapa<sup>1</sup>, Staffan Bensch<sup>1</sup>, Caroline Isaksson<sup>1</sup>

<sup>1</sup>Lund University, Lund, Sweden

Urbanisation of natural habitats is rapidly intensifying and poses a potential global threat to many species and populations. Nonetheless, many species have extended their distributions into urban environments where parks and gardens provide alternative habitats. Despite this, cities may impose new challenges and stressors to urban wildlife, e.g. from traffic noise, artificial light or air pollution. Telomeres are highly conserved tandem repeats of a short DNA sequence at the ends of eukaryotic chromosomes. In wild populations, telomere length has been shown to be correlated with important life history traits such as survival, senescence and lifetime reproductive success. Telomere loss is normally unavoidable with each cell division and the rate of telomere shortening has been proposed to play an important role in organismal senescence. However, repeated exposure to stressors can be associated with accelerated telomere attrition, potentially reducing individual fitness. Understanding telomere dynamics in an urban context provide important information about the effects of urban life on vertebrate populations. However, to date, no studies have examined this molecular marker in an urbanisation context. We here present telomere length data from two Great Tit (*Parus major*) populations, one established in a city (four different urban parks) and the other in a natural/semi-natural forest. Comparing telomere dynamics between these two contrasting populations provides insights into the impact of urban environment on the senescence process and physiological health status of urban bird populations.

## Oral session 6: Migration II

15:00	SUNDAY, 20/08/2017	HALL IX	OS6.1
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### Stopover niche use of East Asian buntings

Wieland Heim<sup>1,2</sup>

<sup>1</sup>Münster University, Institute of Landscape Ecology, Münster, Germany; <sup>2</sup>Potsdam University, Animal Ecology, Potsdam, Germany

Stopover niche utilisation of birds during migration has not gained much attention so far, since the majority of the studies focuses on breeding or wintering areas. However, stopover sites are crucial for migratory species. They are often used by a multitude of species, which could lead to increased competition. In this work I investigate niche use of eight migratory and closely related *Emberiza* bunting species at a stopover site in Far East Russia, situated on the poorly studied East Asian flyway. I used bird ringing data to evaluate morphological similarity as well as niche overlap on the trophic, spatial and temporal dimension. Bill morphology was used as a proxy for their trophic niche. I was able to prove that a majority of the species occupy well-defined stopover niches on at least one of the dimensions. Niche breadth and niche overlap differ between spring and autumn season with higher overlap found during spring. Morphological differences are mostly related to overall size and wing pointedness. The temporal dimension is most important for segregation among the studied species. All species seem to exhibit a rather strict and consistent phenological pattern. Their occurrence at the study site is highly correlated with their geographic origin and the length of their migration route. I assume that buntings are able to use available resources opportunistically during stopover, while trying to follow a precise schedule in order to avoid competition and to ensure individual fitness.

15:15	SUNDAY, 20/08/2017	HALL IX	OS6.2
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## How to recover after an endurance flight? Rest patterns in migratory birds during stopover

Andrea Ferretti<sup>1</sup>, Niels Rattenborg<sup>2</sup>, Scott R. McWilliams<sup>3</sup>, Massimiliano Cardinale<sup>4</sup>, Leonida Fusani<sup>1,5</sup>

<sup>1</sup>Department of Cognitive Biology, University of Vienna, Vienna, Austria; <sup>2</sup>Sleep & Flight Group, Max Planck Institute for Ornithology Seewiesen, Starnberg, Germany; <sup>3</sup>Department of Natural Resources Science, University of Rhode Island, Kingston, USA; <sup>4</sup>Department of Aquatic Resources, Swedish University of Agricultural Sciences, Lysekil, Sweden; <sup>5</sup>Konrad-Lorenz-Institut of Ethology, Veterinary university of Vienna, Vienna, Austria

During spring migration, birds minimize time spent at stopover sites to reach their breeding grounds in the shortest time. Rest is fundamental for birds during migration given its importance for cognitive and physical recovery. The extension of activity throughout the 24 hours, however, leaves little time for rest. Previous studies showed that physiological conditions predict the duration of stopover. Furthermore, the posture adopted by birds during rest varies according to meteorological conditions, suggesting an important role of rest posture in energy saving. The aim of this study was to investigate rest patterns during spring stopover in relation to body condition, with a focus on postures displayed during rest. The study was carried out on Ponza island (Italy), an important stopover site for European passerines, in spring 2015-2016. We caught garden warblers (*Sylvia borin*) and whitethroats (*Sylvia communis*) using mist nets. After collecting morphological and physiological measurements, birds were housed into soundproof cages from 12:00 hr to the following morning. Animals were provided with food and water ad libitum and their behaviour was continuously recorded by video-cameras. From the videorecordings we analyzed the time spent resting and the posture adopted during rest. Our results showed that physiological conditions at capture predict rest behavior during stopover. Moreover, we found that the posture displayed during rest changed according to the physiological condition. This study provides novel evidence that the physiological status influences rest pattern and posture during stopover.

15:30	SUNDAY, 20/08/2017	HALL IX	OS6.3
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## Energy for the road: Carbohydrates and water availability influences on fueling processes in autumn migrating passerines

Adi Domer<sup>1</sup>, Ofer Ovadia<sup>1</sup>, Eyal Shochat<sup>1,2</sup>

<sup>1</sup>Ben-Gurion University of the Negev, Be'er Sheva, Israel; <sup>2</sup>Yerucham Center of Ornithology and Ecology, Yerucham, Israel

Bird migration involves extremely long flights between breeding and wintering grounds. Lipids stored subcutaneously serve as the main energy source for this effort. The two major inputs of such lipids are dietary fats and de-novo synthesis of fatty acids from non-lipid sources, including carbohydrates. Yet, while the role of dietary fats in fat deposition processes is well understood, relatively little is known about the involvement of dietary carbohydrates in migratory fueling processes. We tested how simple carbohydrates and water availabilities affect fueling processes of autumn migrating passerines. The study included field and controlled experiments, in which migratory birds had access to water and sucrose solution. Field experiment was conducted during the autumns of 2014-2015 in the Northern Negev, Israel, where birds mostly consume Atlantic Pistachio (*Pistacia atlantica*) fruits. These fruits are fat-rich, but have relatively low amounts of water and carbohydrates. The controlled experiment used captive Blackcaps (*Sylvia atricapilla*) subjected to similar nutritional conditions, during autumn 2015. In both experiments, access to both water and sucrose-solution resulted in increased fattening rates. Furthermore, sucrose solution supplementation significantly reduced fruit consumption by Blackcaps, possibly indicating higher preference to sugar over lipids. Our results provide the first evidence that simple carbohydrates availability can significantly accelerate fueling processes in autumn migrating passerines. Possibly, simple carbohydrates substitute the need to exploit valuable stored fatty acids for immediate energetic demands, while

also initiating de-novo synthesis of fatty acids. These results will help developing forest management programs for the benefit of staging migratory birds in the Negev.

15:45	SUNDAY, 20/08/2017	HALL IX	OS6.4
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### Intra- and interspecific variation in relative energy demands for trans-Sahara bird migrants

Felix Liechti<sup>1</sup>, Steffen Hahn<sup>1</sup>, Silke Bauer<sup>1</sup>

<sup>1</sup>Swiss Ornithological Institute, Sempach, Switzerland

Energy expenditure during migration is supposed to have serious fitness consequences, but up to now estimates of individual energy demands for a complete migratory period were not available for small birds. Recent development in miniaturization of logger technology (~1g) allows now to record parameters like acceleration, temperature and atmospheric pressure continuously over a whole year with a relatively high resolution. We compare individual flight behaviour of European hoopoes (*Upupa epops*) and Great reed warbler (*Acrocephalus arundinaceus*), two trans-Sahara migrants exclusively using powered flapping flight. While Great reed warblers are considered to be nocturnal migrants, Hoopoes are supposed to fly mainly at daytime. With their broad wings they are expected to have higher flight costs than great reed warblers with their much slimmer and more pointed wings. Based on data loggers recording light and acceleration in intervals of 5 minutes (year-round), we show the seasonal and circadian pattern of flight bouts and stopovers for the two species. Additional recordings of atmospheric pressure (every 30min.) allow describing for the first time individual cruising heights and maximum flight altitudes. Finally, we present the intra- and interspecific variation of the relative energy demands estimated from flight time and sum of ascents in relation to distance flown.

16:00	SUNDAY, 20/08/2017	HALL IX	OS6.5
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### Barrier crossing in small long-distance migratory birds

Will Cresswell<sup>1,2</sup>, Emma Murray<sup>1,2</sup>, Marina Xenophontos<sup>1</sup>, Malcolm Burgess<sup>3</sup>, Sam Ivande<sup>2</sup>, Alice Risely<sup>4</sup>, Arin Azang<sup>2</sup>, Ben Freeman<sup>2</sup>

<sup>1</sup>Centre for Biological Diversity, University of St Andrews, St Andrews, Fife, UK; <sup>2</sup>AP Leventis Ornithological Research Institute, Jos, Plateau State, Nigeria; <sup>3</sup>RSPB Centre for Conservation Science, Sandy, Beds, UK; <sup>4</sup>Centre for Integrative Ecology, Deakin University, Geelong, Victoria, Australia

The ability for small migrant birds to cross barriers such as the Sahara and the Mediterranean will determine population resilience with climate and habitat change. Geolocator data from 35 whinchats tagged on the wintering ground and 6 Cyprus Wheatears on the breeding ground provide a unique opportunity to measure barrier crossing accurately because the species must immediately start their migrations by crossing the Sahara and the Mediterranean respectively. Cyprus Wheatears all reached their sub-Saharan wintering grounds with a single flight of mean 2,538 km with an average speed of 43.1 km/h. 91% of Whinchats crossed the Sahara or both the Sahara and the Mediterranean with a single flight of 2,697 km and an average speed of 46.8 km/h: these high speeds of migration probably ruled out stop-overs greater than a few hours. In whinchats, flight speeds over Europe and the Mediterranean, were roughly half these speeds and 9% had no stop-overs of more than two days anywhere on the route, suggesting continuous daily nocturnal migration followed by diurnal stopover may be preferred where possible. Migration distances between stop-overs were on average 1,199 km when crossing continental Europe or the Mediterranean but were 2,618 km when crossing the Sahara. Stopover duration increased with prior migration distance, but this relationship was less steep for males and negative for first year males. This, an overall lack of age and sex effects generally and the routine migration distances

demonstrated suggest that the Sahara and particularly the Mediterranean are not necessarily significant barriers to migration.

16:15	SUNDAY, 20/08/2017	HALL IX	OS6.6
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### Advancing the study of intra-African bird migration: ecology, conservation and policy

Samuel Osinubi<sup>1</sup>, Desire Dalton<sup>2</sup>, Phoebe Barnard<sup>1,3</sup>, Peter Ryan<sup>1</sup>

<sup>1</sup>Percy FitzPatrick Institute of African Ornithology, Cape Town, South Africa; <sup>2</sup>National Zoological Gardens, Pretoria, South Africa; <sup>3</sup>Pacific Biodiversity Institute, Winthrop, USA

There is less known about the migratory routes, timings, drivers, connectivity and environmental prescriptions of intra-continental migrant birds in comparison to inter-continental migrants. This knowledge gap, particularly in Africa, Asia and South America, has an impact on regional conservation and policy efforts. The case study of intra-African migration offers insight into a unique yet broad-scale evolutionary adaptation. Our primary goal is to provide information about the movement patterns of intra-African migrants, but ultimately facilitate a viable research network that links research institutions across Africa, providing a near-regional operating base for students and researchers interested in intra-African migrant birds. Since 2015, we have implemented a broad-scale spatial approach to questions of intra-African connectivity, movement, variation and speciation in target species with seasonal breeding ranges across western, eastern and southern Africa. Employing diverse techniques, we are using single nucleotide polymorphisms (SNPs) and mitochondrial DNA sequence analysis to explore genetic differentiation across the range. To investigate movement patterns, we are relying on ringing data, stable isotope analysis of the oldest primary feather and telemetry data from geolocators deployed on suitable species. Phenotypic variation is being explored as differences in the body mass index (BMI) and vocalisation characteristics across the range and between genetically distinct populations. The analyses of spatial and temporal movement patterns in relation to NDVI data will facilitate predictive models to more accurately direct conservation action and policy. In this presentation, we will be presenting our approach, preliminary results and seeking feedback on advancing our study objectives.

### Oral session 7: Parasites and immunity

15:00	SUNDAY, 20/08/2017	HALL XXII	OS7.1
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#### Effect of host-intrinsic vs environmental factors on gut microbiota of a brood parasite, the common cuckoo (*Cuculus canorus*)

Lucie Kropackova<sup>1</sup>, Jakub Kreisinger<sup>1</sup>, Milica Požgayová<sup>2</sup>, Marcel Honza<sup>2</sup>, Petr Procházka<sup>2</sup>

<sup>1</sup>Department of Zoology, Faculty of Science, Charles University, Prague, Czech Republic; <sup>2</sup>Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, Brno, Czech Republic

Gut microbiota is shaped by various environmental factors that affect communities of environmental bacteria invading the host. At the same time, however, animal hosts are equipped by many mechanisms allowing regulation of associated microbial communities. There is a very limited knowledge about the relative contribution of environmental compared to host-intrinsic factors affecting gut microbiota in birds. Our aim was to assess the significance of host-intrinsic vs. environmental factors in nestlings of an obligate brood parasite, the common cuckoo (*Cuculus canorus*), raised by two different species of foster parents. Specifically, we compared gut microbiota of cuckoo nestlings (lower intestine microbiota from faecal samples and from samples of secretion with an antipredatory function putatively formed in caecum) raised by the great reed warbler (*Acrocephalus arundinaceus*) and the Eurasian reed warbler (*A. scirpaceus*), with gut microbiota of warbler own offspring



(represented by faecal samples). Illumina MiSeq sequencing of bacterial 16S rRNA amplicons was used for microbiota profiling. We found that microbiota composition varied considerably among cuckoo faeces, cuckoo deterrent secretion and faeces of warbler nestlings, providing evidence for host-intrinsic regulatory mechanisms on microbial content. Interestingly, species identity of foster parents affected microbiota of cuckoo deterrent secretion and of warbler faeces, but not of cuckoo faeces, suggesting that contribution of environmental factors on microbial profiles may vary among different gut sections and different host species.

15:15	SUNDAY, 20/08/2017	HALL XXII	OS7.2
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### The higher prevalence of haemosporidian at lower altitude. Is it true?

Tamer Albayrak<sup>1</sup>, Tugba Tuncel<sup>1</sup>

<sup>1</sup>Mehmet Akif Ersoy University, Science and Art Faculty, Department of Biology, Lab of Ornithology, Burdur, Turkey

Altitude has been proposed to shape the prevalence of malaria across populations because individuals at higher altitudes are supposed to be less exposed to vectors. Here, we tested the “higher prevalence of haemosporidian at lower altitude” hypotheses. The birds were caught in two different mountains, Beydağları Mountains, four different altitudinal areas and Kazdağları Mountains, three different altitudinal areas. Prevalence of the haemosporidian parasites was characterized by analyzing partial sequence of the mitochondrial cytochrome b gene of 123 songbirds from Beydağları and 92 songbirds from Kazdağları Mountains. We found that the prevalence of *Haemoproteus* was positively correlated with altitude in Beydağları Mountains (Low altitude= 24%, Low-Middle altitude= 42%, High-Middle altitude= 56%, High altitude= 80%;  $r=0.61$ ,  $p<0.01$ ). Though we did not find significant correlation in Kazdağları Mountains, high levels of *Haemoproteus* prevalence occurred in high altitude (Low altitude= 63%, Middle altitude= 71%, High altitude= 90%;  $p>0.05$ ). We did not find any correlation between altitude and prevalence of *Leucocytozoon* (Low altitude= 43%, Low-Middle altitude= 42%, High-Middle altitude= 10%, High altitude= 37% in Beydağları; Low altitude= 63%, Middle altitude= 58%, High altitude= 54%;  $p>0.05$  in Kazdağları). Our results reject the higher prevalence of haemosporidian at lower altitude hypotheses for *Haemoproteus*.

15:30	SUNDAY, 20/08/2017	HALL XXII	OS7.3
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### Avian malaria on Madagascar: prevalence and genetic diversity of haemosporidian parasites

Sandrine Schmid<sup>1</sup>, Anke Dinkel<sup>1</sup>, Friederike Woog<sup>2</sup>, Ute Mackenstedt<sup>1</sup>

<sup>1</sup>Universität Hohenheim, Stuttgart, Germany; <sup>2</sup>Staatliches Museum für Naturkunde Stuttgart, Stuttgart, Germany

The island of Madagascar is located approximately 400 km east of Africa in the Indian Ocean. Due to its isolation from mainland India and Africa it has many endemic species and is classified as an important biodiversity hotspot. Avian Malaria is caused by haemosporidian parasites including the genera *Plasmodium*, *Haemoproteus* and *Leucocytozoon*. To date, few studies exist on blood parasites of Malagasy birds where either only blood samples were examined microscopically or just a small number of samples were analyzed by PCR. In our study over 1000 birds of over 50 different species (mainly Passeriformes), sampled in the years 2003 – 2016 were analyzed using molecular techniques. We found an extremely high variety of blood parasites. Over 80 different lineages of haemosporidian parasites could be identified. None of them were described before. Due to the high number of investigated birds we could determine if the parasite lineage is a specialist or a generalist and which factors might influence the prevalence.

15:45	SUNDAY, 20/08/2017	HALL XXII	OS7.4
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### Avian evolution of adaptive immunity – comparative genomics of the major histocompatibility complex gene region

Maria Strandh<sup>1</sup>, Matthias Weissensteiner<sup>2</sup>, Jochen Wolf<sup>2,3</sup>, Helena Westerdahl<sup>1</sup>

<sup>1</sup>Lund University, Lund, Sweden; <sup>2</sup>Uppsala University, Uppsala, Sweden; <sup>3</sup>LMU, Munich, Germany

Pathogens evolve rapidly compared to vertebrate hosts and the adaptive immune system with the extremely polymorphic major histocompatibility complex (MHC) is central for pathogen recognition and survival. In birds from the orders Galliformes, Pelecaniformes and Ciconiiformes the genomic MHC region is small, dense and contains few genes compared to mammals. However, the genomic MHC region has not been characterized in the most species rich bird order, Passeriformes, where MHC diversity is exceptionally high. The core MHC region in birds studied to date contains the MHC class I and class II genes and a number of other immune related genes like non-classical MHC class II genes (DMA and DMB), tapasin (TAPBP) and antigen peptide transporter 1 and 2 (TAP1 and TAP2). We study how the organization of the core MHC region has evolved from Galliformes to Passeriformes and investigate how the expansion of MHC diversity might have occurred. The MHC region has been notoriously difficult to characterize in particular for passerines due to their large number of highly similar MHC gene copies. We therefore long read sequenced genomes from three passerine birds; the hooded crow and the jackdaw from the more basal family Corvidae and the great reed warbler from the more derived family Acrocephalidae. Compared to galliforms the genomic MHC region in passerines is substantially larger with sparsely spaced genes which may have facilitated recent gene duplications and rearrangements in passerines that potentially affect their ability to fight pathogens.

16:00	SUNDAY, 20/08/2017	HALL XXII	OS7.5
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### Major histocompatibility complex gene expression in Eurasian siskin (*Spinus spinus*) during an avian malaria infection

Anna Drews<sup>1</sup>, Olof Hellgren<sup>1</sup>, Helena Westerdahl<sup>1</sup>

<sup>1</sup>Lund University, Lund, Sweden

The Major Histocompatibility Complex (MHC) plays an important role in adaptive immunity where it enables the immune system to recognize pathogens. Passerines have exceptionally high numbers of MHC class I genes compared to birds from other bird orders. However, it is not known if all MHC gene copies are of equal importance in the immune system and if they are all equally expressed during an immune response. We therefore investigated the expression of MHC class I genes during two different infections with Haemosporidian parasites, *Plasmodium relictum*, in Eurasian siskins *Spinus spinus*. Siskins were inoculated with either a high parasitaemia strain (SGS1) or a low parasitaemia strain (GRW4). The infection intensities and the expression of the MHC alleles were then monitored during the infection period. We used high throughput sequencing (Illumina MiSeq) to determine the expression of every MHC allele in each individual. By following the same individual throughout the infection period we were able to determine how the expression of specific MHC alleles varied and to what extent this variation was correlated with the severity of the infection. MHC gene expression during an infection further our understanding of the multiple MHC genes found in passerines.

16:15	SUNDAY, 20/08/2017	HALL XXII	OS7.6
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### Acquired immunity of a bird species and evolution of its pathogen as apparent mechanisms of population regulation

Wesley Hochachka<sup>1</sup>, Dana Hawley<sup>2</sup>, André Dhondt<sup>1</sup>

<sup>1</sup>Lab of Ornithology, Cornell University, Ithaca, New York, USA; <sup>2</sup>Department of Biological Sciences, Virginia Tech, Blacksburg, Virginia, USA

Diseases affect bird populations in many ways, ranging from causing irregular and temporary declines to causing extinction. If disease transmission increases with higher densities of bird hosts, stable regulation of the bird species' population size can even result: density-dependent population regulation. We present new results from a study of the first 22 years of interaction between one bird species, the House Finch (*Haemorrhous mexicanus*) and the bacteria *Mycoplasma gallisepticum*, in which such density-dependent regulation appeared to be establishing in the immediate aftermath of a roughly 50% decline in finch numbers. With over 10 years of additional data now available, we have found that local densities of House Finches have remained low and relatively stable, and that the prevalence of disease similarly has remained low and stable. However, we also found that while originally there was a density-dependent relationship at a local level, now we find the opposite: sites with higher abundances of House Finches have lower rates of disease prevalence. This current pattern cannot explain the failure of House Finch populations to recover, nor the continued persistence of disease. We present evidence that the continued population-level stability that we are observing is the result of an evolutionary arms race in which: (1) House Finches acquire immunity to the current circulating strain of the bacteria, and more rapidly in high-density populations; (2) which produces selection on the bacteria to evade this immune response; (3) allowing newer bacterial strains to persist and continue to regulate House Finch populations.

## Oral session 8: Reproductive behaviour

15:00	SUNDAY, 20/08/2017	HALL I	OS8.1
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### Nest as a signal in the Nuthatch *Sitta europaea*

Alejandro Cantarero<sup>1</sup>, Jimena López-Arrabé<sup>1</sup>, Mireia Plaza<sup>1</sup>, Irene Saavedra-Garcés<sup>1</sup>, Juan Moreno<sup>1</sup>

<sup>1</sup>National Museum of Natural Sciences, Madrid, Spain

Nest size has been suggested to be a sexually selected signal, allowing individuals to obtain reliable information about partner quality and thereby optimize paternal investment in reproduction. Studies concerning the potential role of nests as signals are scarce for avian species in which the female is the only builder. We have aimed at understanding whether males' reproductive investment (e.g., provisioning rates and risk taking) change in relation to experimental manipulation of nest size in the Nuthatch *Sitta europaea*, as would be predicted if nest size is a sexually selected signal reflecting female's quality. To that end, we have experimentally manipulated nest size by approximately doubling its size and leaving other nests as controls. Experimental manipulation led males to increase their incubation feeding rates, and females from the experimental group showed higher levels of glutathione (tGSH), an important endogenous antioxidant whose synthesis may be enhanced indirectly through nutrition. Although male provisioning rates during the nestling stage did not differ between experimental groups, males responded to nest size manipulation by visiting nests sooner after human disturbance (an index of risk taking) as compared to control nests. Our study suggests that nest size constitutes a signal of female quality which elicits differential allocation of male resources both to females themselves and to their broods. Higher risk taking in favour of offspring by mates of strongly signaling females may denote an improvement in offspring survival chances in the field.

15:15	SUNDAY, 20/08/2017	HALL I	OS8.2
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### The relationship between quality representation through plumage colouration and song in Yellowhammers

Sharina van Boheemen<sup>1</sup>, Ondra Kauzal<sup>1</sup>, Magdalena Gajdošová<sup>1</sup>, Ana Magalhães<sup>1</sup>, Fabio Samperi<sup>1</sup>, Lucia Heredero<sup>1</sup>, Tereza Petruskova<sup>1</sup>

<sup>1</sup>*Department of Ecology, Charles University, Prague, Czech Republic*

Song and plumage colouration are two relatively well, but usually separately studied features which may reflect the quality of an individual. Here we present the relation between song, a behavioural trait, and colouration, a physiological trait, within Yellowhammer (*Emberiza citrinella*) as a model species. At our densely populated study locality, we have individually ringed 63 birds across two breeding seasons (2015 and 2016). 13 males returned in the second season, of which most managed to conquer the same territories. During the ringing we collected feather parasites, feather samples and detailed photographs. Throughout both seasons we have recorded all singing males (in total 744 recordings). We can directly track where and when which male was singing, as their song is individually unique, and how its song performance changed. We found a great variation in parasite abundance across birds, which does not seem to be directly linked to the spectrographically measured feather colour characteristics. We did however find that brightly coloured males more often have stable territories throughout and between seasons, suggesting that they are strong territory holders. We will monitor this population for at least 2 more years, and know more about the relation between bird song and plumage colouration.

15:30	SUNDAY, 20/08/2017	HALL I	OS8.3
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### How to estimate assortative mating for labile traits in the wild

Barbara Class<sup>1</sup>, Jon Brommer<sup>1</sup>, Niels Dingemanse<sup>2</sup>, Yimen Araya-Ajoy<sup>3</sup>

<sup>1</sup>*University of Turku, Turku, Finland;* <sup>2</sup>*Ludwig Maximilians-University of Munich, Munich, Germany;* <sup>3</sup>*Norwegian University of Science and Technology, Trondheim, Norway*

Assortative mating is a form of sexual selection that has long been studied in wild populations because of its evolutionary implications and is commonly reported as the correlation between males' and females' phenotypes across unique pairs. Although this approach is valid for "fixed" traits which do not vary across repeated measures of individuals, the correlation between the phenotypes of paired individuals might not fully capture the real strength of assortative mating when applied to labile traits such as behavior, body mass, hormone levels or coloration. This is because part of the phenotypic variation in these labile traits is due to environmental effects which can be shared by paired individuals. Indeed, individuals might look similar because they respond similarly to shared environmental factors (e.g. temperature, food) rather than because they are assortatively mated. In this respect, birds are an ideal study system because in a majority of species, pairs share the same environment at least during breeding season. In this talk we introduce different statistical approaches that can be used to accurately estimate assortative mating in labile traits. Using simulations, we contrasted these approaches by varying the number of repeated measures within individuals or pairs, which is determined by the study design, and rates of survival and divorce in the population. We applied one of these approaches to two bird species, and show that common environmental effects on the phenotypes of paired individuals might be more common than previously thought and are likely to occur in a wider range of organisms.

15:45	SUNDAY, 20/08/2017	HALL I	OS8.4
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### Is divorce heritable? The quantitative genetic basis to divorce in a wild sparrow population

Ryan Germain<sup>1</sup>, Matthew Wolak<sup>1</sup>, Jane Reid<sup>1</sup>

<sup>1</sup>*University of Aberdeen, Aberdeen, UK*

Decisions by individual females and males over whether or not to remain with the same mate across multiple reproductive attempts can affect mating system evolution by shaping social and reproductive interactions and the transmission of alleles to future generations. Considerable evidence suggests that the ongoing evolutionary dynamics of divorce as a reproductive strategy would require a heritable genetic basis. However, to date there are no empirical estimates of the heritability of divorce in wild populations, and hence the evolutionary dynamics of this major reproductive strategy in nature are entirely unknown. We use 39 years of pedigree data and comprehensive observations of social pairing and divorce in a wild population of song sparrows (*Melospiza melodia*) to quantify the joint female and male contributions to the heritability of divorce. Using a novel application of the 'animal model', we estimated small but non-zero additive genetic variance in divorce for females and males. These sex-specific estimates of additive genetic variance corresponded to small heritabilities for divorce in females and males, and moderate total heritability, which reflects the total additive genetic variance in divorce upon which selection may act. However, the cross-sex genetic covariance and correlation for divorce in song sparrows was effectively zero, suggesting that evolutionary responses to selection on divorce may differ between sexes. Overall, we provide a novel empirical framework to estimate the genetic basis to individual variation in divorce from a wild population, and thus the contributions of this reproductive strategy to mating system evolution.

16:00	SUNDAY, 20/08/2017	HALL I	OS8.5
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### **Density dependence in space and time: Does staggered laying reduce effective breeding densities in an urban raptor species?**

Petra Sumasgutner<sup>1,2</sup>, Ann Koeslag<sup>1</sup>, Arjun Amar<sup>1</sup>

<sup>1</sup>*FitzPatrick Institute of African Ornithology, University of Cape Town, Cape Town, South Africa;* <sup>2</sup>*Centre for Statistics in Ecology, Environment and Conservation, University of Cape Town, Cape Town, South Africa*

Many studies have examined the influence of breeding density on breeding performance. However, the vast majority have explored this issue in the Northern hemisphere, mainly in temperate environments where breeding seasons are relatively short and synchronised. In contrast, breeding seasons in the Southern hemisphere and tropical regions may be far longer and highly asynchronous. Density dependence has been explored using various metrics, for example, breeding performance in relation to (i) numbers of pairs in the study area; (ii) nearest neighbour distances; or, (iii) numbers of pairs within a buffer of a nest. Few, if any have however incorporated a temporal component into such analyses, but this may be important where species show extended breeding seasons. Here we use a highly territorial urban population of Black Sparrowhawks in Cape Town which has a nine-months breeding season to explore density dependence in both space and time. We used a 16 year data-set of colour ringed breeding pairs, information on their timing of breeding and breeding performance to explore various approaches to score the competitive landscape, including a proximity index that takes temporal aspects into account (the time of overlap between active nests). We found the effect of density dependence was strongest when we incorporated a temporal aspect in the analysis. This suggests that staggered breeding may enable higher overall breeding densities and higher productivity. Our findings are amongst the first to show that failing to incorporate a temporal component into density dependence analyses can reveal unrealistic results, specifically in the Southern hemisphere.

### **Oral session 9: Breeding**

15:00	SUNDAY, 20/08/2017	HALL XXI	OS9.1
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### **Fitness consequences of nest site depth for breeding blue tits (*Cyanistes caeruleus*): an experiment**

Rienk W. Fokkema<sup>1</sup>, Richard Ubels<sup>1</sup>, Joost M. Tinbergen<sup>1</sup>

<sup>1</sup>*University of Groningen, Groningen, The Netherlands*

An important caveat in understanding the form and function of bird nests is that birds non-randomly distribute over the available nest-sites. Higher 'quality' individuals may get the higher 'quality' nest-sites and therefore effects of traits of the nest and traits of the breeding bird(s) on breeding success cannot be separately estimated. In the current study we aimed to tackle this problem to quantify the fitness consequences of nest cavity depth for blue tits. Deeper cavities could be safer from predators. We contrasted two experiments, in the first experiment blue tits competed for scarce deep nest boxes provided before nest box choice, enabling an association between nest box and bird 'quality'. In the second experiment we randomly altered nest box depth after blue tits had chosen a nest box, disconnecting the association between nest box and bird 'quality'. We found clear positive effects of nest box depth on fledging success and the probability of broods to succeed in sub-areas with high predation risk. These effects of nest box depth on breeding success did not differ between the two experiments, indicating that they were not due to an association between parental traits and nest box depth. We found no evidence that the occurrence of signs of predation was related to nest box depth. Shallow boxes may have had a lower breeding success due to 1) actual predation or 2) reduced reproductive investment by the parents, based on own experience with predation or based on an evolutionary response to past predation risk.

15:15	SUNDAY, 20/08/2017	HALL XXI	OS9.2
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### **The effect of nest fleas on breeding behaviour and nest success of Arctic barnacle geese (*Branta leucopsis*)**

Margje E. de Jong<sup>1</sup>, Maarten J.J.E. Loonen<sup>1</sup>

<sup>1</sup>*University of Groningen, Groningen, The Netherlands*

Ectoparasites, such as nest fleas (order Siphonaptera), can be detrimental for their host. High flea numbers in birds' nests can diminish current and future reproductive success by negatively influencing offspring condition and survival and the likelihood of parents to return as breeders. Most studies on the effects of nest fleas on host fitness have been performed in altricial bird species. This means that adult and offspring are both exposed to fleas until fledging. However, little is known about the effects of fleas in nests of precocial birds. Research on lesser snow geese (*Chen caerulescens*) and Ross's geese (*Chen rossii*) in the Canadian Arctic indicated that fleas have a negative impact on nest success. Flea infestation in Arctic goose colonies seems to be a relatively recent phenomenon and is potentially linked to warming climates. It was hypothesized that high flea abundance may reduce nest success by affecting female breeding behaviour. We investigated this hypothesis in a flea infested barnacle goose population on Spitsbergen. We monitored the natural variation in flea infestation and nest success during three study years and in 2016 we carried out an experiment to test whether fleas affect female breeding behaviour. In this experiment we manipulated nest flea abundance by selectively killing nest fleas using a microwave. Female breeding behaviour was monitored by both wildlife cameras and temperature loggers. With these data we gain insight in the role and influence of ectoparasites in determining the fitness of a precocial species.

15:30	SUNDAY, 20/08/2017	HALL XXI	OS9.3
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### **Nestling development exhibits time rather than growth costs in response to predator exposure as mediated by parental behaviour**

Devin de Zwaan<sup>1</sup>, Kathy Martin<sup>1,2</sup>

<sup>1</sup>University of British Columbia, Vancouver, British Columbia, Canada; <sup>2</sup>Environment and Climate Change Canada - Pacific Wildlife Research Centre, Delta, British Columbia, Canada

Nestling growth patterns strongly influence their fitness as adults, but time available for development can be constrained by predation risk. Predator-prey dynamics have a hierarchical structure, where parental responses reflect risk to their own survival and reproductive output (i.e., nest survival), which in turn can influence nestling growth. We test how parental behaviour and nestling development interact and respond to predation risk in an alpine population of Horned Larks (*Eremophila alpestris*), in northern British Columbia. We manipulated perceived predation risk at nests using decoys (with calls) of two predators (Fox, Raven) and a co-resident songbird during the nestling period. We failed to find a difference in growth rates of nestling morphological or size traits among predation risk treatments. However, development time (duration in the nest from hatch to fledge) was on average 0.5 days longer for predator treatments, corresponding to a 1.6% decrease in nest survival. This general lack of developmental consequence may be explained by flexible parental behaviour. Compared to control nests, parental feeding visits for predator treatments decreased by half and biomass delivery showed a 4-fold reduction. However, Horned Larks showed compensatory provisioning behaviour, as visitation rates immediately following predator treatments increased to 23% above control levels. Finally, nestlings responded directly to increased predation risk by reducing begging rates to 50% of control levels. We are currently investigating nestling feather corticosterone accumulation in response to predation risk treatments to determine possible physiological costs signalled by changes in nestling behaviour.

15:45	SUNDAY, 20/08/2017	HALL XXI	OS9.4
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### Modelling avian growth with the Unified-Richards: As exemplified by wader-chick growth.

Kathleen M. C. Tjørve<sup>1</sup>, Even Tjørve<sup>1</sup>

<sup>1</sup>Inland Norway University of Applied Sciences, Lillehammer, Norway

Postnatal growth in birds is traditionally modelled by fitting three-parameter models, namely the logistic, the Gompertz, or the von Bertalanffy models. The application of these methods has remained unchanged since Robert Ricklefs defined the tools for this field in the 1960s and -70s. We will address the utility of the Unified-Richards (U-Richards) model, draw attention to its two forms and lay down a set of recommendations for bird growth analysis, in order to make this model and the methods more accessible. We also examine the behaviour of the parameters in each model form and interpret them. The two parameters that control the inflection point enable us to compare its placement in two dimensions: (1) inflection value (mass or length at inflection) and (2) inflection time (time since hatching), between data sets (e.g. between biometrics or between species). We also show how the growth rate provides us with the relative growth rate at inflection, and we demonstrate how one can compare growth rates across data sets. The two forms of the U-Richards model makes it possible to fix the upper asymptote (adult value), in addition to the intersection with the y-axis (hatching value). The new model forms validate the usefulness of interpreting inflection placement and growth rate. It also illustrates the advantages and limitations of constraining the upper asymptote and the y-axis intersection to fixed values. We conclude that the U-Richards model can successfully replace some of the commonly used growth models.

16:00	SUNDAY, 20/08/2017	HALL XXI	OS9.5
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### Egg movement within the clutch seems to compensate for asymmetries in heat transfer

David Diez Méndez<sup>1</sup>, Samuel Rodríguez<sup>2</sup>, Elena Álvarez<sup>2</sup>, Emilio Barba<sup>2</sup>

<sup>1</sup>*Museo Nacional de Ciencias Naturales (CSIC), Madrid, Spain;* <sup>2</sup>*'Cavanilles' Institute of Biodiversity and Evolutionary Biology, Valencia, Spain*

During incubation, eggs experience two types of movements: egg turning (i.e. rotation), intensively studied in captive birds, and known to be of major importance in embryo development; and egg movement (i.e. displacement), which has been rarely highlighted. Recent studies have shown that eggs located in the center of the nest receive more heat than peripheral ones. Therefore, a possible function of egg movement could be to adjust the heat that each particular egg receives along the incubation period, thus females could potentially modulate hatching asynchrony (HA). We tested this hypothesis for the first time in wild birds by (1) removing eggs from 19 great tit *Parus major* nests as they were laid (replacing them by fake eggs), and returning them when incubation began, to avoid the potential effect of partial incubation on HA, and (2) monitoring twice a day the position of each individually marked egg relative to the clutch center along the incubation period, estimating an index of "centrality". Experimental nests (not allowed to experience partial incubation) reduced their HA by 50% compared to randomly assigned controls. However, the relative movement of eggs within the clutch was similar in all experimental nests, not modulating HA at any point. Thus, females manage to move the eggs homogeneously within the clutch so that they probably receive the same amount of heat along the incubation period, being partial incubation during egg laying the main source of HA. Some fitness consequences of these findings will be discussed.

16:15	SUNDAY, 20/08/2017	HALL XXI	OS9.6
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### **Experimentally increased nest temperature affects growth and long-term survival in blue tit nestlings**

Fredrik Andreasson<sup>1</sup>, Andreas Nord<sup>1,2</sup>, Jan-Åke Nilsson<sup>1</sup>

<sup>1</sup>*Lund University, Lund, Sweden;* <sup>2</sup>*University of Tromsø, Tromsø, Norway*

Incubation temperature is an important factor for developing embryos and incubation temperature outside the optimal thermal range can affect nestling growth, hatching and fledgling success and long-term survival, negatively. However, the thermal environment in the nest during early postembryonic development may also be an important factor in shaping both growth and long-term survival but it has been much less studied. With an increasing amount of extreme climatic events, e.g. heat waves, data on thermoregulation during heat stress can provide insight into how nestlings cope with these events. We currently do not know the consequences of heat stress on body temperature in nestlings or to which extent such stress would affect nestling growth and development. Based on recent results we will discuss how experimentally increased nest temperature affects body temperature, growth and long-term survival in blue tit nestlings. In short, nestlings in heated nest-boxes had a higher body temperature compared to unheated nestlings but without increased mortality. However, body mass gain was lower in nestlings from heated boxes, suggesting a trade-off between thermoregulation and growth. Surprisingly, survival to the first winter or longer was higher in nestlings from heated nest-boxes, which could be a consequence of a decreased parasitic load in heated nest-boxes. The thermal nest environment during nestling development is thus an important factor in shaping both growth patterns and long-term survival and the potential trade-off between thermoregulation and other essential developmental processes, such as growth, makes it an important component in studies on nestling development.

### **Oral session 10: Agriculture and birds**

15:00	SUNDAY, 20/08/2017	HALL X	OS10.1
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### **Habitat heterogeneity and its impact on population dynamics**



Matthieu Paquet<sup>1</sup>, Debora Arlt<sup>1</sup>, Pär Forslund<sup>1</sup>, Jonas Knape<sup>1</sup>, Matthew Low<sup>1</sup>, Tomas Pärt<sup>1</sup>

<sup>1</sup>*Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden*

Habitat quality and its variation in space and time is a key driver of population dynamics. There is strong evidence that breeding habitat quality can dramatically affect reproductive success but also survival of breeders and their decisions to stay in the same habitat or move for another, potentially more suitable habitat. Despite accumulating evidence of the influence of habitat quality for individual fitness parameters, very few studies have investigated the effects of different habitat types on population dynamics. Furthermore, habitat quality often varies in space and time at a fine scale for a single population and habitat choice within a population may have important implication for the dynamics of the population. We propose an Integrated Population Model that takes into consideration different types of habitats and the possibility for the breeders to switch from one type to another. We use 24 years of data from a declining population of Northern Wheatears *Oenanthe oenanthe* breeding in a farmland in southern Central Sweden as a case study. Breeders occupy territories characterised by diverse land uses and vegetation height is known to influence their reproductive success, their survival, and their transition probabilities from a type of habitat to another. Our model will help to better understand the impact of habitat heterogeneity on age specific demographic parameters, immigration patterns, and the growth rate of the population.

15:15	SUNDAY, 20/08/2017	HALL X	OS10.2
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### **Hungry for more: Dietary changes, usage of bespoke habitat management options and implications for body condition in a rapidly declining species**

Jenny Dunn<sup>1,2</sup>, Jennifer Stockdale<sup>3</sup>, Alexandra McCubbin<sup>3</sup>, Rosemary Moorhouse-Gann<sup>3</sup>, Helen Hipperson<sup>4</sup>, Antony Morris<sup>3</sup>, Philip Grice<sup>5</sup>, William Symondson<sup>3</sup>

<sup>1</sup>*University of Lincoln, Lincoln, UK;* <sup>2</sup>*RSPB, Bedfordshire, UK;* <sup>3</sup>*Cardiff University, Cardiff, UK;* <sup>4</sup>*NERC Biomolecular Analysis Facility, University of Sheffield, Sheffield, UK;* <sup>5</sup>*Natural England, Peterborough, UK*

Dietary changes linked to the availability of anthropogenic food resources can have complex implications for species and ecosystems, especially when species are in decline. The European Turtle Dove *Streptopelia turtur* is a rapidly declining obligate granivore, with a reduction in the number of breeding attempts occurring concurrently with dietary changes on breeding grounds. A bespoke habitat management option has been developed and incorporated into the UK agri-environment scheme to provide a source of seed food for breeding Turtle Doves, based on plant species found during previous dietary studies of the species. Here, we use next-generation sequencing of DNA from faecal samples to monitor the usage of this habitat management option. We analysed 96 Turtle Dove faecal samples from adults, nestlings and nests post-fledging using novel primers targeting the ITS2 region of plants to determine dietary composition. We show a considerable change in Turtle Dove diet compared to previous studies, probably reflecting opportunistic foraging behaviour within a highly anthropogenically-modified landscape. We relate plant seeds available within the bespoke habitat to occurrence within diet over 4 years, and examine associations between diet, broader habitat availability and Turtle Dove body condition. We discuss these results in the context of wider conservation applications of these techniques.

15:30	SUNDAY, 20/08/2017	HALL X	OS10.3
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### **Effects of farmland practices on bird diversity conservation in North-West Spain**

Sandra Goded<sup>1</sup>, Johan Ekroos<sup>2</sup>, Jesús Domínguez<sup>1</sup>, José A. Guitián<sup>3</sup>, Henrik G. Smith<sup>2</sup>

<sup>1</sup>*Departamento de Zoología, Genética y Antropología Física, Facultad de Biología, Universidad de Santiago de Compostela, Santiago de Compostela, Spain;* <sup>2</sup>*Centre for Environmental and Climate Research, Lund University, Lund, Sweden;* <sup>3</sup>*Departamento de Biología Funcional, Facultad de Biología, Universidad de Santiago de Compostela, Santiago de Compostela, Spain*

Previous studies have documented how organic farming can counteract farmland intensification regarding the conservation of birds, but few studies have considered how the effect of organic farming works in a heterogeneous landscape and how it varies between seasons. We analysed the effect of organic farming during an entire year in a previously understudied region, North-West Spain, an important wintering and breeding ground for many European bird species. In this area, the land destined to organic farming has increased more than 33% for the last eighteen years, therefore, it is important to understand whether organic farming can enhance agricultural biodiversity conservation there, or how could it be improved in order to meet this objective. We selected 16 paired organic and conventional farms, and transects were done in three 0.5 x 0.5 km study squares within each pair. Bird species richness and abundance were compared both between conventional and organic squares and between squares with either high or low proportions of organic farming, while simultaneously controlling for landscape structure. Species richness was higher in winter in organic squares than conventional squares, probably due to higher food availability. Bird abundance was higher in squares with high proportion of organic farming with low surrounding agricultural area, especially for seed-eating birds, which suggests a concentration effect of these species in organic farms in heterogeneous landscapes. Seedeater abundance also increased in organic squares with increasing surrounding native forest, suggesting that these species prefer organic farms in combination with native forests, offering both feeding and roosting habitats.

15:45	SUNDAY, 20/08/2017	HALL X	OS10.4
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### Visiting gardens in winter: impact of the surrounding intensive agricultural landscape on garden birds

Pauline Pierret<sup>1</sup>, Frédéric Jiguet<sup>1</sup>

<sup>1</sup>*MNHN, Paris, France*

The link between agricultural changes and bird population declines is well documented and investigations often focused on reproductive success. However, few studies investigated survival and especially during winter although changes in practices make winter bird survival even harder, chiefly for seed-eating passerines, by reducing seed availability. Nevertheless, more and more people supply birds with food in their gardens so we expect those gardens to play a major role in maintaining populations by acting as havens, notably in an intensive landscape. Using for the first time the French Garden Birds program (a national citizen science program), we related bird winter counts to an agricultural intensity indicator (the Input Cost per hectare index - "IC/ha"). We found a strong interaction between the species degree of dependence on agricultural landscape and the IC/ha indicator. There are more dependent birds in gardens surrounded by intensive landscape. However, we did not found clear differences in phenology of visiting: the arrival of birds does not seem to be earlier in intensive landscapes. As some seed-eaters, in particular species dependent on agricultural landscape, were recently placed on the French IUCN Red List of species of conservation concern, these results provide a glimpse of hope nevertheless, by suggesting that food supply, in winter in gardens, is not only a recreational activity but attracts seed-eaters and could help to improve their survival during the cold season, chiefly in an intensive agricultural landscape.

16:00	SUNDAY, 20/08/2017	HALL X	OS10.5
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### Long-term impacts of grazing management on breeding success of an upland insectivorous passerine

Lisa Malm<sup>1,2</sup>, Nick Littlewood<sup>2</sup>, Alison Karley<sup>2</sup>, James Pearce-Higgins<sup>3</sup>, Darren Evans<sup>1</sup>

<sup>1</sup>Newcastle University, Newcastle, UK; <sup>2</sup>The James Hutton Institute, Dundee and Aberdeen, UK; <sup>3</sup>British Trust for Ornithology, Thetford, UK

Upland habitats have undergone significant changes in grazing management during the last decades with impacts on vegetation structure and arthropod communities leading to declines of many bird species. Experimental manipulations of livestock grazing intensities are helping to provide a mechanistic understanding of upland bird declines in the short-term, but none have examined the longer-term impacts on breeding success and habitat quality.

Using a fully-replicated landscape scale experiment that started in 2003 at Glen Finglas, Scotland, we investigated the effects of livestock grazing density on the breeding success of a common insectivorous upland passerine: the meadow pipit. Territory and nest surveys were carried out within four livestock grazing treatments during the early (2003/4) and late (2015/16) stages of the experiment. We show that the duration of grazing is important for how grazing affects breeding success of meadow pipits, with stronger effects of grazing treatments on breeding parameters in the two latter years.

We also examined the diets and nutritional quality of insect prey provisioned to pipit nestlings within the grazing treatments using DNA-metabarcoding, elemental analysis and inductively coupled plasma mass spectrometry of faecal sacks. Important elements such as Zn and Ca were lowest in ungrazed plots, which are previously known to have the highest abundance of arthropod groups common in upland bird diets. This suggests that food could be present, but not available, and highlights the importance of studying predator-prey interactions rather than simply prey abundance.

16:15	SUNDAY, 20/08/2017	HALL X	OS10.6
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### **Telemetric studies of individual Starlings' habitat use confirm the mechanisms behind their marked population decline across half a continent**

Henning Heldbjerg<sup>1,2</sup>, Anthony Fox<sup>1</sup>, Peder Thellesen<sup>3</sup>, Lars Dalby<sup>1</sup>, Peter Sunde<sup>1</sup>

<sup>1</sup>Arhus University, Rønde, Denmark; <sup>2</sup>DOF-Birdlife Denmark, Copenhagen, Denmark; <sup>3</sup>Hjortkær, Hjortkær, Denmark

The abundant and widespread Common Starling (*Sturnus vulgaris*) is currently declining across much of Europe due to agricultural intensification. However, the proximate mechanisms through which these landscape changes adversely affect breeding Starlings is unclear, hampering our ability to implement cost-efficient agri-environmental schemes to restore them to former population levels. We attached GPS-loggers to seventeen breeding Starlings at a Danish dairy cattle farm and analysed use of land cover types and distance intervals relative to availability. Here we present results of how this central place foraging farmland bird uses and selects land cover types in general and as an interactive function of distance to the nest. Potential foraging areas were increasingly avoided with increasing nest distance and Starlings selected the land cover category Grazed most, followed by Short Grass, Bare Ground, Meadow and Winter Crops. Starlings compensated for increasing travel costs by being increasingly selective in their habitat choice the further they foraged from the nest. The results show the importance of the nature and proximity of foraging habitats to nest sites for breeding Starlings. Since similar patterns in Starling trends as well as agricultural intensification are found all across North and West Europe, this indicates that the ecological capacity of intensively managed farmlands is decreasing through conversion of the most strongly selected land cover type (Grazed) to the least selected one (Winter Crops).

### **Oral session 11: Migration III**

10:30	TUESDAY, 22/08/2017	HALL IX	OS11.1
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## Stellar compass of European robins *Erithacus rubecula* is time-independent

Anna Anashina<sup>1,2</sup>, Alexander Pakhomov<sup>1,2</sup>, Nikita Chernetsov<sup>1,3</sup>

<sup>1</sup>Biological Station Rybachy, Zoological Institute RAS, Rybachy, Russia; <sup>2</sup>Sechenov Institute of Evolutionary Physiology and Biochemistry RAS, St. Petersburg, Russia; <sup>3</sup>Department of Vertebrate Zoology, St Petersburg State University, St. Petersburg, Russia

While indicating directions to their goals, birds can use different sources of compass information, such as magnetic field of the Earth, the movement of the sun, polarized light and the stars. Whereas the necessity of birds' internal clock for successful sun orientation has been claimed earlier, its role to the star orientation has remained unproven as all the experiments were performed in the vertical magnetic field which rules out the use of the magnetic compass, and under the artificial stars. In our experiment European robins *Erithacus rubecula* were caught on the Courish Spit during autumn migration, kept indoors in a windowless room under the imitated local photoperiod and tested for their migratory orientation in Emlen funnels under the natural clear starry sky as the control group. The birds were tested in the artificial vertical magnetic field in Merritt four-coil magnet system, so that the magnetic field provided no compass information. Birds showed orientation directions consistent with their normal autumn migratory direction. Then we changed the local photoperiod in the room where the birds were kept to the artificial photoperiod, clock-shifted four hours forward. When birds' activity rhythms were synchronized to the new photoperiod, their orientation was again tested under the natural clear starry sky in the artificial vertical magnetic field. The new distribution was not significantly different from the direction shown before clock-shift. Our data show that star compass of European robins is time-independent. This study was supported by Russian Foundation for Basic Research, grant 15-04-05386.

10:45	TUESDAY, 22/08/2017	HALL IX	OS11.2
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## Non-stop on the wing - migration patterns of the Common Swift *Apus apus* from two breeding colonies in Germany

Arndt Wellbrock<sup>1</sup>, Christina Bauch<sup>1,2</sup>, Axel Degen<sup>1</sup>, Felix Liechti<sup>1,3</sup>, Jan Rozman<sup>1</sup>, Klaudia Witte<sup>1</sup>

<sup>1</sup>University of Siegen, Siegen, Germany; <sup>2</sup>University of Groningen, Groningen, The Netherlands; <sup>3</sup>Swiss Ornithological Institute, Sempach, Switzerland

The better understanding of the life history consequences of variability in migration routes and wintering areas in small migratory birds still requires investigation implementing state-of-the-art technology. Especially in highly aerial migrants like the Common Swift *Apus apus*, ring recoveries provide limited information, because they are non-stop on the wing except for the breeding season. Here we present migration patterns of 18 individuals (eleven females and seven males) breeding at two different breeding colonies only 170 km apart in West Germany revealed by light-level geolocators. Forty devices (ten in each year) were fitted from 2012 to 2015 in the first colony and five loggers in 2015 in the second colony. Our geolocator results showed that wintering areas were widely distributed over Central, South-East, South and even West Africa by far exceeding so far known wintering areas in Central Africa (Congo Basin) based on German ring recoveries. Birds of the two colonies could not be distinguished by stopover sites or wintering areas. Additionally, our data showed that migration routes and wintering areas were rather specific for individuals than for breeding colonies. Repeatedly tracked swifts used the same migration routes and wintering areas in subsequent years. Some stopover sites in Spain during autumn migration and at the coast of Liberia during spring migration seem to be essential for swifts in general before crossing the Sahara desert. With upcoming logger recoveries, we intend to assess flight activity and to investigate the influence of environmental conditions on swifts encountered throughout their journey.

11:00	TUESDAY, 22/08/2017	HALL IX	OS11.3
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## Complex behaviour in complex terrain. Modelling bird migration in high resolution wind field to explain observed behaviour in the Jura mountains

Annika Aurbach<sup>1</sup>, Baptiste Schmid<sup>2</sup>, Felix Liechti<sup>2</sup>, Ndaona Chokani<sup>1</sup>, Reza Abhari<sup>1</sup>

<sup>1</sup>Laboratory for Energy Conversion, ETH Zürich, Zurich, Switzerland; <sup>2</sup>Swiss Ornithological Institute, Sempach, Switzerland

Crossing of large ecological barriers, such as open waters or mountains, is in terms of energy considered to be a demanding and critical step during bird migration. Besides forming a geographical barrier, mountains have a profound impact on the resulting wind flow. Thus topography directly and indirectly influences the flight behaviour of migratory birds. Flying along the western European flyway, migratory birds are confronted with mountainous areas (e.g. Alps, Jura) and must adapt their flight behaviour with respect to the obstacle. To better understand their decision making over this highly complex terrain, we have modeled nocturnal broad-front passerine migration north of the Alps over the Jura mountains with different behavioural strategies. Bird counts from weather radar data provide the initial intensities of birds. High temporal and spatial resolution mesoscale weather simulations are used to determine the wind fields. An individual based bird migration model, which accounts for all phases of flight – departure, cruise, landing and refuelling – is used to simulate the flight of the birds. In this work we show how different behaviour strategies can lead birds over complex terrain and how energy expenditure and duration of migration is affected. Further, we show how the topography shapes the wind field and how this influences birds' movement. Finally we determine which flight strategy best explains observations from bird radar. The outcomes of this work can be used to guide the development and operation of renewable power plants such that bird collisions are minimized.

11:15	TUESDAY, 22/08/2017	HALL IX	OS11.4
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## Are migratory populations tracking the niche between seasons? A test with two partial migratory passerines

Guillermo Fandos<sup>1</sup>, José Luis Tellería<sup>1</sup>

<sup>1</sup>Universidad Complutense de Madrid, Madrid, Spain

Migratory birds spend periods of the year in different locations due to particular ecological circumstances. In terms of the way they track environmental conditions, migratory birds are classified as either 'niche-trackers' (i.e. they move in the search of similar conditions) or 'niche-switchers' (i.e. they change their preferences). We examined how migratory robins (*Erithacus rubecula*) and blackcaps (*Sylvia atricapilla*) track seasonal changes in the environment and how they differ from their sedentary counterparts. To approach this, we used ringing data from breeding and non-breeding grounds to explore the conditions relating to the seasonal distribution of migratory and sedentary individuals wintering sympatrically in the Iberian Peninsula. We explored seasonal niche-tracking using multivariate analyses of increasingly more comprehensive sets of landscape and climate variables that produce different environmental scenarios. Migratory individuals tracked climatic conditions more than sedentary birds, which, on the other hand, coped with sharp changes in their permanent ranges. Migratory birds overlapped vegetation structure less than sedentary individuals, which remained in the same areas throughout the year. These results suggest a trade-off between the greater ability of migratory individuals to track climatic conditions throughout the year and the capability of sedentary birds to tolerate climatic changes within their breeding ranges.

11:30	TUESDAY, 22/08/2017	HALL IX	OS11.5
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## Diverse migration strategies with similar investments in movement

Judy Shamoun-Baranes<sup>1</sup>, Joseph Burant<sup>1,2</sup>, Emiel van Loon<sup>1</sup>, Viola Ross-Smith<sup>3</sup>, Chris Thaxter<sup>3</sup>, Eric Stienen<sup>4</sup>, Willem Bouten<sup>1</sup>, Kees Camphuysen<sup>5</sup>

<sup>1</sup>University of Amsterdam, Amsterdam, The Netherlands; <sup>2</sup>University of Guelph, Ontario, Canada; <sup>3</sup>British Trust of Ornithology, Norfolk, UK; <sup>4</sup>Research Institute for Nature and Forest (INBO), Brussels, Belgium; <sup>5</sup>NIOZ, Texel, The Netherlands

In several species of birds, migration strategies may differ greatly even within a single population. Migration is often assumed to be a costly endeavour, especially for long distance migrants and these costs are presumably compensated for by better survival conditions in the non-breeding area. One way to assess the cost of alternative strategies is to study the investment in movement within the context of the entire annual cycle. In this study we compare trade-offs associated with several migration strategies in a generalist seabird. We used GPS tracking data to quantify lesser black-backed gulls' movement throughout their annual cycle. The annual cumulative distance travelled by long distance migrants wintering in west Africa, thousands of kilometres from their breeding colony, did not differ significantly from individuals of the same breeding colony wintering only a few hundred kilometres away. Within a year, birds travelled approximately 30,000 km across all migrations strategies. Short distance migrants returned earlier than long distance migrants. Maximum range, cumulative distance travelled or timing of arrival at the breeding area were not correlated with sex and wing length. Individuals spent only a small proportion of their time in flight and generally spent < 20% of their time at sea throughout an annual cycle, suggesting a reliance on inland resources for many individuals. Studying movement throughout the annual cycle may change our perspective when considering the consequences of different migration strategies.

11:45	TUESDAY, 22/08/2017	HALL IX	OS11.6
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### Advanced identification and analysis of biological targets in time series data from a radar wind profiler

Nadja Weisshaupt<sup>1</sup>, Mercedes Maruri<sup>1,2</sup>, Volker Lehmann<sup>3</sup>

<sup>1</sup>University of the Basque Country, Bilbao, Spain; <sup>2</sup>Basque Meteorology Agency (EUSKALMET), Vitoria, Spain; <sup>3</sup>Meteorologisches Observatorium Lindenberg, Tauche, Germany

Operational radars used in meteorology have been known to detect biological targets, such as birds. The continuous operation mode and widespread use of these radars offers potentially a great treasure of biological data. The present study uses data from a radar wind profiler (RWP) designed to measure three-dimensional winds. In a previous study, the authors have developed an approach to objectively identify birds and extract migration parameters (flight altitude profiles and migration intensity) from RWP time series data (raw data). As an important step to extend the developed methodology and to check its broader implementation in a different RWP model for ornithological purposes, the researchers have undertaken three new steps to proceed with an advanced signal analysis: (1) non-atmospheric signals were studied in a second RWP with diverging system specifications (height resolution and frequency) and compared to the original RWP; (2) a preliminary approach was explored to classify different bird signatures (bird composition); (3) biological signals presumably not stemming from birds were identified in a parallel step in the RWP, along with a verification by secondary remote-sensing measurement systems, and contrasted to bird echoes. Results are presented and briefly discussed. This study represents an unprecedented analysis of the biological RWP data pool. It is potentially of interest to a broader community of both biologists and meteorologists as it promotes the understanding of biological signals as well as could help improve signal processing in meteorology.

### Oral session 12: Communities

10:30	TUESDAY, 22/08/2017	HALL XXI	OS12.1
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## Linking species interactions with phylogenetic and functional distance in European bird assemblages at broad spatial scales

Mikko Mönkkönen<sup>1</sup>, Vincent Devictor<sup>2</sup>, Jukka Forsman<sup>3</sup>, Aleksi Lehikoinen<sup>4</sup>, Merja Elo<sup>1</sup>

<sup>1</sup>University of Jyväskylä, Jyväskylä, Finland; <sup>2</sup>Institut des Sciences de l'Evolution de Montpellier, Montpellier, France; <sup>3</sup>University of Oulu, Oulu, Finland; <sup>4</sup>Finnish Museum of Natural History, Helsinki, Finland

Understanding the relative contribution of species interactions in shaping community assembly has been a pivotal aim in community ecology. Biotic interactions are acknowledged to be important at local scales although their signal is assumed to weaken over longer distances. Here we examine the relationship between positive, neutral, and negative pairwise bird abundance distributions and the phylogenetic and functional distance between these pairs after first accounting for habitat associations. We used results from French and Finnish land bird monitoring programs. We fitted linear mixed-effects models for pairwise abundance values across years per point count station to infer the association between all common species pairs while controlling for geographic distribution and habitat associations, and saved pairwise regression coefficients for further analyses. We used a null model approach to infer whether the observed associations (effect sizes) differ from random. Finally, using quantile regression we analyzed the relationships between functional dissimilarity/phylogenetic distance and effect sizes. Our results show both negative and positive species associations although negative ones were twice as common as positive. Functionally similar and/or closely-related species were more likely to show strong associations, both negative and positive, than more distant species across broad spatial scales. Our results emphasize the importance of functional and phylogenetic proximity in generating both negative and positive species associations, which can produce pervasive patterns from local to geographical scales. Future assembly studies should refrain from strict dichotomies such as compensatory dynamics versus environmental forcing and instead consider the possibility of positive interactions.

10:45	TUESDAY, 22/08/2017	HALL XXI	OS12.2
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## Is degradation in matrix homogenizing bird communities in protected areas?

Matti Häkkilä<sup>1</sup>, Nerea Abrego<sup>2</sup>, Otso Ovaskainen<sup>2</sup>, Mikko Mönkkönen<sup>1</sup>

<sup>1</sup>University of Jyväskylä, Jyväskylä, Finland; <sup>2</sup>University of Helsinki, Helsinki, Finland

The process of biotic homogenization, or increasing similarity of natural communities, is accelerating as a consequence of human land-use and destruction of habitats. Setting aside areas from human usage is a common protocol when trying to maintain biodiversity. Protected areas are designed to be free from human-caused disturbances, but are often surrounded by a matrix, which is heavily managed. Landscape change in the matrix may have effects on species in protected areas, and small, isolated protected areas may not be able to maintain their biological diversity. In addition, if the original species pool in the landscape is maintained but communities become more similar (homogenized), the ability of protected area network to maintain diversity is decreased. We studied how the characteristics of the protected areas and matrix quality are affecting composition and dissimilarity of bird communities. Finally, we studied how much traits of forest bird species explain the variation in community composition and if different traits respond differently to the habitat characteristics both in protected areas and in the matrix. To achieve this, we used joint species distribution modeling on bird line transect count data from 91 protected areas in Northern Finland and landscape data from the areas and 5 km buffer zones surrounding them. We found that matrix doesn't have strong effects on bird communities, but it is the characteristics of the areas and especially traits of the species that play more important roles in determining community composition. Our results show that even small protected areas are important in maintaining biodiversity.

11:00	TUESDAY, 22/08/2017	HALL XXI	OS12.3
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### Winter bird populations are changing faster in colder than in warmer communities under climate change

Aleksi Lehikoinen<sup>1</sup>, Lluís Brotons<sup>2</sup>, Jaanus Elts<sup>3,4</sup>, Ruud P.B. Foppen<sup>5,6</sup>, Henning Heldbjerg<sup>7</sup>, Sergi Herrando<sup>8</sup>, Marc Herremans<sup>9</sup>, Åke Lindström<sup>10</sup>, Andrea Santangeli<sup>1</sup>, Päivi Sirkä<sup>1</sup>, Tibor Szép<sup>11</sup>, Chris van Turnhout<sup>5,6</sup>

<sup>1</sup>Finnish Museum of Natural History, University of Helsinki, Helsinki, Finland; <sup>2</sup>InForest JRU (CTFC-CREAF-CSIC), Solsona, Spain; <sup>3</sup>Estonian Ornithological Society, Tartu, Estonia; <sup>4</sup>Department of Zoology, Institute of Ecology and Earth Sciences, University of Tartu, Tartu, Estonia; <sup>5</sup>Sovon Dutch Centre for Field Ornithology, Nijmegen, The Netherlands; <sup>6</sup>Department of Animal Ecology & Physiology, Institute for Water and Wetland Research, Radboud University, Nijmegen, The Netherlands; <sup>7</sup>Dansk Ornitologisk Forening–BirdLife Denmark and University of Aarhus, København, Denmark; <sup>8</sup>Catalan Ornithological Institute. Natural History Museum of Barcelona, Barcelona, Spain; <sup>9</sup>Natuurpunt Studie, Mechelen, Belgium; <sup>10</sup>Department of Biology, Biodiversity Unit, Lund University, Lund, Sweden; <sup>11</sup>Institute of Environmental Sciences, University of Nyíregyháza, Nyíregyháza, Hungary

Species distributions and abundances are shifting towards high latitudes or altitudes in response to climate change. However, the spatial variation in the speed of climate driven bird population changes, especially during non-breeding season, is not well understood. We investigated how fast bird communities have changed in Europe in 2003–2016 using winter bird census data from eight countries situated in north, central and south Europe. We used the Community Temperature Index (CTI) approach when estimating the speed of change in the community. CTI is a measure of the relative temperature average of the species within a community, with high CTI values associated to communities dominated by warm-dwelling species. We show that CTI increased significantly over time in most countries considered, but the rate of CTI change was significantly faster in northern cold communities compared to southern warm communities. Annual changes in CTI were positively linked with annual changes in December temperature in most of the countries, suggesting that long-term CTI changes are caused by climate change. Northern bird communities may change faster because northern latitudes have experienced faster temperature shifts than southern latitudes. These changes could be associated with species thermal tolerance and changes in resource availability and migratory behaviour, both probably more marked in northern communities.

11:15	TUESDAY, 22/08/2017	HALL XXI	OS12.4
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### Effects of predator activity on wood warbler *Phylloscopus sibilatrix* nest survival in a primeval forest

Marta Maziarz<sup>1,2</sup>, Alex Grendelmeier<sup>1</sup>, Tomasz Wesołowski<sup>2</sup>, Raphaël Arlettaz<sup>3,4</sup>, Gilberto Pasinelli<sup>1</sup>

<sup>1</sup>Swiss Ornithological Institute, Sempach, Switzerland; <sup>2</sup>Laboratory of Forest Biology, Wrocław, Poland; <sup>3</sup>Division of Conservation Biology, Bern, Switzerland; <sup>4</sup>Swiss Ornithological Institute, Sion, Switzerland

Nesting birds are often exposed to a multidimensional threat of predators employing varying hunting methods, but how they respond to this risk to optimise own survival and reproduction is unclear. The wood warbler *Phylloscopus sibilatrix* is a ground-nesting passerine of temperate European forests that winters in equatorial Africa. Its breeding numbers have declined in Western Europe due to unknown reasons, but have remained stable in central and eastern parts of the range. Studies of nest predator identity have so far been conducted in areas, where woodland structure and predator fauna has been largely modified by humans, but information is lacking from regions with low direct human interference. Consequently, it is difficult to assess to what extent these habitat alterations may affect patterns of nest predation, and the consequent implications for nesting birds. Here,



we present the identity and foraging behaviour of potential and actual predators recorded by cameras at wood warbler nests in the primeval forest of Białowieża National Park, Poland, where the predator fauna is diverse and almost intact. The results reveal differences in the number and composition of predator species attacking bird nests between the primeval forest and transformed woodlands elsewhere, which has consequences for the pattern of nest predation and the risk of adult mortality. We propose that the observed disparities are a legacy of human activity responsible for changes in the geographical distribution, and/or local abundance and behaviour of various predators, along with modification of habitat structure.

11:30	TUESDAY, 22/08/2017	HALL XXI	OS12.5
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### Acclimatisation history of birds in New Zealand (un)folded from newspapers

Pavel Pipek<sup>1,2</sup>, Petr Pyšek<sup>1,2</sup>, Tim Blackburn<sup>3</sup>

<sup>1</sup>*Department of Ecology, Faculty of Science, Charles University in Prague, Prague, Czech Republic;*  
<sup>2</sup>*Institute of Botany, The Czech Academy of Sciences, Pruhonice, Czech Republic;* <sup>3</sup>*Centre for Biodiversity & Environment Research, University College London, London, UK*

Bird introductions to New Zealand are a suitable model system in macroecological studies exploring the determinants of success in establishment, especially the propagule pressure. Most bird transports to this archipelago were organised by acclimatisation societies, which kept records about their activities. Recently, however, the data are being criticised due to inconsistent numbers reported for released individuals. Indeed, the data are often incomplete or misinterpreted, mainly because authors did not use primary data sources that are, however, still available. The documents of acclimatisation societies are kept in New Zealand libraries, and wealth of information can be extracted from online archive of New Zealand newspapers. In our recent case study exploring the history of acclimatisation of yellowhammer we demonstrated that by using these primary sources many errors or misinterpretations can be corrected. We extended our study to other introduced songbirds and here we analyse the passerines of European origin introduced to New Zealand before 1890. Overall we have identified more than one hundred ships, for almost half of them we have also the information about the mortality during transport. About one fifth of the ships departed in preacclimatisation period, which demonstrates that the process started sooner than is generally believed. Furthermore, some of the liberated birds did not come from shipments - instead they were caught in New Zealand only to be released in other regions of the country. Preliminary results therefore suggest that the history of songbird introductions to this region was more complex than thought.

11:45	TUESDAY, 22/08/2017	HALL XXI	OS12.6
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### Waterbirds in a changing world: effects of climate, habitat and conservation policy on European waterbirds

Diego Pavón-Jordán<sup>1</sup>

<sup>1</sup>*Finnish Museum of Natural History, Helsinki, Finland*

The environment in which species develop their life cycle is naturally dynamic in time and space. Individual species, thus, have to cope with high levels of unpredictability with respect to their surroundings. In this context, effective evidence-based conservation can only be accomplished when the drivers of population change at local, country and global scales have been disentangled. Here, I provide new evidence on the impacts of environmental change, including climate change, on 25 European waterbird species in the past three decades and the effectiveness of the EU Special Protection Area (SPA) network delivering climate change adaptation. Specifically, I show that (1) there is a tendency for 25 waterbird species to winter closer to the breeding grounds

as a response to climate change causing a shift in the centre of gravity in abundance northeastwards, but this response vary between feeding guilds, (2) waterbirds respond rapidly to inter-annual variation in winter weather conditions causing large fluctuations in local wintering numbers, (3) trends in wintering numbers are more positive inside than outside SPAs but there are important gaps in the network in northeastern Europe. In addition, I show that (4) breeding abundance in Finland is linked to weather conditions in the preceding winter and, most importantly, the type of breeding habitat, which is deteriorating in Finland and causing population declines. These findings show important aspects of waterbird responses to environmental change that should be taken into account to improve the site-safeguard network in the future.

### Oral session 13: Evolution

10:30	TUESDAY, 22/08/2017	HALL X	OS13.1
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#### Migrant birds on their wintering grounds in the tropics have higher basal metabolic rate than tropical sedentary species

Andrey Bushuev<sup>1,2</sup>, Anvar Kerimov<sup>1,2</sup>, Oleg Tolstakov<sup>2,3</sup>, Ekaterina Zubkova<sup>1,2</sup>, Eugenia Solovyeva<sup>4</sup>

<sup>1</sup>Department of Vertebrate Zoology, Faculty of Biology, Lomonosov Moscow State University, Moscow, Russia; <sup>2</sup>Joint Russian-Vietnamese Tropical Research and Technological Center under the A.N. Severtsov Institute of Ecology and Evolution of Russian Academy of Sciences, South Branch, Ho Chi Minh City, Viet Nam; <sup>3</sup>Laboratory of Experimental Parasitology, Center of Parasitology, A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow, Russia; <sup>4</sup>Zoological Museum of Lomonosov Moscow State University, Moscow, Russia

Analysis of a global avian dataset showed that summer basal metabolic rate (BMR) of long-distance migrants is higher than that of non-migrants. There are two alternative explanations to this finding: 1) The high BMR in migratory species reflects elevated maintenance costs of metabolic machinery for long-distance migration; 2) The high summer BMR of migrants reflects the negative correlation between ambient temperature and BMR because long-distance migrants generally breed at higher latitudes than non-migrants. At the same time, information on BMR of long-distance migrants at their wintering grounds in tropics is scarce. To fill in this knowledge gap, we measured BMR in 17 species of passerine migrants from southern Vietnam, as well as BMR in 51 species of passerine residents and 35 species of non-passerine residents. In a phylogenetically controlled analysis we showed that migratory birds had higher BMR than both groups of residents. Taking into account the high rate of BMR adjustment in laboratory acclimation studies, the higher BMR of migrants on their wintering grounds was more likely related to energetic demands of long-distance migration than to preadaptation to lower temperatures on their breeding grounds.

10:45	TUESDAY, 22/08/2017	HALL X	OS13.2
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#### Evolution of iris coloration in owls

Arianna Passarotto<sup>1</sup>, Deseada Parejo<sup>1,2</sup>, Jesús M. Avilés<sup>1</sup>

<sup>1</sup>Departamento de Ecología Funcional y Evolutiva, Estación Experimental de Zonas Áridas (CSIC), Almería, Spain; <sup>2</sup>Área de Zoología, Departamento de Anatomía, Biología Celular y Zoología, Universidad de Extremadura, Badajoz, Spain

Owls show an extraordinary variation in eye coloration, with some species having completely dark iris while others displaying bright yellow-orange coloured iris. The origin and function of this variation remains unknown, but the fact that owls occupy a wide range of luminal conditions may suggest that iris colour may serve in visual

perception. Therefore, in an evolutionary scenario we would expect that iris colour had evolved in concert with change in the luminal niche of owls. Ancestral state reconstruction revealed that yellow-orange iris colour was the most likely ancestral state. Phylogenetic signal was very strong, showing that closely related species had similar iris colour. Dark eyed species are more likely to be nocturnal and to display a well-shaped facial disc. Also, correlated evolution analyses revealed that iris colour coevolved with activity rhythm and that the evolution of nocturnality preceded the evolution of dark iris. In addition, we found evidence that the facial disc evolved after iris became dark. Summing up, our study provides support for a previously neglected role of iris coloration in facilitating the adaptation to new luminal niches.

11:00	TUESDAY, 22/08/2017	HALL X	OS13.3
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### **Eavesdropping on interspecific alarm vocalizations: Maximizing information**

Katharina Mahr<sup>1</sup>, Carlo Lutz Seifert<sup>2</sup>, Bernhard Paces<sup>3</sup>, Herbert Hoi<sup>1</sup>

<sup>1</sup>University of Veterinary Medicine, Vienna, Austria; <sup>2</sup>University of South Bohemia, České Budějovice, Czech Republic; <sup>3</sup>University of Vienna, Vienna, Austria

In songbirds, predation can be considered as one of the major factors reducing the survival of the brood and hence lifetime reproductive success. Therefore individuals should be able to maximize the information received about their environment. A crucial source of information about predator presence is eavesdropping on interspecific alarm vocalizations. Blue tits (*Cyanistes caeruleus*) and great tits (*Parus major*) produce two distinctive types of alarm calls directed towards different predators, one specifically for snakes and the other for aerial raptors. Those specific alarm vocalizations are mainly used in parent - offspring communication to manipulate the behaviour of fledglings in the breeding cavity. Given, that both species breed in close vicinity two questions arise (i) do breeding individuals also perceive "private" communication patterns of neighboring species and (ii) do they estimate the risk for their own offspring and respond accordingly? To investigate whether blue tits eavesdrop on predator specific alarm vocalizations of great tits, we conducted a playback experiment using alarm calls of both species. Our results reveal that blue tits respond with mobbing towards the snake-call, which presents a high risk towards the nestlings but not the adults. In contrast, individuals kept greater distance towards the playback of the aerial raptor specific call. These findings indicate that blue tits respond not only towards intraspecific alarm vocalizations but also recognize predator specific alarm calls involved into parent offspring communication of other species. Furthermore they differentiate between predator type and display risk dependent defence behaviour.

11:15	TUESDAY, 22/08/2017	HALL X	OS13.4
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### **Varying environmental conditions at the wintering grounds induce sudden reversal in the relative quality of mates in a long-distance migratory passerine**

Pauliina Järvis<sup>1</sup>, Sara Calhim<sup>2</sup>, Wiebke Schuett<sup>3</sup>, Päivi Sirkä<sup>4</sup>, William Velmala<sup>1</sup>, Toni Laaksonen<sup>1</sup>

<sup>1</sup>University of Turku, Turku, Finland; <sup>2</sup>University of Jyväskylä, Jyväskylä, Finland; <sup>3</sup>University of Hamburg, Hamburg, Germany; <sup>4</sup>University of Helsinki, Helsinki, Finland

To understand the consequences of ever-changing environment on sexual selection, interactive effects of environmental conditions and secondary sexual traits on fitness need to be investigated. Studying how such interplay affects fitness of a long-distance migratory species is even more intriguing as wintering and breeding seasons often take place in two separate continents with different environmental processes. Moreover, distinguishing between selection processes and plasticity of phenotypic traits is crucial. We studied interactive effects of environmental conditions (measured as NAO, a climatic index) at the wintering ground and male

white wing patch on breeding success of breeding pairs and survival of females and males in the pied flycatcher (*Ficedula hypoleuca*). Moreover, we studied individual plasticity of wing patch in relation to winter NAO. While winter NAO correlates positively with moisture in Europe, in West Africa (where pied flycatchers winter) it correlates negatively with moisture and positively with winds and dust. After high NAO winters small-patched males suffered lower survival than large-patched males, and intriguingly females paired with small-patched males were less likely to survive to the next breeding season than those paired with large-patched males, and vice versa after low NAO winters. Moreover, wing patch size decreased with higher NAO at the individual level. We show that it is important to consider conditions during the non-breeding season when the effects of secondary sexual traits on fitness are examined. Furthermore, we demonstrate how variation in phenotypic composition of a natural population can be a result of both environment-dependent individual plasticity and selection.

11:30	TUESDAY, 22/08/2017	HALL X	OS13.5
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### **Birds with longer lifespan and slower life-history pace are more resistant to oxidative stress**

Csongor I. Vágási<sup>1,2</sup>, Orsolya Vincze<sup>1,2</sup>, Laura Patras<sup>2</sup>, Gergely Osváth<sup>1,2</sup>, Janka Péntzes<sup>2</sup>, Zoltán Barta<sup>1</sup>, Péter László Pap<sup>1,2</sup>

<sup>1</sup>University of Debrecen, Debrecen, Hungary; <sup>2</sup>Babes-Bolyai University, Cluj Napoca, Romania

The questions of why do we grow old and die, and why do life histories vary among species are fundamental to evolutionary biology. Oxidative state was proposed as a mechanism that might play a role. However, the role of redox state in the ageing process is highly controversial, and its role in governing the evolution of life histories is still poorly understood. Moreover, broad scale comparative analyses conducted so far measured only the antioxidant components of the redox state. To shed more light on these issues, we used the comparative approach and measured both non-enzymatic antioxidants (total antioxidant status, uric acid and glutathione) and the level of oxidative damage to cell membrane phospholipids (malondialdehyde by HPLC) across 88 European wild-living bird species. We found that (1) maximum life span - a proxy of ageing - increases with larger body mass, higher total antioxidant capacity and lower oxidative damage, (2) mortality rates are independent of redox state markers, and (3) species investing more into current reproduction (i.e. have higher brood value and a faster pace-of-life) sacrifice antioxidant defence and suffer more oxidative damage. Our findings indicate that the redox state might coevolve with longevity and might mediate the trade-off between current and future reproductive performance across species, though does not contribute to the intrinsic causes of mortality.

### **Oral session 14: Information and habitat use**

10:30	TUESDAY, 22/08/2017	HALL I	OS14.1
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### **Interspecific social information use in habitat selection decisions among migrant songbirds differing in arrival phenology**

Jakub Szymkowiak<sup>1</sup>, Robert Thomson<sup>2,3</sup>, Lechoslaw Kuczynski<sup>1</sup>

<sup>1</sup>Population Ecology Lab, Institute of Environmental Biology, Faculty of Biology, Adam Mickiewicz University, Poznan, Poland; <sup>2</sup>FitzPatrick Institute of African Ornithology, DST-NRF Centre of Excellence, University of Cape Town, Cape Town, Rondebosch, South Africa; <sup>3</sup>Section of Ecology, Department of Biology, University of Turku, Turku, Finland

Social information use for habitat selection decisions in songbirds commonly involves using the presence of conspecifics as a cue to make own settlement decisions (so-called conspecific attraction). In migratory species, however, conspecific cues are not available for individuals that arrive first to breeding grounds. Instead, they

may use information acquired from ecologically similar heterospecifics, but wild examples are currently limited to a specific system and the generality of this strategy remains unknown. Here, we experimentally investigated whether wood warblers *Phylloscopus sibilatrix*, a species that uses a conspecific attraction strategy, also uses heterospecific location cues from migrant chiffchaffs *Phylloscopus collybita* and blackcaps *Sylvia atricapilla* in breeding-site selection. We found that wood warblers settled earlier and more numerous on plots with simulated presence of chiffchaffs, while blackcap cues had apparent negative effects on wood warblers settlement. This suggests that wood warblers use cues from heterospecifics when deciding where to breed. Moreover, chiffchaffs and blackcaps were attracted to sites with simulated presence of conspecifics, which provides evidence for conspecific attraction in breeding-site selection of these species. Our results show that heterospecific attraction as a habitat selection strategy is not a phenomenon limited to resident-migrant interactions, but may involve also an information flow from early-arriving migrants to late-arriving ones. The interplay of attraction and avoidance when using social cues in habitat selection decisions within the migrant songbird guild highlights also the importance of both positive and negative effects of social environment on settlement behavior of individuals. (National Science Centre, Poland, grant no. 2012/07/N/NZ8/00129)

10:45	TUESDAY, 22/08/2017	HALL I	OS14.2
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### Competitor phenology as a social cue in breeding site selection

Jelmer M. Samplonius<sup>1</sup>, Christiaan Both<sup>1</sup>

<sup>1</sup>University of Groningen, Groningen, The Netherlands

Predicting habitat quality is a major challenge for animals selecting a breeding patch, because it affects reproductive success. Breeding site selection may be based on previous experience, or on social information from the density and success of competitors with an earlier phenology. Variation in animal breeding phenology within years may however also convey information with regard to habitat quality, predation risk or interspecific competition. Therefore, we hypothesized that competitor breeding phenology can be used as social cue by settling migrants to locate high quality breeding sites. To test this hypothesis, we experimentally advanced and delayed hatching phenology of two resident tit species on the level of study plots and studied male and female settlement patterns of migratory pied flycatchers *Ficedula hypoleuca*. The manipulations were assigned at random in two consecutive years, and treatments were swapped between years in sites that were used in both years. In both years, males settled in equal numbers across treatments, but later arriving females avoided pairing with males in delayed phenology plots. Moreover, male pairing probability declined strongly with arrival date on the breeding grounds. Our results demonstrate that competitor phenology may be used to assess habitat quality by settling migrants, but we cannot pinpoint the exact mechanism (e.g. resource quality, predation pressure, or competition) that has given rise to this pattern. We discuss our findings in the context of climate warming, social information use, and the evolution of protandry in migratory animals.

11:00	TUESDAY, 22/08/2017	HALL I	OS14.3
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### Nosy neighbours: do large broods attract more visitors? A brood size manipulation experiment in the pied flycatcher

Wiebke Schuett<sup>1</sup>, Pauliina Järvis<sup>2</sup>, Sara Calhim<sup>2,3</sup>, William Velmala<sup>2</sup>, Toni Laaksonen<sup>2</sup>

<sup>1</sup>University of Hamburg, Hamburg, Germany; <sup>2</sup>University of Turku, Turku, Finland; <sup>3</sup>University of Jyväskylä, Jyväskylä, Finland

In order to make adaptive decisions individuals need to collect information. Individuals often visit the breeding sites of their conspecifics ("prospect"), likely to assess conspecifics' reproductive success and to use

such information to identify high quality spots for future breeding. Here, we investigated whether visitation rate by prospectors and success of visited sites are causally linked. We manipulated the reproductive success (enlarged, reduced, control broods) in a nest-box population of migratory pied flycatchers, *Ficedula hypoleuca*, in Finland. We measured prospecting at 87 nest-boxes continuously from manipulation (3 days after hatching) to fledging. 302 adult pied flycatchers prospected ca. 10000 times on these manipulated nests. While the number of visitors and visits were not influenced by the relative change in brood size we induced, the resulting absolute brood size predicted the prospecting behaviour: the larger the brood size after manipulation, the more visitors and visits a nest had. Brood size pre-manipulation did not predict the number of visitors or visits post-manipulation. Our results suggest that individuals collect social information when visiting conspecific nests during breeding. We discuss the results in light of individual decision-making by animals in their natural environments.

11:15	TUESDAY, 22/08/2017	HALL I	OS14.4
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### Search for different behavioral states in summer movements of the European honey buzzard

Sanna Mäkeläinen<sup>1,2</sup>, Heidi Björklund<sup>3</sup>, Patrik Byholm<sup>3</sup>

<sup>1</sup>*Metapopulation Research Centre, University of Helsinki, Helsinki, Finland;* <sup>2</sup>*Novia University of Applied Sciences, Tammsaari, Finland;* <sup>3</sup>*Finnish Museum of Natural History, University of Helsinki, Helsinki, Finland*

Modern high-frequency movement data provides new possibilities to investigate the behavior underlying the movement patterns and apply the observed behavioral decisions and related habitat selection to species conservation. For example, several modeling approaches have been developed in order to divide movement paths into segments of similar behaviors. However, in the use of any modeling technique models must be compatible with the data and research aims. Furthermore, despite of the diversity of methods, testing different models on data of same individuals is still limited. We use space-use data collected by means of two different types of GPS trackers in 2011-2015 in Western Finland as a part of study on migratory behavior of the European honey buzzard. Thus, these relatively high-resolution, but varying data sets with partly irregular sampling offer a good and challenging basis to study the utility of movement models. In order to find a method that most likely identifies different behavioral states, such as resting, incubating or foraging bursts of breeding and non-breeding individuals, we extract summertime movements between May and August and apply different path segmentation techniques to both types of data and compare their results. Extracted behaviors of honey buzzards are finally related to their habitat use. Our observations on the performance of different methods can be applied in analyzing similar type movement data.

11:30	TUESDAY, 22/08/2017	HALL I	OS14.5
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### High resolution GPS tracking of European nightjars provides new evidence for breeding season home range size and foraging habitat use: implications for habitat creation and management

Greg Conway<sup>1</sup>, Ian Henderson<sup>1</sup>, Thomas Bolderstone<sup>2</sup>, Ruben Evens<sup>3</sup>

<sup>1</sup>*British Trust for Ornithology, Thetford, UK;* <sup>2</sup>*Natural England, Peterborough, UK;* <sup>3</sup>*Hasselt University, Hasselt, Belgium*

Although the British Nightjar population is increasing, decreases have occurred at sites supporting nationally important numbers, e.g. Thetford Forest (part of the Breckland Special Protection Area); primarily a commercial conifer plantation, where breeding territories dropped from 426 in 1998 to 280 territories 2010. This decrease was attributed to a loss of key habitat - specifically 1-10 year old plantation. In contrast, Dersingham Bog National Nature Reserve, 50km away and primarily heathland, has a breeding population increasing from 12 to 28 territories between 1993-2016, and twice the breeding density of Thetford Forest. This difference implies that

the quality of available foraging habitat is much lower in Thetford Forest, therefore influencing the population size that can be supported. Evidence is required to identify important unknown foraging habitats and their proximity to breeding sites, to inform effective conservation actions in order to halt/reverse the decline. Foraging locations were determined using GPS loggers, attached to 45 Nightjars across both sites during three breeding seasons (2014-2016). The devices collected 370+ high precision fixes ( $\pm 10$ m) at 5-min intervals per night, over of 3+ successive nights, providing high quality, objective, location data; far superior to previous radio telemetry studies. Analysis revealed that key foraging locations were separate from breeding sites and located up to 5km away, at both sites, crucially involved habitats mainly dominated by grassland. These results provide direct evidence about the relative importance of foraging habitats and their proximity within the landscape to sometimes quite separate nesting areas, to direct effective habitat management.

11:45	TUESDAY, 22/08/2017	HALL I	OS14.6
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### Sex-specific dominance effects on resources use in an endangered vulture population

Thijs van Overveld<sup>1</sup>, Marina García Alfonso<sup>1</sup>, Niels Dingemanse<sup>2</sup>, Willem Bouten<sup>3</sup>, Laura Gangoso<sup>1</sup>, David Serrano<sup>1</sup>, José Donázar<sup>1</sup>

<sup>1</sup>Estación Biológica de Doñana, Sevilla, Spain; <sup>2</sup>Ludwig-Maximilians University, Munich, Germany; <sup>3</sup>University of Amsterdam, Amsterdam, The Netherlands

Supplementary feeding programs are a widely used conservation tool to facilitate the recovery of endangered species, but detailed studies on individual consumption patterns of surplus food are very scarce. Here we investigated individual variation in the exploitation of carcasses provided at feeding sites (predictable in space and time) and those supplied by farmers (predictable in space, but not time) in the endangered Canarian Egyptian vulture (*Neophron percnopterus*) living on the island of Fuerteventura. Using GPS-technology, we quantified monthly time-activity budget for 44 individuals tracked for 1 year (> 1 million data-points) and tested how feeding activity patterns co-vary with dominance rank as well as sex, age and breeding status. We found that i) individuals differed consistently in the relative use of carcasses at the main feeding station vs. farms, ii) high-ranked females, young birds and non-territorial females preferred the main feeding station over farms, while an opposite pattern was found for high-ranked males and, iii) similar individual variation in carcass use was found at frequently used farms, suggesting some farms to function as 'feeding stations'. Our study shows that changes in food predictability caused by supplementary feeding programs may lead to unequal resource use among individuals due to unequal competitive abilities. We discuss the population-level implications of our findings.

### Oral session 15: Population ecology

10:30	TUESDAY, 22/08/2017	HALL XXII	OS15.1
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### Is tit survival enhanced by buckthorn berry consumption?

Joost M. Tinbergen<sup>1</sup>, Rienk W. Fokkema<sup>1</sup>, Richard Ubels<sup>1</sup>

<sup>1</sup>Groningen University, Groningen, The Netherlands

Winter survival of birds depends on food availability, but often there are no consistent measurements of both food consumption and food availability. We studied winter food availability, food consumption and annual survival in a population of tits that lives in an area with ample buckthorn berry production (Lauwersmeer, NL, 53°23'N, 6°14'E). Six hundred nest boxes were available in this area and used by the birds for breeding in spring and roosting in winter. Wintering birds defecate in the nest boxes, and birds that eat buckthorn berries

produce orange faeces allowing us to index the buckthorn berry consumption. The incidence of buckthorn consumption in this population was high (80%). To find out whether population dynamics of the tits was affected by buckthorn berry production on an annual basis we 1) measured the berry availability in the study area during winter (November, December, January and February) for 19 bushes in the period 2008-2014, 2) scored an index of berry consumption in December on the basis of a night check of all 600 nest boxes 3) scored the number of breeding great and blue tits in the subsequent summer 4) measured annual local survival till next breeding season and to the next winter of the individually marked great tits based on ringing recoveries during recapture. Winter berry stock did predict the number of breeding pairs in the next season, however within years great tits that consumed more berries survived less well. Perhaps extra high consumption harms or is associated with bad individual circumstances.

10:45	TUESDAY, 22/08/2017	HALL XXII	OS15.2
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### **Difference in the contour feather structure may explain the morph-specific winter survival of tawny owls**

Katja Koskenpato<sup>1</sup>, Patrik Karell<sup>2</sup>

<sup>1</sup>University of Helsinki, Helsinki, Finland; <sup>2</sup>Novia University of Applied Sciences, Tammissaari, Finland

In colour polymorphic species morphs are considered to be adaptations to different environments, where they have evolved and are maintained because of their differential sensitivity to the environment. In cold environments the plumage insulation capacity is essential for survival and it has been proposed that plumage colour is associated with feather structure and thereby the insulation capacity of the plumage. We studied the structure of contour feathers in the colour polymorphic tawny owl (*Strix aluco*). A previous study of tawny owls in the same population has found strong selection against the brown morph in cold and snowy winters whereas this selection pressure is absent in mild winters. We predicted that grey morphs have a denser and more insulative plumage, enabling them to survive better in cold climate compared to brown ones. The insulative plumulaceous part of the dorsal contour feathers was larger and the fine structure of the plumulaceous part of the feather was denser in grey tawny owls than in brown ones. In the ventral contour feathers the plumulaceous part of the feather was denser in females than in males and in older birds without any differences between morphs. Our study suggests that insulative microscopical feather structures differ between colour morphs and we propose that feather structure may be a trait associated with morph-specific survival in cold environments.

11:00	TUESDAY, 22/08/2017	HALL XXII	OS15.3
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### **Spatially thorough sampling reveals no survival consequences of natal dispersal but higher breeding dispersal rates among natal dispersers than non-dispersers in a migratory shorebird**

Veli-Matti Pakanen<sup>1</sup>, Kari Koivula<sup>1</sup>, Blandine Doligez<sup>2</sup>, Lars-Åke Flodin<sup>3</sup>, Angela Pauliny<sup>3</sup>, Nelli Rönkä<sup>1</sup>, Donald Blomqvist<sup>3</sup>

<sup>1</sup>Department of Ecology and Genetics, University of Oulu, Oulu, Finland; <sup>2</sup>CNRS, Université Lyon 1, Department of Biometry and Evolutionary Biology, Lyon, France; <sup>3</sup>Department of Biological and Environmental Sciences, University of Gothenburg, Gothenburg, Sweden

The costs and benefits of dispersal have often been assessed by comparing fitness components between dispersing and non-dispersing individuals. Importantly, individuals that disperse as juveniles may be more likely to disperse as adults. This can bias individual survival estimates especially if dispersal leads to emigration out of a limited study area. However, evidence for such within-individual consistency in dispersal behavior is still scarce, and its impacts on fitness estimates are not well known. We quantified within-individual consistency



in dispersal and long-term natal dispersal correlates on adult survival in two metapopulations of the southern dunlin (*Calidris alpina schinzii*), a long-lived migratory species reported to have strong adult site fidelity. Because metapopulations were intensively monitored and geographically separated from other populations, we were able to reliably estimate survival and breeding dispersal between habitat patches. We found that within-metapopulation between-patch breeding dispersal was more common among natal dispersers than non-dispersers, especially in females. Adult survival did not differ between natal dispersers and non-dispersers, suggesting that between-patch dispersal is not associated with reduced long-term survival. In more than half of the cases, natal dispersers that dispersed again between patches as adults returned to their natal patch. We conducted a literature review of within-individual consistency in dispersal, which suggested that consistency is common especially among females. Studies examining within-individual consistency in dispersal and the consequences of dispersal should preferably be done with individuals that were born in the study area in order to control for breeding dispersal back to their natal sites.

11:15	TUESDAY, 22/08/2017	HALL XXII	OS15.4
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### Immigration and reinforcement drive population dynamics in a long-lived bird: Implications for Eurasian crane conservation

Andrea Soriano-Redondo<sup>1,2</sup>, Geoff M. Hilton<sup>2</sup>, Leigh Lock<sup>3</sup>, Andrew Stanbury<sup>3</sup>, Stephen C. Votier<sup>4</sup>, Stuart Bearhop<sup>1</sup>

<sup>1</sup>Centre for Ecology and Conservation, College of Life and Environmental Sciences, University of Exeter, Cornwall Campus, UK; <sup>2</sup>Wildfowl & Wetlands Trust, Slimbridge, Gloucester, UK; <sup>3</sup>Royal Society for the Protection of Birds, The Lodge, Sandy, Bedfordshire, UK; <sup>4</sup>Environment and Sustainability Institute, University of Exeter, Cornwall Campus, UK

Understanding population dynamics and designing appropriate management strategies requires knowledge of the effects of survival, productivity and dispersal in population growth. This is particularly the case for small and recently established populations, where stochastic birth and death rates may end up producing sinks and population persistence relying on net immigration. Here, we investigated the importance of population reinforcement in a recently established population of Eurasian cranes (*Grus grus*) in the UK. We developed stochastic population models to assess the population dynamics and the effect of adding 90 individuals, while also quantifying the population-level effects of immigration. The best-supported models suggest that the crane population is self-sustaining; however much of the population increase observed in recent years has been driven by immigration of birds from continental Europe. We found that population reinforcement resulted in a 50% increase in the projected population size from 178 breeding pairs to 275 over the next 50 years. We also found that the relative contribution of immigration to population growth declined from 43%, when the reintroduced birds were not considered, to 29%, when they were included in the breeding pool. Moreover, after the population reinforcement, the probability of the population improving its conservation status increased from just above zero to 32%. Population reinforcement is a highly effective technique to boost numbers in small and slowly growing populations. In our case, a modest reintroduction programme resulted in a 50% increase in the projected population size and a reduction in the long-term dependency on immigration.

11:30	TUESDAY, 22/08/2017	HALL XXII	OS15.5
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### Turnover and post-bottleneck genetic structure in a recovering population of Peregrine Falcons *Falco peregrinus*

Suvi Ponnikas<sup>1,3</sup>, Tuomo Ollila<sup>2</sup>, Laura Kvist<sup>3</sup>

<sup>1</sup>Lund University, Lund, Sweden; <sup>2</sup>Metsähallitus, Rovaniemi, Finland; <sup>3</sup>University of Oulu, Oulu, Finland

Dispersal is a process that increases genetic diversity and genetic connectivity of populations. We studied the turnover rate of breeding adults and genetic population structure to estimate dispersal in Peregrine Falcons in Finland. We used relatedness estimates among Finnish Peregrine Falcons over a 5-year period, genotyping over 500 nestlings with 10 microsatellite loci to reveal the rate of turnover. Our results reveal a high turnover rate (21.7%) that does not seem to be correlated with the breeding success of the previous year. The extent of population genetic structure and diversity, and possible signs of a population crash during the 1970s, was assessed with a reduced dataset, excluding relatives. We found genetic diversity to be similar to previously studied falcon populations (expected heterozygosity of 0.581) and no population genetic structuring among our sampled populations. We did not find a genetic imprint of the past population bottleneck that the Finnish Peregrine population experienced. We conclude that high dispersal rates are likely to have contributed to maintaining genetic diversity across the landscape, by mixing individuals within the species' distribution in Finland and thus preventing genetic structuring and negative effects associated with the population decline in the 1970s.

11:45	TUESDAY, 22/08/2017	HALL XXII	OS15.6
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### Negative influence of resource pulse driven apparent competition on bird reproduction

Alex Grendelmeier<sup>1</sup>, Raphaël Arlettaz<sup>2,3</sup>, Gilberto Pasinelli<sup>1</sup>

<sup>1</sup>Swiss Ornithological Institute, Sempach, Switzerland; <sup>2</sup>Division of Conservation Biology, Institute of Ecology and Evolution, University of Bern, Bern, Switzerland; <sup>3</sup>Swiss Ornithological Institute, Valais, Switzerland

Resource pulses, like mast seeding in temperate forests, are associated with strong growth and decline of populations of various taxa throughout the food web. Mediated by resources pulses, various non-seed and seed consumers may be linked directly via e.g. predation or indirectly via e.g. shared predation. The goal of this study was to evaluate if and how resource pulses influence reproduction of a ground nesting forest passerine, the wood warbler (*Phylloscopus sibilatrix*) by testing three competing hypotheses concerning the interaction between rodents, rodent-hunting mammals and wood warbler reproduction, all camera-monitored between 2010 and 2015. In rodent outbreak years, wood warbler daily nest survival rate was lower than in rodent crash years, but rodents were not important nest predators, in contrast to rodent-hunting mammals. In rodent outbreak years, abundance of rodent-hunting mammals and proportion of nests predated by rodent-hunting mammals were higher than in rodent crash years, confirming a rodent-mediated aggregative numerical response of rodent-hunting mammals, which incidentally prey on wood warbler nests. We show that wood warblers and rodents are linked via shared predators, a pattern referred to as apparent competition. Our results suggest that apparent competition is stronger in rodent outbreak years, which typically follow a mast seeding, than in rodent crash years. Understanding how the magnitude of apparent competition changes with varying abundances of primary prey (rodents) is important because mast seeding and hence rodent outbreaks appear to increase in frequency and may thus explain in part why wood warblers, as incidental prey, are declining.

### Oral session 16: Migration IV

15:00	TUESDAY, 22/08/2017	HALL XXII	OS16.1
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### A test of short- and long-term effects of geolocator attachment on Pied Flycatchers *Ficedula hypoleuca*

Malcolm Burgess<sup>1,2</sup>, Myriam El Harouchi<sup>1</sup>, Chris Hewson<sup>3</sup>, Sophie Bell<sup>1</sup>

<sup>1</sup>*PiedFly.Net, Exeter, Devon, UK;* <sup>2</sup>*RSPB Centre for Conservation Science, Sandy, Bedfordshire, UK;* <sup>3</sup>*British Trust for Ornithology, Thetford, Norfolk, UK*

Tracking small passerines using miniaturised location tags is a rapidly expanding field of study. Here in a one-year study we test whether there are any short- or long-term effects of fitting geolocators weighing 3% of body mass to Pied Flycatchers *Ficedula hypoleuca*. In the deployment year we compared adult provisioning rates to nestlings, nestling growth and nest success between nesting attempts where adult males were fitted with a geocator, with control nests where males had the same capture history but were not tagged. We found no difference between treatments two days after geocator fitting in provisioning effort by males or their associated female, in nestling growth or on subsequent brood reduction or nest success. Return rate, arrival date to territories, timing and breeding parameters were compared the following breeding season and tagging impact assessed. We found no difference in return rate or arrival date, and no difference in nest timing, fecundity or outcome. Our study suggests fitting lightweight tags to small passerines need not affect behaviour, breeding or between-year survival. However tagging new species should still require assessment and comparison with well-matched control cohorts, and it should be recognised that tag effects could vary between years, mediated by environmental conditions

15:15	TUESDAY, 22/08/2017	HALL XXII	OS16.2
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# **What drives pied flycatchers to extreme and conserved detours in autumn, but population-specific wintering sites and spring routes?**

Janne Ouweland<sup>1</sup>, Carlos Camacho<sup>2</sup>, Vladimir G. Grinkov<sup>3</sup>, Jaime Potti<sup>2</sup>, Helmut Sternberg<sup>4</sup>, Christiaan Both<sup>1</sup>

<sup>1</sup>*Groningen Institute for Evolutionary Life Sciences, Conservation Ecology, University of Groningen, Groningen, The Netherlands;* <sup>2</sup>*Estación Biológica de Doñana – CSIC, Department of Evolutionary Ecology, Seville, Spain;* <sup>3</sup>*Evolutionary Biology Department, Faculty of Biology, Lomonosov Moscow State University, Moscow, Russia;* <sup>4</sup>*OAG f. Populationsforschung Braunschweig, Braunschweig, Germany*

With the development of miniaturized tracking technology, an incredible progress has been made in describing bird migration in small birds. The factors causing and maintaining their migratory patterns, such as migratory connectivity or alternate migration strategies are often not well understood. Trying to unravel the scale and potential causes of migratory connectivity is important for successful conservation and to understand how well complex migratory life-styles are suited to adapt to ongoing environmental changes. In a previous geocator study, we found strong migratory connectivity in the wintering longitude of pied flycatchers *Ficedula hypoleuca* in West Africa of birds originating from European breeding populations. Individuals breeding in Fennoscandia, that have a late breeding phenology, wintered further west compared to individuals breeding at more southern latitudes in the Netherlands and SW-United Kingdom (both breeding early). By comparing Dutch geolocators tracks with birds from two populations at the extreme south and east end of the range, i.e. Spain and Tomsk (Russia), we now show that breeding latitude is not the univocal cause of migratory connectivity in pied flycatchers. Birds from across the breeding range again converged strongly at the stopover sites at the Iberian Peninsula, but do so at different times in autumn. Birds use alternative spring routes, and migrate more directly towards breeding sites without the extreme detours made in autumn. We discuss potential drivers of extreme and conserved detours in autumn and population-specific wintering sites and spring routes in pied flycatchers.

15:30	TUESDAY, 22/08/2017	HALL XXII	OS16.3
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# **Comparing individual migratory schedule of different alpine swift population with geolocators: Are food, survival and reproduction all that matter?**

Christoph M. Meier<sup>1</sup>, Raúl Aymí<sup>2</sup>, Hakan Karaardıç<sup>3</sup>, Strahil G. Peev<sup>4</sup>, Felix Liechti<sup>1</sup>

<sup>1</sup>Swiss Ornithological Institute, Sempach, Switzerland; <sup>2</sup>Catalan Institute of Ornithology, Barcelona, Spain; <sup>3</sup>Akdeniz University, Antalya, Turkey; <sup>4</sup>Bulgarian Academy of Sciences, Sofia, Bulgaria

Since observing individual year-round behaviour of small migratory birds is technically challenging, studies are generally conducted with few individuals and rarely in more than one population. This hampers our understanding of the extent of variance we can expect in different migratory behaviours within different populations. As a consequence, the degree of synchronization in arrival and departure times of different individuals in the same breeding population remains unclear. We investigated the annual migratory schedule of 155 individual Alpine swifts (*Apus melba*) from four European populations along a latitudinal gradient over three years. We expected that populations at higher latitude have a shorter breeding season and that individuals have little flexibility in their arrival and departure times to fully exploit the short season. At lower latitude, on the contrary, we expected that the breeding season lasts longer and individuals could afford flexible schedules while still successfully breeding. This latter case offers insight how birds allocate their residential time between the breeding and the non-breeding range when having excess time during the annual cycle beyond breeding and moulting. Indeed, preliminary results of comparisons among different populations show a higher synchronization in individual migration schedules with increasing latitude. We will discuss whether proxies for food abundance could explain this pattern and whether the very different migration schedule of the closely related Common swift (*Apus apus*) does fit into this picture.

15:45	TUESDAY, 22/08/2017	HALL XXII	OS16.4
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### Migratory routes and population structure in common cuckoo *Cuculus canorus* populations across Northern Europe

Mikkel Willemoes<sup>1,2</sup>, Chris Hewson<sup>3</sup>, Raymond H. G. Klaassen<sup>1,6</sup>, Frode Fossøy<sup>4</sup>, Bård Stokke<sup>4</sup>, Roine Strandberg<sup>1</sup>, Yannis Vardanis<sup>1</sup>, Paul Howey<sup>5</sup>, Anders Tøttrup<sup>2</sup>, Philip Atkinson<sup>3</sup>, Kasper Thorup<sup>2</sup>, Thomas Alerstam<sup>1</sup>

<sup>1</sup>Lund University, Lund, Sweden; <sup>2</sup>Natural History Museum of Denmark, Copenhagen, Denmark; <sup>3</sup>British Trust for Ornithology, Thetford, UK; <sup>4</sup>Norwegian University of Science and Technology, Trondheim, Norway; <sup>5</sup>Microwave Telemetry Inc, Columbia, USA; <sup>6</sup>University of Groningen, Groningen, The Netherlands

Population specific patterns of migration routes and phenology is the result of colonization history and of adaptive changes in relation to environmental conditions and competition effects within and between populations. It can therefore help to identify which traits are conserved and which are modified, and hence provide information about the plasticity and adaptability of migratory behavior. We compare these patterns to population structure within these and other populations across northern Europe, to elucidate if the current differences in migration routes potentially reflect differences in post glacial colonization routes. In this study we compare individual annual migratory cycles between three populations of common cuckoos *Cuculus canorus* in northern Europe (populations in Great Britain, South and North Scandinavia, respectively). We find a high degree of migratory connectivity in the routes followed through Europe, but no or low connectivity within Africa. Temporal connectivity was likewise non-existing in the winter area, but grew stronger the closer the birds were to their breeding grounds. This suggests that winter area is a well-preserved trait, whereas route and timing are more easily modified mainly to fit breeding site location and phenology. Population structure could potentially reflect a separation in different glacial refugia comparable to the different migration routes, but the structure is generally very low across Europe suggesting a high degree of gene flow.

16:00	TUESDAY, 22/08/2017	HALL XXII	OS16.5
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## Apparent resilience of a declining Afro-Palaeartic migrant to forest loss on the wintering grounds

John Mallord<sup>1</sup>, Chris Orsman<sup>1</sup>, Japheth Roberts<sup>2</sup>, Kwame Boafu<sup>2</sup>, Roger Skeen<sup>1</sup>, Danaë Sheehan<sup>1</sup>, Juliet Vickery<sup>1</sup>

<sup>1</sup>RSPB Centre for Conservation Science, Sandy, Bedfordshire, UK; <sup>2</sup>Ghana Wildlife Society, Accra, Ghana

Afro-Palaeartic migrants have suffered some of the steepest population declines of all European species. One such species, the wood warbler *Phylloscopus sibilatrix*, spends the northern winter in the humid forest zone of West Africa. Between 2012-14, we studied the species' fine-scale habitat preferences at a site in Eastern Region, Ghana. Here we found strong selection for various woodland habitat characteristics, including a preference for a particular tree species, *Albizia zygia*, a fast-growing native pioneer. Mapping of the study site showed that it was comprised predominantly of dense and open forest, habitats which compositional analysis showed to be the most favoured by wood warblers. However, forest cover declined by 26% between 2012 and 2014, with areas converted to arable cultivation and plantations. Playback surveys carried out across the three winters showed that the number of birds recorded varied by month, but there was no evidence for a reduction across the three years despite the loss of forest. We suggest that although forests are converted to other land uses, a varying number of trees are retained and that use of these 'wooded farmland' habitats buffer wood warblers from forest loss. However, further loss of trees is likely to have a negative effect on wintering birds.

16:15	TUESDAY, 22/08/2017	HALL XXII	OS16.6
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## Animal tracking across borders – automated radiotelemetry in Europe

Sissel Sjöberg<sup>1</sup>, Heiko Schmaljohann<sup>2</sup>

<sup>1</sup>Lund University, Lund, Sweden; <sup>2</sup>Vogelwarte Helgoland, Wilhelmshaven, Germany

Studies at stopover sites along the different migration routes have given us a fairly good understanding about how intrinsic and extrinsic factors modulate the endogenously controlled migration program in birds. However, recent radio-tracking studies have demonstrated that birds leaving a 'stopover site' do not necessarily resume migration, but that they could also leave in search for a more favourable stopover site or possibly to explore the current wind condition for future departure decisions. Determining when a bird actually resumes migration, and whether the findings of a current site can be generalized for the entire migration route, are challenges for future stopover ecology research. Avian research using radiotelemetry has traditionally been limited by the spatial range of tags and the number of animals that can be tracked using manual tracking devices. The recent development of automated radiotelemetry now allows simultaneous and continual tracking of multiple individuals at the scale of the entire receiver array. More and more research groups are starting and planning projects using automated radiotelemetry in Europe. With coordination and cross-boundary cooperation many of the challenges of operating over many nations can be addressed, and we can work towards a network of receiver coverage across the flyway. This opens up for new collaborations to study migratory and stopover behaviour, routes and other aspects of movement ecology across a wide range of species at different spatial scales. Here we will introduce the collaboration on automated radiotelemetry in Europe and highlight its potential for bird migration studies across borders.

## Oral session 17: Social behaviour

15:00	TUESDAY, 22/08/2017	HALL X	OS17.1
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## Social organization of free-living Eurasian tree sparrow (*Passer montanus*) flocks forming a fission-fusion society

Attila Fülöp<sup>1</sup>, Bianka Kocsis<sup>1</sup>, Dóra Lukács<sup>1</sup>, Zoltán Németh<sup>1</sup>, Judit Bereczki<sup>1</sup>, Zoltán Barta<sup>1</sup>

<sup>1</sup>University of Debrecen, Debrecen, Hungary

Most bird species can be characterized by a varying degree of sociality and hence form and maintain social structures (i.e. groups). Although the social organization of groups may influence individual fitness, characteristics of social structures and factors shaping group attributes under natural conditions are largely unexplored. We studied the social structure of free-living Eurasian tree sparrow flocks under natural conditions, and the relationships between social connectedness and individual phenotypic traits and a proxy of fitness (i.e. body condition). During 4 years of study we marked 265 individuals with unique combinations of colour rings and made regular observations at three and six different feeding locations during the 2015-2016 and 2016-2017 wintering seasons, respectively. We characterized flocks using size and social network structure, based on the co-occurrence of the marked individuals within the same flock. In addition, we followed individual movements of six members from different sub-groups (i.e. communities) using radio telemetry to determine their home range size and space use. We found that the overall social and spacial structure of the groups was consistent during both wintering seasons. Tree sparrow flocks were not random associations, the structure of their social network indicated multiple communities forming a fission-fusion society with some degree of social preference. Flocks forming the communities were not homogeneously distributed in space, which was indicated by flock size and individual home ranges of tracked birds. Individual traits and fitness were similar across the communities and were not related to social network measures. (NKFIH grant K112527)

15:15	TUESDAY, 22/08/2017	HALL X	OS17.2
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### **Rank-dependent fattening strategies, group coherence and winter survival differ in ‘egalitarian’ and ‘despotic’ mixed-species groups of wintering birds**

Indrikis Krams<sup>1</sup>, Tatjana Krama<sup>1</sup>

<sup>1</sup>University of Tartu, Tartu, Estonia

Mixed-species flocking appears to be a common form of parid social organization. Heterospecifics in these flocks are generally considered to substitute for conspecifics as protection against predators at a lower competition cost. However, when comparing the advantages of conspecific versus heterospecific groups, existing data show little evidence that heterospecific groups are an advantage. It was previously shown that only dominant individuals have unrestricted access to the contested resources and this often shows up in the form of better winter survival. Subordinate individuals respond to these unpredictable conditions by acquiring and carrying extra body reserves as a buffer against periods of high-energy demand when dominants are most likely to take advantage of their higher rank. We estimated time budgets of members of mixed-species flocks by calculating the proportion of time crested tits (*Lophophanes cristatus*) and willow tits (*Poecile montanus*) spent together and as members of separate subflocks. We found that the pattern of greater body reserves in subordinate flock members is evident in comparisons of energy reserves between individuals in mixed-species flocks where the amount of reserves gradually became higher as rank decreased from dominant crested tit alpha males to the most subordinate willow tit females. We found that the flocks where willow tit alpha males were above crested tit subordinate and dominant females were found to be more coherent as crested and willow tits spend more time together. This shows that ‘egalitarian’ mixed-species groups (more reversals in dominant-subordinate interactions) are more stable than ‘despotic’ groups that form strongly linear hierarchies.

15:30	TUESDAY, 22/08/2017	HALL X	OS17.3
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### **Inland diplomacy: spatial segregation of lesser kestrels from neighbouring colonies**

Jacopo G. Cecere<sup>1</sup>, Salvatore Bondi<sup>2</sup>, Stefano Podofillini<sup>3</sup>, Matteo Griggio<sup>4</sup>, Egidio Fulco<sup>5</sup>, Andrea Curcio<sup>3</sup>, Delphine Ménard<sup>3</sup>, Simona Imperio<sup>6</sup>, Ugo Mellone<sup>7</sup>, Nicola Saino<sup>3</sup>, Lorenzo Serra<sup>1</sup>, Maurizio Sarà<sup>2</sup>, Diego Rubolini<sup>3</sup>

<sup>1</sup>ISPRA, Ozzano Emilia, Italy; <sup>2</sup>University of Palermo, Palermo, Italy; <sup>3</sup>University of Milano, Milano, Italy; <sup>4</sup>University of Padova, Padova, Italy; <sup>5</sup>Studio Milvus, Pignola, Italy; <sup>6</sup>CNR-IGG, Pisa, Italy; <sup>7</sup>University of Alicante, Alicante, Spain

Coloniality arises when individuals of the same species share resources, often without showing territoriality and marked intra-specific competition, during a critical period of their life-cycle. Improving information transfer in the colony environment has been proposed as the main factor leading to the evolution of coloniality. For instance, in habitats where food resources are predictable only within short time frames, the use of an individual's cognitive map could not be enough for efficiently targeting food, and birds might benefit from the experience gathered by conspecifics. Transfer of social information on location of food resources implies that individuals from the same colony share foraging areas and that a colony can be associated to exclusive foraging zones. By means of simultaneous GPS tracking of lesser kestrels from neighbouring colonies in two study areas, we were able to show a clear segregation of space use by individuals belonging to different colonies. The overlap of home ranges of birds from different colonies was significantly smaller than what would be expected by chance, strongly suggesting that birds of a given colony actively avoided foraging with individuals belonging to other colonies. To our knowledge, this is the first demonstration of spatial segregation of foraging ranges in a colonial landbird, a pattern that has been previously demonstrated to occur in some seabird species only. Hence, our findings suggest that mitigation of intra-specific competition between individuals from neighbouring colonies by means of spatial segregation of exploited areas may be widespread among colonial avian taxa.

15:45	TUESDAY, 22/08/2017	HALL X	OS17.4
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### Cooperative breeding in an Afrotropical songbird: a buffer against habitat disturbance?

Dries Van de Loock<sup>1,2</sup>, Liesbeth De Neve<sup>1</sup>, Diederik Strubbe<sup>1</sup>, Mwangi Githiru<sup>3,4</sup>, Luc Lens<sup>1</sup>, Erik Matthysen<sup>1</sup>

<sup>1</sup>Terrestrial Ecology Unit, Ghent University, Ghent, Belgium; <sup>2</sup>Evolutionary Ecology Group, University of Antwerp, Antwerp, Belgium; <sup>3</sup>Ornithology Section, Zoology Department, National Museums of Kenya, Nairobi, Kenya; <sup>4</sup>Wildlife Works, Voi, Kenya

The apparent paradox of individuals forgoing personal reproduction for the sake of raising a brood cooperatively, has received extensive attention during the last decades. Consequently, knowledge on the evolutionary maintenance and underlying fitness trade-offs has grown substantially, but the relative importance of the various proposed mechanisms is still subject to ongoing debate. It's however clear that distinctive traits associated with cooperative breeding, like the presence of helpers which can insure a breeding attempt against stochastic events or altered predator communities, could render populations more resistant to habitat fragmentation and disturbance, and hence facilitate their persistence in space and time. Yet, our understanding of potential behavioural responses by cooperative breeders to cope with these ubiquitous challenges is very limited. During six breeding seasons, we collected data on parental investment, helper investment and reproductive outcome of a forest specialist passerine, the Placid Greenbul (*Phyllastrephus cabanisi*), in seven remnant patches of a disturbed forest archipelago, the Taita Hills (SE Kenya). The remnant forest patches represent a gradient in environmental disturbance and size, allowing us to assess both indirect and direct benefits of cooperative breeding on reproductive performance of female breeders in relation to environmental conditions. We observed that cooperation was more prevalent, and groups larger, in smaller and more disturbed patches. Overall investment increased with group size, with related helpers contributing more and females reducing their personal investment correspondingly. This behavioural response did not affect reproductive outcome, but suggests that cooperation can facilitate population persistence in small and disturbed areas.

16:00	TUESDAY, 22/08/2017	HALL X	OS17.5
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### Cooperative breeding biology of the African pygmy falcon

Diana Bolopo<sup>1</sup>, Anthony Lowney<sup>1</sup>, Robert Thomson<sup>1</sup>

<sup>1</sup>*FitzPatrick Institute of African Ornithology, University of Cape Town, Cape Town, South Africa*

Diurnal raptors show a high occurrence of cooperative breeding (14% vs 3% of all birds). However, most records are anecdotal and likely linked to the difficulty of data collection in this group. The predominance of the trait may be linked to unique selection pressures, but these remain unexplored. We present a detailed study of the social breeding organization of African pygmy falcon *Polihierax semitorquatus* in the southern Kalahari. We collected group size, group formation and breeding success data during 5 breeding seasons from 133 nests. We found cooperative breeding at 22% of nests, with multi-male (72%), multi-female (17%) and multi-male-female (11%) groups. Breeding groups included unrelated adults, delayed offspring or both types of individuals. Pygmy falcons are therefore facultative cooperative breeders whose mating system may vary among monogamous, polyandrous and traditional cooperation within a single population. We propose that cooperative breeding in the African pygmy falcon might have evolved as a result of a) delayed natal dispersal, for learning purposes and to obtain indirect fitness benefits when the individuals are not sexually mature, and b) harsh and unpredictable environmental conditions that make joining a polyandrous group more profitable than independent breeding attempts.

16:15	TUESDAY, 22/08/2017	HALL X	OS17.6
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### Claudia's leaf warblers (*Phylloscopus claudiae*) increase observed repertoire size and decrease entropy in response to simulated territorial intrusion

Yulia A. Kolesnikova<sup>1</sup>, Alexey S. Opaev<sup>1</sup>, Liu Meishi<sup>2</sup>, Zujie Kang<sup>2</sup>

<sup>1</sup>*A.N. Severtsov Institute of Ecology and Evolution of Russian Academy of Sciences, Moscow, Russia;*

<sup>2</sup>*Hupingshan National Nature Reserve, Hunan province, China*

Birdsong is a highly complex signaling system which can theoretically convey an immense amount of information via its (1) song type/note composition and (2) ordering rules. Besides, birdsong is a good example of non-random vocal structures in nonhuman animals. Non-random vocal structures are well known in birds, but in most cases we know neither what the content of these signals are nor if conspecifics could use and encode information in them. We asked whether organization of song bouts functions as a graded signal of aggression in Claudia's Leaf warblers. The study was conducted in April-June 2016 in Hupingshan National Nature Reserve (Hunan province, China). We simulated territorial intrusion by broadcasting Claudia's Leaf warbler song in territories. Experiments involved 14 different males. Comparing singing prior, with those produced in response to playback, showed that (1) observed repertoire size increased, (2) first-order relative entropy decreased (i.e. non-randomness of singing increased) and (3) singing rate increased. Additionally we found that soft low-amplitude songs were produced in response to playback by several (but not all) males. This study thus provides empirical evidence that non-random vocal structures along with the other parameters could play a role in male-male competition.

### Oral session 18: Physiology II

15:00	TUESDAY, 22/08/2017	HALL XXI	OS18.1
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## From auditory recognition to motivation underlying vocal production: a journey into unlearned calls of zebra finches

Pietro D'Amelio<sup>1</sup>, Lisa Trost<sup>1</sup>, Milena Klumb<sup>1</sup>, Nicolas Adreani<sup>1</sup>, Manfred Gahr<sup>1</sup>, Andries ter Maat<sup>1</sup>

<sup>1</sup>*Max Plank Institute for Ornithology, Seewiesen, Germany*

The study of bird vocal communication has historically focused on songs, whereas the study of unlearned calls has not been given much attention. Songs are elaborated and long whereas calls are much shorter and simpler; but while the first only serve few functions the latter are employed in a myriad of situations. Calls are used from alarming to recruit feeding companions and, most interestingly, calls can mediate social relationships. Our knowledge of song functions is well refined but we do not understand in detail the usage of calls especially in the context of network communication. Using zebra finches as model species we investigated the patterns and functions of their continuous chattering. We developed and used miniaturized backpack microphones (0.6 grams) to record the daily vocalizations of each bird individually and we addressed 3 questions. 1) When these calls are emitted. 2) How the vocal communication develop within a pair. 3) Are the unlearned calls individually recognized? For each type of call we describe how movement and relative distance between birds influenced call production. Further, we report that mates developed precise patterns of alternated calling during pair formations and how we determined that soft calls were individually recognized. In conclusion, we aim to establish a solid bulk of knowledge under controlled conditions to then be able to explore call usage in the wild; to eventually clarify functions and usage of the soft calls, the most common and yet unexplored vocalizations in birds.

15:15	TUESDAY, 22/08/2017	HALL XXI	OS18.2
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## Different visual acuity for different behaviours in birds

Mindaugas Mitkus<sup>1</sup>, Robin Jonsson<sup>1</sup>, Simon Potier<sup>1</sup>, Almut Kelber<sup>1</sup>

<sup>1</sup>*Lund Vision Group, Department of Biology, Lund University, Lund, Sweden*

Birds rely on vision for a variety of behaviours. Different visual abilities are needed to optimally perform different tasks. High visual acuity, the ability to detect small details, is important in finding tiny edible items among inedible ones or spotting approaching predators from a distance. However, small details might be superfluous for other behaviours, such as flight control. In order to provide important information for different behaviours efficiently, visual system of a bird has to extract relevant features from the ample information reaching the eyes. We investigated visual acuity for a large-field moving stimulus in domestic chickens, budgerigars and Harris hawks. Achromatic sinusoidal gratings were displayed on computer monitors positioned in an arc around the bird. Optokinetic head reflex, a series of slow visual pursuits interspersed with fast saccadic gaze repositions, was monitored with a video camera positioned above the bird. Only when a bird could resolve the spatial detail in the pattern, the reflex was released. Previous studies reported visual acuities for small-field stationary gratings of 7.0, 11.7 and 37.3 cycles/degree in chickens, budgerigars and Harris hawks, respectively. Here, we found that the resolution for large-field moving gratings was 2.4, 2.0 and 2.8 cycles/degree in three species, respectively. These results raise the question which mechanisms determine the spatial resolution limit of the optokinetic head reflex. However, as the three tested species have different body mass, eye size, flight speed and behaviour, our results suggest that high spatial detail is not needed for the flight control in general.

15:30	TUESDAY, 22/08/2017	HALL XXI	OS18.3
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## Insulin-like growth factor-1 decreases in response to stress in a free-living bird

Zsófia Tóth<sup>1</sup>, Orsolya Vincze<sup>1</sup>, Ádám Zoltán Lendvai<sup>1</sup>

<sup>1</sup>University of Debrecen, Debrecen, Hungary

Insulin-like growth factor-1 (IGF-1) is an evolutionary conserved hormonal signal that regulates major life-history processes in all animals. Reduced IGF-1 signaling increases lifespan and the expression of genes involved in stress resistance in model organisms. However, it is unknown whether free-living organisms can adaptively respond to stressful stimuli by changing their IGF-1 levels, especially on the short term. Here, we analyzed circulating IGF-1 levels in response to capture-restraint stress in a free-living songbird, the bearded reedling, *Panurus biarmicus*, a species characterized by an unusually fast life-history strategy. We found that IGF-1 levels significantly decreased compared to baseline levels even after 15 minutes of restraint, and this response showed marked individual and seasonal differences. Interestingly, the changes in IGF-1 levels were independent from the increase in glucocorticoid levels, which play a prominent role in the vertebrate stress response. Our results represent the first investigation of the effects of stress on IGF-1 levels in free-living organisms and suggest that the IGF-1 pathway can have an autonomous but important role in how individuals cope with environmental challenges.

15:45

TUESDAY, 22/08/2017

HALL XXI

OS18.4

### Longterm variation in winter metabolism in a boreal passerine population

Juli Broggi<sup>1,2</sup>, Esa Hohtola<sup>3</sup>, Kari Koivula<sup>3</sup>, Jan-Åke Nilsson<sup>1</sup>

<sup>1</sup>University of Lund, Lund, Sweden; <sup>2</sup>Estación Biológica de Doñana, CSIC, Sevilla, Spain; <sup>3</sup>University of Oulu, Oulu, Finland

We studied the sources of variation in basal metabolic rate (BMR) among individuals from a wild population of great tit *Parus major* in the northern border of its distribution in Oulu (Finland) 65°N. The study was conducted over sixteen consecutive winters on 400 individuals. Previous studies have shown that birds exhibit plastic metabolic strategies albeit consistent within individuals. BMR in this population has been shown to be intrinsically determined and different from southern populations, to rise with declining temperatures and decline with individuals age. Furthermore, recent studies suggest that in terms of energy management BMR may be a more plastic and possibly relevant trait than body mass for winter survival. With the aim of identifying the determinants of such variation we explored the effect of local and large scale (NAO) environmental drivers in addition to biometric and individual characteristics. Despite the large amount of variance explained, interannual variation still remained a relevant and significant component of such variation. BMR significantly declined over the study years after environmental factors standardization. The second step was to obtain a standardized mean for each winter BMR within the population, and explore the possibility that factors occurring not within the winter but in previous episodes could explain the interannual variance observed, presumably through carry-over effects. We explored the influence of previous breeding season environmental factors and average population performance, on both juvenile and adult individuals. To our knowledge this is the first study in a wild passerine, reporting such a long term dataset in BMR.

16:00

TUESDAY, 22/08/2017

HALL XXI

OS18.5

### Body temperature responses to winter stress in great tits

Lucy Winder<sup>1</sup>, Andreas Nord<sup>2</sup>, Barbara Helm<sup>1</sup>, Stewart White<sup>1</sup>, Dominic McCafferty<sup>1</sup>

<sup>1</sup>Institute of Biodiversity, Animal Health and Comparative Medicine, College of Medical Veterinary and Life Sciences, University of Glasgow, Glasgow, UK; <sup>2</sup>Department of Biology, Evolutionary Ecology, Lund University,

Lund, Sweden

In winter months at high latitudes, cold ambient temperatures, limited food supply and short foraging periods make supporting high metabolic rates challenging. Great tits (*Parus major*) have a body temperature of around 42°C, which can be lowered to reduce their metabolic rate in times of energetic stress. Captive birds have been shown to enter nocturnal hypothermia during low temperatures to prevent overnight starvation when they have insufficient energy stores. Using temperature recording radio transmitters, we monitored skin temperature in wild great tits in an oak woodland in Scotland to assess the use of nocturnal hypothermia under winter temperatures and after restriction of otherwise reliable food supplementation. We also used thermal imaging to determine the extent to which energetically stressed great tits use vasoconstriction, as measured from changes in bill temperature to minimise heat loss. These results are compared with previously collected data on great tits in outdoor aviaries in Stensocka, Sweden, which act as a control for other environmental factors, such as increased predation risk. Monitoring body temperature will increase our knowledge of how wintering birds are adapted to survive in habitats faced with high energy demands.

16:15	TUESDAY, 22/08/2017	HALL XXI	OS18.6
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### Ontogenetic ultradian rhythmicity in sleep-wakefulness is colour-related in nestling barn owls

Madeleine F. Scriba<sup>1,2</sup>, Isabelle Henry<sup>1</sup>, Alexei L. Vyssotski<sup>3</sup>, Jakob C. Mueller<sup>4</sup>, Niels Rattenborg<sup>2</sup>, Alexandre Roulin<sup>1</sup>

<sup>1</sup>Department of Ecology & Evolution, University of Lausanne, Lausanne, Switzerland; <sup>2</sup>Avian Sleep Group, Max Planck Institute for Ornithology, Seewiesen, Germany; <sup>3</sup>Institute of Neuroinformatics, University of Zürich and ETH Zürich, Zürich, Switzerland; <sup>4</sup>Department of Behavioural Ecology & Evolutionary Genetics, Max Planck Institute for Ornithology, Seewiesen, Germany

The possession of a rhythm is usually described as an important adaptation to the regular changing environmental conditions like the dark-light cycle. However, recent studies suggest plasticity in the expression of a rhythm depending on life-history and environmental factors. Barn owl (*Tyto alba*) nestlings show variation in behaviour and physiology in relation to the size of black feather spots, a trait associated with many behavioural and physiological phenotypes including the circadian expression of corticosterone and the regulation of body mass. This raises the possibility that individual spottiness is associated with rhythmicity in sleep-wakefulness. Owlets showed ultradian rhythms in sleep-wakefulness with a period length of 4.5 to 4.9h, which increased in duration with age. The period length was related to the interaction of sex and spot size. Nestlings displaying small black spots showed strong rhythmicity levels in sleep-wakefulness states. This might be an advantage in a stable environment with predictable periodic changes in light, temperature or social interactions. Heavily spotted individuals displayed weak rhythms, which might enable them to be more flexible in reactions to unexpected events like predation or it might be a mechanism to save energy. These results are consistent with previous findings showing that large-spotted nestlings switch more frequently between wakefulness and sleep, resulting in higher levels of vigilance compared to small-spotted conspecifics. Thus, nestlings with larger black feather spots might differently handle the trade-off between wakefulness and sleep, attention and social interactions compared to nestlings with smaller black spots.

### Oral session 19: Conservation II

15:00	TUESDAY, 22/08/2017	HALL IX	OS19.1
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### Recreationists and trails: disentangling these two effects on forest birds

Yves Bötsch<sup>1,2</sup>, Daniel Scherl<sup>3,1</sup>, Zulima Tablado<sup>1</sup>, Roland Graf<sup>3</sup>, Lukas Jenni<sup>1</sup>

<sup>1</sup>Swiss Ornithological Institute, Sempach, Switzerland; <sup>2</sup>Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Zurich, Switzerland; <sup>3</sup>ZHAW Zurich University of Applied Sciences, Institute of Natural Resource Sciences, Wädenswil, Switzerland

Outdoor recreational activities are increasing worldwide and forests are often used for these activities (e.g. jogging, hiking, dog walking, mountain biking, and horse riding). The mere presence of people in forests can lead to disturbance of wildlife, which may perceive humans as potential predators. In many cases recreation relies on trails that inevitably fragment an otherwise continuous habitat. This habitat modification might also impact wildlife communities. The aim of this study was to separate the effect of mere human presence from that of habitat alteration on forest breeding-bird communities. We compared the effect of recreational trails on the avian community in two forests frequently used by recreationists with that in two rarely visited forests. In each forest, we did paired-point counts to investigate the differences between the avian community close (50m) and far (120m) from trails, while accounting for possible habitat differences. In the two forests with high levels of recreation, we found a reduction in the density of birds (13%) and in the species richness (12%) at points close to trails when compared to those further away. In contrast, such an effect was not detectable within the two forests with low levels of recreation. In addition we found that the effect of human presence varied depending on the characteristics of the species. These findings suggest that the impact of recreational trails on the avian community is not only caused by habitat modification but also by the mere presence of recreationists using those trails.

15:15	TUESDAY, 22/08/2017	HALL IX	OS19.2
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### Native woodland creation is associated with increase in a black grouse *Lyrurus tetrix* population

David Douglas<sup>1</sup>, Davide Scridel<sup>2,3</sup>

<sup>1</sup>RSPB, Edinburgh, UK; <sup>2</sup>Università Pavia, Pavia, Italy; <sup>3</sup>MUSE-Museo delle Scienze di Trento, Trento, Italy

Expansion of native woodland should benefit woodland biodiversity but few studies have tested the benefits for species of conservation concern. The black grouse *Lyrurus tetrix* has declined across many European countries and is a typical species occupying mosaics of woodland and open ground. We examine whether change in a regional population of black grouse within Scotland is associated with native woodland creation over recent decades. From 2002 to 2012 the number of lekking males increased by 90%. The location of all leks, including those newly established during the study, was positively associated with the amount of edge habitat between new native woodland and other habitats. Leks were larger where there was more new native woodland around leks. Increases in lek size were greatest where new native woodland comprised about 30% of land area within a 1500m radius. New native woodland plots supported taller and denser field layer vegetation than adjacent moorland, likely due to exclusion of grazers. Well developed field layer vegetation is important for breeding black grouse and provides a plausible explanation for the benefits of these woodland plots. Increases in lek size were greatest where new native woodland was young, averaging c5 years since establishment, and woodland plots >c20 years of age were associated with black grouse declines. Subject to longer-term management commitments to maintain benefits for black grouse, for example through periodic grazing of the field layer, expansion of native woodland could contribute to landscape-scale recovery of black grouse populations after decades of decline.

15:30	TUESDAY, 22/08/2017	HALL IX	OS19.3
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### The impacts of human land-use on forest bird community beta diversity in northern USA

Eric Le Tortorec<sup>1</sup>, Matti Häkkinen<sup>1</sup>, Edmund Zlonis<sup>2</sup>, Gerald Niemi<sup>2</sup>, Mikko Mönkkönen<sup>1</sup>

<sup>1</sup>University of Jyväskylä, Jyväskylä, Finland; <sup>2</sup>University of Minnesota, Duluth, USA

Biotic homogenisation, the process by which natural communities become more and more similar, is an increasingly global phenomenon. By definition, the increase of abundant generalist species at the expense of rarer specialists homogenises communities, but can also decrease phylogenetic and functional diversity, with potential negative impacts on the adaptation potential of communities, as well as ecosystem functioning. However, the mechanisms by which biotic homogenisation arises, as well as its impacts on phylogenetic and functional diversity are still poorly understood. In this study, we set out to study if human land-use causes biotic homogenisation in forest bird communities in the state of Minnesota in the USA. We split the entire state into 19km x 19km units, within each of which bird counts had been conducted at several points. We then calculated indices describing the intensity of human land-use and the state of the forests within each unit to explain the variation in bird community structure within sampling units, taking the hierarchical nature of the study system into account. We found that variation in community structure is primarily driven by geographic factors but still found a signal of biotic homogenization for taxonomic and functional diversity. Our study shows how increased human land-use can lead to biotic homogenisation at large spatial scales, and highlights the importance of considering multiple facets of beta diversity when making inferences about the impacts of human land-use on biodiversity.

15:45	TUESDAY, 22/08/2017	HALL IX	OS19.4
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### The impact of invasive plant management and an introduced parasite on the breeding success of Darwin's finches

Arno Cimadam<sup>1</sup>, Paul Schmidt Yáñez<sup>2</sup>, Julia Zarfl<sup>2</sup>, Christian H. Schulze<sup>2</sup>, Heinke Jäger<sup>3</sup>, Sabine Tebbich<sup>1</sup>

<sup>1</sup>Department of Behavioural Biology, University of Vienna, Vienna, Austria; <sup>2</sup>Department of Botany and Biodiversity Research, University of Vienna, Vienna, Austria; <sup>3</sup>Charles Darwin Foundation, Puerto Ayora, Galapagos, Ecuador

Introduced plants have invaded a unique forest on the Galapagos island of Santa Cruz, which is a key habitat for Darwin's finches. The Galapagos National Park applies manual control and herbicides to combat this invasion, which causes a temporary removal of the entire understory. A previous study showed that the control measures had a negative impact on the breeding success of Darwin's finches. Additionally, the invasive parasitic fly *Philornis downsi* reduced the breeding success. We hypothesized that the control measures lead to reduced arthropod food supply during chick rearing, which in turn caused mortality in chicks that were already weakened by the invasive parasite. In the present study we investigated the interaction between invasive plant control and *P. downsi* parasitism with an experimental approach. We compared food availability and breeding success in three study sites of varying degree of invasion (heavily invaded areas, areas with long-term management and recently controlled areas). Additionally, we reduced *P. downsi* intensities in nests by injecting insecticides. The reduction of *P. downsi* numbers, lead to an increase in breeding success at all three sites in the small tree finch (*Camarhynchus parvulus*). Furthermore, breeding success of the insectivorous warbler finch (*Certhidea olivacea*) and arthropod abundance was significantly lower in the recently controlled areas. Our experiments confirm the detrimental effects of *P. downsi* on the breeding success of Darwin's finches. The control of invasive plants had negative short-term effects on arthropods and birds but our data suggest long-term benefits of the forest restoration.

16:00	TUESDAY, 22/08/2017	HALL IX	OS19.5
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## The reproductive success of urban and rural peregrine falcons: the effects of land-use and prey availability

Esther Kettel<sup>1</sup>, Richard Yarnell<sup>1</sup>, John Quinn<sup>2</sup>, Louise Gentle<sup>1</sup>

<sup>1</sup>Nottingham Trent University, Nottingham, UK; <sup>2</sup>University College Cork, Cork, Ireland

Urban environments present raptors with many challenges yet, despite this, many species have colonised towns and cities globally. Peregrine falcons (*Falco peregrinus*) are perhaps the most well-known urban raptor species, yet whether or not the species is benefiting from urban-nesting has been little explored. Here, the productivity of urban and rural peregrine falcons is compared using historical breeding data collected between 1992 and 2016 from across Great Britain, and the reasons for any differences, including impacts of land-use and prey availability, are explored. Findings indicate that urban-nesting peregrines have significantly larger brood sizes, clutch sizes and more young to fledge than those in non-urban habitats, producing just over one more egg, one more egg to hatch and one more fledgling per nesting attempt. Bird (i.e. peregrine prey) density and biomass were found to be significantly higher in the urban sites and are likely to be the paramount reasons for higher reproductive success in urban environments; indeed, the biomass of birds was shown to have a significant positive effect on peregrine productivity. Furthermore, the amount of improved grassland within a 2 km radius of a peregrine nest had a negative impact on productivity, which is likely linked to a significant negative effect of improved grassland on prey abundance and biomass. In summary, urban environments appear to provide not only adequate, but superior-quality alternative habitats to rural landscapes for peregrine falcons, most likely due to the high abundance of prey.

## Oral session 20: Predation

15:00	TUESDAY, 22/08/2017	HALL I	OS20.1
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### Do intraguild predators and supplementary food affect the food hoarding of pygmy owls?

Elina Koivisto<sup>1</sup>, Chiara Morosinotto<sup>1</sup>, Giulia Masoero<sup>1</sup>, Erkki Korpimäki<sup>1</sup>

<sup>1</sup>University of Turku, Turku, Finland

Both food abundance and predation risk are known to alter the behaviour of animals but it is still unclear how these factors interact, especially in food hoarding species. To reduce the risk of starvation under harsh winter conditions, pygmy owls (*Glaucidium passerinum*) hoard prey items to natural cavities and nest boxes in late autumn and early winter. Because of their small size, pygmy owls are also subject to intraguild (IG) predation risk by larger avian predators. We studied whether supplementary food and presence of potential IG predators (Tengmalm's owls *Aegolius funereus* and Ural owls *Strix uralensis*) affect the amount of prey items stored and consumed by pygmy owls. Pygmy owl stores close to Tengmalm's owl territories, Ural owl territories or not in the vicinity of either of these IG predators were checked regularly in autumn-winter and the stored prey items were counted and identified by species. Half of the stores were regularly supplemented with rooster chickens from November to March. Pygmy owls hunting and storing prey near territories of IG predators tended to consume more supplementary food than those having stores further away but there was no difference in the number of stored prey items in relation to either food supplementation or IG predator presence. These results suggest that pygmy owl hunting performance is not reduced by IG predation risk as such but efficient foraging under predation risk might require additional resources, which could affect the future reproductive success in harsh conditions.

15:15	TUESDAY, 22/08/2017	HALL I	OS20.2
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### Short-term increase in predation risk affects the immune system of nestlings

Gianluca Roncalli<sup>1</sup>, Elisa Colombo<sup>2</sup>, Manuel Soler<sup>1</sup>, B. Irene Tieleman<sup>3</sup>, Maaïke A. Versteegh<sup>3</sup>, Francisco Ruiz-Raya<sup>1</sup>, Mercedes Gómez Samblas<sup>1</sup>, Juan Diego Ibáñez-Álamo<sup>3,4</sup>

<sup>1</sup>University of Granada, Granada, Spain; <sup>2</sup>University of Padua, Padova, Italy; <sup>3</sup>University of Groningen, Groningen, The Netherlands; <sup>4</sup>Estación Biológica de Doñana, C.S.I.C., Sevilla, Spain

Predation risk is thought to modify prey's physiology mainly through stress response. However, little is known about its potential effects on the immunity of animals, particularly in young individuals, despite its possible importance to successfully overcome wounding and pathogen aggression following a predator attack. We investigated the effect of three progressive levels of nest predation risk (moderate, high and extreme) on several components of the immunity (11 parameters) in common blackbird nestlings and analyse the potentially complex relationships between these two factors. Nest predation risk induced an increase in ovotransferrin, immunoglobulins levels and the number of lymphocytes and eosinophils, suggesting a general activation of the immune system. Thus, the perception of a potential predator per se could stimulate the immunity of nestlings and prepare the organism to cope with the possible inflammation or infection provoked by a predator attack. Interestingly, only high and extreme levels of risk caused the immunological changes, suggesting that nestlings modulate their immune responses according to the perceived level of threat. Immune responses due to nest predation risk are partially mediated by the presence of parasites (i.e. *Leucocytozoon*) and the current health status of the individual as only nestlings not parasitized or in good body condition were able to maintain a high immune response. This study highlights a previously unknown link between predation risk and the immune system, emphasizing the complex relationship among several selective pressures (predation, parasitism and environment) on developing organisms and accentuating the importance of studying predation from a physiological point of view.

15:30	TUESDAY, 22/08/2017	HALL I	OS20.3
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### Predation risk modifies the oxidative status of passerine birds in harsh environmental conditions

Chiara Morosinotto<sup>1</sup>, Miia Rainio<sup>1</sup>, Suvi Ruuskanen<sup>1</sup>, Erkki Korpimäki<sup>1</sup>

<sup>1</sup>University of Turku, Department of Biology, Turku, Finland

Prolonged physiological stress-response may lead to an excessive production of reactive oxygen species (ROS) and ultimately to oxidative stress and severe fitness costs. We investigated if natural variation in predation risk, induced by pygmy owls (*Glaucidium passerinum*), modifies the oxidative status of two free-living food-supplemented passerine species: the great tit, *Parus major* and the willow tit, *Poecile montanus* in March 2012-2013. Predation risk significantly affected antioxidant enzyme activities in supplementary fed willow tits. Antioxidant enzyme activity [principal component factor 2 (PC2) representing glutathione-S-transferase (GST) and superoxidase dismutase (SOD) activities] was higher in high predation risk area in 2013 than in low risk area in the same year. Higher antioxidant activity suggests higher ROS production in birds living under high predation risk. In addition, antioxidant enzyme activity (PC2) was also higher in high risk area in 2013 than in risky areas in the previous year, 2012. This suggests that for passerines the risk represented by pygmy owls varied between the two study years, probably in relation to the natural variation in the availability of their main prey (voles). In willow tits, PC1 [representing catalase (CAT), glutathione (tGSH), glutathione ratio (GSH:GSSG) and protein carbonylation] was not affected by perceived predation risk, and neither were antioxidant levels or enzymatic activities (PC1 and PC2) in great tits. Higher enzyme activities observed in willow tits suggest that predator presence modifies the oxidative status of avian prey but the response seems to be species-specific and influenced also by other environmental characteristics.

15:45	TUESDAY, 22/08/2017	HALL I	OS20.4
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### **Insect herbivory may cause changes in the visual properties of leaves and affect the camouflage of herbivores to avian predators**

Tuuli-Marjaana Koski<sup>1</sup>, Carita Lindstedt<sup>2</sup>, Tero Klemola<sup>1</sup>, Jolyon Troscianko<sup>3</sup>, Elina Mäntylä<sup>1</sup>, Esa Tyystjärvi<sup>1</sup>, Martin Stevens<sup>3</sup>, Marjo Helander<sup>1</sup>, Toni Laaksonen<sup>1</sup>

<sup>1</sup>University of Turku, Turku, Finland; <sup>2</sup>University of Jyväskylä, Jyväskylä, Finland; <sup>3</sup>University of Exeter, Penryn, Cornwall, UK

‘Cry for help’ hypothesis predicts that attraction of predators with chemical or visual cues can decrease insect damage of plants. Visual cues involve changes in photosynthetic activity and reflectance of leaves, and there is some evidence that birds may use these changes as foraging cues. However, changes in the visual properties of leaves have not been quantified and it is not known how birds see these changes. We also presented and tested a new ‘reduction in camouflage’ hypothesis (not mutually exclusive with ‘cry for help’) stating that herbivore-mediated changes in leaf colour can increase the conspicuousness of herbivore against leaves. To define changes in the visual properties of leaves, their detectability to birds, and whether these changes affect the conspicuousness of herbivore, we manipulated the level of herbivory in silver birch trees (*Betula pendula*) with autumnal moth (*Epirrita autumnata*) larvae, and used blue tit (*Cyanistes caeruleus*) vision models to images of leaves and larvae. Hue, luminance (lightness), contrast, transparency, chlorophyll content, photosynthetic activity and water content of the leaves were compared between herbivore-damaged and control trees. The leaves of herbivore-damaged trees had a decreased chlorophyll *a* concentration, increased contrast and they reflected more longer wavelengths. However, these changes are likely not obvious to birds. In contrast to our expectation, there were only minor differences in conspicuousness of larvae against the leaves of damaged trees, which may be very subtle to predator vision. Nevertheless, according to visual models, larvae should be easily detectable to birds from both herbivore-damaged and control trees.

16:00	TUESDAY, 22/08/2017	HALL I	OS20.5
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### **Does type of discrimination task affect learning about prey palatability in great tits?**

Lucia Doktorovová<sup>1</sup>, Alice Exnerová<sup>1</sup>, Lenka Junová<sup>1</sup>, Martina Kišlová<sup>1</sup>, Aneta Kuncová<sup>1</sup>

<sup>1</sup>Charles University in Prague, Prague, Czech Republic

When learning to discriminate between palatable and unpalatable prey, predators encounter different prey types either simultaneously or sequentially. Both types of discrimination task are frequently used in experiments focused on predator learning in context of aposematism. Although they may differ in level of difficulty for predators, and choice of the task may affect the results, studies directly comparing performance of predators between sequential and simultaneous discrimination tasks are lacking. We tested the effect of type of discrimination task on rate and effectiveness of learning in adult and juvenile great tits (*Parus major*). Birds were trained to discriminate between palatable and unpalatable prey (paper "bugs" baited with piece of mealworm soaked in water or quinine), and re-tested the following day. We compared the performance of birds tested with two discrimination cues - colour and pattern - in three discrimination tasks (1) alternative presentation of palatable and unpalatable prey items in a sequence, (2) simultaneous presentation of two prey items (palatable and unpalatable) and (3) simultaneous presentation of multiple items of palatable and unpalatable prey. Colour was more effective discrimination cue than pattern for both adult and juvenile birds. The birds tested with colour as a cue performed equally well in all three types of tasks. Performance of birds tested with pattern was affected by type of task: the birds performed worse in simultaneous task with multiple items than in other two tasks. Thus, the type of discrimination task affects the learning performance, but the effect depends on the discrimination cue.



16:15	TUESDAY, 22/08/2017	HALL I	OS20.6
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### Can bird predation affect polymorphism in aposematic prey populations?

Elena Zvereva<sup>1</sup>, Katerina Hotová-Svádová<sup>2</sup>, Lucia Doktorovová<sup>3</sup>, Pavel Štys<sup>3</sup>, Vitali Zverev<sup>1</sup>, Dana Adamová-Ježová<sup>3</sup>, Alice Exnerová<sup>3</sup>

<sup>1</sup>University of Turku, Turku, Finland; <sup>2</sup>University Hradec Kralove, Hradec Kralove, Czech Republic; <sup>3</sup>Charles University Prague, Prague, Czech Republic

Theory predicts that selection by predators should favour uniformity of warning signal in unpalatable prey. However, some aposematic species are still polymorphic in colour patterns. We tested whether birds react differently to colour morphs (orange-and-black patterned light, orange-and-black patterned dark and unpatterned metallic) of a polymorphic and chemically defended leaf beetle *Chrysomela lapponica*, potentially affecting colour morph frequencies in prey populations. In the laboratory experiments with live beetles, naïve great tits (*Parus major*) attacked all colour morphs at the same rate. Wild-caught birds attacked light morph at first encounter at the same rate as novel control prey (crickets), but significantly avoided both dark and metallic morphs. All colour morphs appeared similarly unpalatable for great tits, and about half of attacked beetles were released unharmed. Avoidance learning was similarly fast for all three morphs. However, in the next-day memory test, dark morph was attacked at a greater rate than two other morphs, indicating lower memorability of dark morph. Experience of birds with both patterned morphs was not generalized to the metallic morph. Thus, colour morphs of *C. lapponica* were remembered and generalized differently. As a result, dark morph may have survival advantage over light and metallic morphs at low population densities, presumably being less conspicuous, but it may lose this advantage when the density increases due to its low memorability. Our results suggest that selective predation of birds on colour morphs of *C. lapponica* may be density-dependent and thus may contribute to variations in colour morph frequencies during population fluctuations.

### Other oral presentations

18:00	MONDAY, 21/08/2017	HALL I	FE
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### Fledglings' event

Jan O. Engler<sup>1</sup>, Madeleine F. Scriba<sup>2,3</sup>

<sup>1</sup>Ghent University, Ghent, Belgium; <sup>2</sup>LMU, Munich, Germany; <sup>3</sup>University of Lausanne, Lausanne, Switzerland

This event specifically aims at early-career researchers, who want to learn more about various topics of academic life that normally don't get taught at the university or deeply discussed in the lab. The event will be structured in two broad sections, each of which will last one hour: 1. How to write a paper that gets accepted and cited? How to turn your results into a great story? What are the features of a good paper? Why publish in ornithological journals? The burden of the impact factor. The opportunities of Open Access. Who are the reviewers? What does an editor do? How to deal with rejection? 2. Life-hacks for a successful career What does it take for a PhD student to stay in academia? How to make a competitive record / CV? How do I build up a great academic network? And why is that important? Should I prevent failure? Is there a life outside of academia? What are profitable alternatives to an academic career? Why do women have a harder stand in academia? How to succeed as a woman? Why there is an increasing gender imbalance with increasing academic levels? Each topic will be quickly introduced (ca. 5 min), followed by an open Q/A session with the panelists. Expert panel: Johan Nilson, Managing Editor, Journal of Avian Biology & Lund University (S); Janne Seppänen, Founder of Peerage of Science (FI), Petra Sumasgutner, University of Turku (FI) & FitzPatrick Institute of African Ornithology University of Cape Town (SA).

18:45	FRIDAY, 18/08/2017	HALL IX-X	FH
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## History of Finnish Ornithology

Timo Vuorisalo<sup>1</sup>, Esa Lehtikoinen<sup>1</sup>, Risto Lemmetyinen<sup>1</sup>

<sup>1</sup>*University of Turku, Turku, Finland*

The British traveler Edward Daniel Clarke wrote in 1824 after his visit to Turku that "scientifically Turku is as much ahead of Uppsala as Uppsala is ahead of Lund". From 1642 to 1828 altogether 115 academic dissertations related to animals were published in the Royal Academy of Turku, 21 of them focusing on birds. The total number of bird dissertations until 2000 was 84. Important early ornithologists from the 1700s included Johan Leche (avian phenology) and Pehr Kalm (Passenger Pigeon migration in North America). An academic dissertation of Leche and Grysselius in 1764 argued strongly against swallow hibernation in lake bottoms. Although strongly influenced by Linnaeus, early Finnish ornithologists did not focus on bird systematics, and only one bird species (Southern pale chanting goshawk) has been scientifically described by a Finnish scientist (G. Rislacki in 1799). From 1700s to late 1900s the main foci of Finnish ornithology were bird phenology (spring arrival of several species recorded since 1749), migration studies (J. A. Palmén's study 1874, organized bird ringing since 1913), avian ecology (originally called bird topography), biogeography and quantitative bird censuses (since the 1910s). Developments in plant ecology strongly influenced early avian ecological studies. The history of Finnish ornithology has also been characterized by great contributions by amateur ornithologists, intense international contacts since the first International Ornithological Congress in Vienna 1884, and a tendency to "semi-official" national research programmes that have directed ornithological research activities of both professionals and amateurs.



## 12. Posters

	SATURDAY, 19/08/2017	MAIN BUILDING	P.1
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### **Females need a bond: female zebra finches change their vocal behaviour in response to the breeding onset only if they have established a bond.**

Mauricio Nicolas Adreani<sup>1</sup>, Ellen Zippi<sup>2</sup>, Manfred Gahr<sup>1</sup>, Andries ter Maat<sup>1</sup>

<sup>1</sup>Max Plank Institute for Ornithology, Starnberg, Germany; <sup>2</sup>University of Texas in Austin, Austin, USA

Opportunistic breeding mechanisms have been intensively studied in a wide range of organisms. Typically, animals with this reproductive strategy express breeding behaviours only when the adequate environmental conditions occur. In this context, the social status of the animals has never been investigated as an environmental cue within the breeding strategy. By studying communication behaviour in same-sex trios of male (five trios) and female (six trios) zebra finches (*Taeniopygia guttata*) we aimed to test whether having a social bond, or not, conditioned the response to a breeding onset. Each bird carried a microphone transmitter that continuously recorded individual vocalizations during the 8 days of the experiment. In the first four days the birds were kept in an impoverished environment and in the fourth day the aviary was enriched with a variety of food, green plants, nesting material and nest boxes. Blood samples were taken on the first and the last day of the experiment to measure sex steroid hormones and every day focal observations were made. Subsequently, the strongest bond within each trio could be established and birds could be classified as “bonded” or “single” birds. We found that all males incremented the breeding calls after the breeding onset but no physiological changes were detected, independently of the social status. Intriguingly, both bonded and single females showed a physiological response towards the breeding onset, but, the females that had a bond changed their vocal behaviour after the breeding onset whereas single females did not.

	SUNDAY, 20/08/2017	HALL IX	P.2
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### **Temperatures in early autumn in the wintering grounds affect birds' body condition during spring migration in three warbler species**

Irith Aloni<sup>1</sup>, Shai Markman<sup>2</sup>, Yaron Ziv<sup>1</sup>

<sup>1</sup>Ben Gurion University of the Negev, Beer Sheva, Israel; <sup>2</sup>University of Haifa, Oranim, Israel

Many studies on bird physical condition during spring migration have focused on food availability and factors affecting it just before migratory takeoff. However, only a few studies examined the effect of conditions upon arrival to the wintering grounds on birds' physical condition later on. We are suggesting three hypotheses, including two new ones, regarding the effect of temperatures and precipitation at the wintering grounds on birds' body state upon spring arrival to Eilat, Israel. In all three species studied - *Sylvia curruca*, *Phylloscopus orientalis*, and *Iduna pallida* - temperatures at the wintering grounds in September and October were the only variables correlated with body state upon arrival to Eilat, about six to nine months later. Since September and October are on the verge of the rainy season in the wintering grounds, insect availability should be relatively high, and high temperatures would encourage even higher activity and accessibility. This may translate into higher food availability for these mainly insectivorous species. We suggest that this high food availability is crucial to the birds, which arrive exhausted after a long migratory trip over the Mediterranean Sea and the Sahara desert, and a demanding breeding season preceding it. Given the fact that the later part of the wintering period is a dry season, food availability in September and October may be crucial for the birds' body state and may have a long lasting effect.

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#### **Habitat use of Barn owls in relation to small mammal abundance throughout the year**

Nadine Apolloni<sup>1</sup>, Bettina Almasi<sup>1</sup>, Robin Séchaud<sup>2</sup>, Kim Schalcher<sup>2</sup>, Alexandre Roulin<sup>2</sup>, Reto Spaar<sup>1</sup>

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Small mammals are a staple food for many raptor species. The abundance of small mammals in agricultural landscapes varies between different habitat types and throughout the year. Predators might adjust the location and size of their home ranges to the seasonal variation of small mammal abundance in different habitat types. We studied home range use of barn owls throughout the year in relation to habitat type and food abundance. Barn owls were equipped with light-weight GPS-loggers to assess their home range use. The abundance of small mammals in different habitat types was measured with indirect methods (small mammal indices and track plates) over larger scales in four regions. Our first results show that the abundance of small mammals highly fluctuated between seasons and habitat types. Over larger areas, the fluctuations were synchronous. Home ranges of breeding males varied markedly between seasons. Barn owls preferably hunted along linear structures such as hedges and roadsides where we also found a more constant and generally higher abundance of small mammals compared to other habitat types. Quick and low-cost sampling of small mammals through indirect methods is a good alternative to live-trapping for assessing small mammal abundance, especially over larger areas. Combined with light weight GPS logger data of the birds over longer time periods, we might get new insights into home range use of Barn owls throughout the year.

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#### **A case study: the comparison of persistent organochlorine pesticides levels in feathers of an aerial bird species (*Apus melba*) from Turkey and Switzerland**

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We investigated residues of POPs (Persistent Organochlorine Pesticides) in feathers of migratory Alpine Swift (*Apus melba*) in this study. We collected the three outermost primaries of four birds each from Turkey and Switzerland, respectively. They were prepared by a four step extraction procedure for analysis chlorinated pesticides which are polychlorinated biphenyls (PCBs) and organochlorines (OCPs) (HCHs, CHLs, HCDPs, DDTs and dicofols congeners). Extracts were analysed at gas chromatography–mass spectrometry ( $r^2 = 0.99$ ). We found a significant difference between the mean levels of POPs in the two countries ( $p = 0.021$ ). We observed concentrations of PCBs =  $16.8 \pm 2.1$  and OCPs =  $34.1 \pm 2.4$  in Swiss birds and PCBs =  $13.3 \pm 2.3$  and OCPs =  $12.3 \pm 3.5$  ng/g in Turkish birds. Among all PCBs and OCPs PCB151 ( $2.1 \pm 0.3$  ng/g) and 4,4'-DDT ( $3.5 \pm 1.6$  ng/g) showed the highest levels. The results indicate that Alpine Swift from both country were at risk due to critical POPs level exposure and that birds from Switzerland even had accumulated higher concentration than birds from Turkey. Alpine swifts moult their outermost primaries only after autumn migration and therefore accumulate most POPs in the non-breeding areas. Hence, our result provides evidences that Swiss swifts and Turkish swifts might not share the same non-breeding area.

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### Pair bond and extra pair paternity in the white-eyed bulbul, *Pycnonotus xanthopygos*

Aziz Aslan<sup>1</sup>, Bekir Kabasakal<sup>1</sup>, Ali Erdoğan<sup>1</sup>, Matteo Griggio<sup>2</sup>

<sup>1</sup>Akdeniz University, Antalya, Turkey; <sup>2</sup>University of Padova, Padova, Italy

The territorial and socially monogamous white-eyed bulbul's pair bonds persist throughout the breeding season, over the whole year or frequently through multiple years. However, extra pair paternity in the white-eyed bulbul remains unknown. In this study, therefore, we report the occurrence of Extra pair paternity in a single population of the white-eyed bulbul in Antalya where the northernmost distribution of species occurs. Although the species forms socially monogamous pair bonds during the breeding season, we found that 16 (22.8%) of 67 offspring had a different father than social father and 11 (42.3%) of 26 nests had an extra pair offspring. In socially monogamous species with long-term pair bonds, both males and females may seek extra pair copulations to enhance reproductive success. Extra-pair copulations are an alternative reproductive strategy adopted by males to increase their reproductive success and adopted by females to obtain genetic benefits. In both sexes, it is possible to obtain benefits such as obtaining an alternative mating chance against the mate's infertility, finding a potential future partner, and production of genotypically better or diverse offspring.

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### Integrating ecosystem services delivery and bird conservation into broader management strategies for farmland systems

Giacomo Assandri<sup>1,2</sup>, Giuseppe Bogliani<sup>2</sup>, Paolo Pedrini<sup>1</sup>, Mattia Brambilla<sup>1,3</sup>

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Biodiversity conservation and the delivery of ecosystem services are often tackled as alternative targets in landscape planning, which is frequently focused only on one of the two, even if the strict link between biodiversity and ecosystem functions is inextricable. Modern agriculture poses great challenges for biodiversity conservation and the delivery of valuable ecosystem services. Agricultural intensification is considered to be the main driver of the dramatic population declines experienced by many bird species in Europe, and causes the reduction of several ecosystem services different from provisioning ones. Here we show how it is possible to achieve bird conservation targets, while enhancing the delivery of ecosystem services in agroecosystems, and how the relative integration can lead to ‘win-win’ strategies in landscape planning. We present two study cases focused on Italian vineyards, a perfect model of a truly intensive farming system, nevertheless often harbouring important avian assemblages. The first case illustrates an integrated management strategy aimed at conserving the Mediterranean endemic Moltoni’s warbler (*Sylvia subalpina*), while reducing soil erosion (i.e. promoting a regulating ecosystem service). The second case demonstrates that the conservation of traditional features characterizing a cultural landscape promotes the delivery of cultural ecosystem services (i.e. aesthetic/recreational value, cultural heritage) and, at the same time, increases habitat suitability for common redstart (*Phoenicurus phoenicurus*), an indicator of the wider bird diversity of the area. Evaluating the potential synergies between bird conservation and the delivery of ecosystem services should be regarded as a priority to formulate more comprehensive and appealing conservation strategies.

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### **Timing of migration of the Spotted Flycatcher (*Muscicapa striata*) to the south: departure from the Baltic coast and arrival in South Africa in relation to climate warming**

Jacqueline Badenhurst<sup>1</sup>, Magdalena Remisiewicz<sup>2</sup>, Les Underhill<sup>1</sup>

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Global-warming may affect migrant birds in both hemispheres where they spend parts of their lives. We will assess the timing of migration of the Spotted Flycatcher as it departs from its European breeding grounds and arrives in the South African non-breeding grounds. To determine the changes in the departure timing, we will compare the dates when 5%, 50% and 95% of spotted flycatchers were ringed each year in mid-August to October in 1965-2016 at the Polish coast at the Operation Baltic ringing stations Bukowo-Kopań (54°21'56.50"N; 19°23'24.60"E) and Mierzeja Wiślana (54°21'N, 19°17'–19°23'E). To determine the timing of their arrival at the non-breeding grounds we will analyze citizen scientist data collected in 1987-1991 and 2007-2016 in South Africa. Both datasets will be correlated with the mean, minimum and maximum monthly temperatures at weather stations in the analyzed regions to determine whether the changes in timing of movements are related to changes in temperatures at their breeding and non-breeding grounds.

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### **Effects of early experience and social environment on nest-material choice**

Alexis Breen<sup>1</sup>, Chloe Guerard<sup>1</sup>, Susan Healy<sup>1</sup>, Lauren Guillette<sup>1</sup>

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Evidence is accumulating against the notion that birds build nests by instinct alone: a bird can learn from their own and others' building experiences. What role the developmental period before adulthood plays, however, is unclear. To examine the role of early-life experience in birds' first-time building decisions, we manipulated two components of male (the builder) zebra finches' juvenile experience, access (yes or no) to: (i) an experienced

adult builder and/or (ii) material of a different colour from their natal nest. At sexual maturity, we tested males' preferences among three options: material that matched (in colour) to their (i) natal experience, (ii) juvenile experience, or, was (iii) novel (for males without material access, two of these options were novel). When choosing material for their first nest, males that experienced both an adult builder and material as juveniles preferred the colour of material from that time. Males without juvenile experience of an adult builder and/or material did not prefer one particular material colour. Thus, first-time nest builders use their juvenile experience to select material but only if that experience was in the presence of an adult builder. Bird nest building is, then, shaped by the social environment in early life.

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### **The reintroduction of bearded vultures in South Africa: a feasibility analysis.**

Christiaan W. Brink<sup>1,2</sup>, Sonja C. Kruger<sup>3</sup>, Arjun Amar<sup>1,2</sup>

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The rapid decline of the southern African population of bearded vultures, *Gypaetus barbatus*, and new plans for wind farms within the core of this species' range, threaten this population with extinction. In response, a reintroduction has been proposed to establish a second bearded vulture population within their historic South African range. This population will be an insurance against extinction in the region. To facilitate this proposal, we aim to (1) identify the most suitable area for such a reintroduction and (2) provide insight into the potential outcomes of alternative release strategies. We used habitat modelling and GIS techniques to identify five potential reintroduction areas and compared these areas based on a range of habitat attributes. The two highest ranking areas were situated mostly within the Eastern Cape Province. To explore the attributes of a successful reintroduction scheme (defined as >34 individuals after 30 years), population viability analysis was conducted for various release strategies across different mortality scenarios. Results indicated that direct releases, without simultaneous captive breeding, had a high probability of failure (78.3-95.7%). Supplementation from captive breeding decreased the failure rate considerably (25.5-49.8%). We show that even if mortality rates at the reintroduction area are high, a reintroduction initiative can still be valuable, as it reduces the probability of extinction (one sex remains) by approximately 30% over a 50 year period. We argue that a captive breeding programme is imperative for the success of any reintroduction and would be a prudent conservation strategy.

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### **Finish with a sprint: long-distance migration of collared flycatchers is time-selected in both seasons, but to a different degree**

Martins Briedis<sup>1</sup>, Peter Adamík<sup>1</sup>

<sup>1</sup>*Palacky University, Olomouc, Czech Republic*

Under time-selected migration birds have to choose an appropriate strategy to outcompete their rivals and arrive at the destination first to secure access to prime resources. Thus, migration events can be viewed as races between the individuals. In long-distance bird migration, similar as in long-distance sporting events, individuals may shift from maximum sustained speed to a final burst of sprint to outcompete their rivals. In this study, we test the hypothesis of sprint migration strategy in collared flycatchers *Ficedula albicollis* during autumn and spring, and compare seasonal differences in time selection pressure. In both seasons, collared flycatchers evidently showed a pattern of sprint migration by completing the last leg of their journeys faster compared to the

first leg. Such pattern indicates time-selected migration in both seasons. This phenomenon was more pronounced in spring, emphasising the higher importance for early arrival at the breeding grounds and largely accounting for overall faster spring migration. In both seasons (but particularly in spring), late departing individuals migrated at a faster rate, partially being able to catch-up with their early departing conspecifics. Our findings present a confirmation that there is likely a competition for early arrival at breeding and non-breeding grounds alike and long-distance migrants adopt sprint migration strategy in both seasons. While sprint migration may be the appropriate strategy to gain priority for settling at prime territories, it may not be suitable to compensate for the warming climate as individuals already exhaust their resources due to intraspecific competition, limiting their ability for additional advancement.

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### **Busse's flat orientation cage vs. Emlen's funnel - methodical comparison**

Przemyslaw Busse<sup>1</sup>

<sup>1</sup>*Bird Migration Research Foundation, Przebendowo, Poland*

This presentation is concentrated on the practice when different types of orientation cages are used in the field. Two mentioned in the title orientation cage designs most used in the field work are presented in detail and compared for compatibility of results, simplicity in use and time effectiveness. Apart of the cage designs and field procedures (60 min. nocturnal tests vs. 10 min. diurnal tests) the standard evaluation procedures of data are compared and discussed. The data being the example were collected for four species of nocturnal migrants (Reed Warbler, Sedge Warbler, Willow Warbler, Whitethroat) at the Kalimok Bird Station (Bulgaria): 141 individuals were tested in the Emlen's funnel in 2001, while 788 - in Busse's cage in years 2001-2007. As conclusions there are: (1) The Busse's flat cage design and its standard procedures give the results fully compatible to the Emlen's funnel and connected procedures of work, (2) the procedures compared have distinct differences as to some constrains of methods: - the Busse's 10 minutes standard gives possibility to collect a huge amount of data (12 per hour and person) in real field work performed even in a wilderness, - the Emlen's standard procedure of testing the bird for 60 minutes is absolutely useless, as this is not effective for quality of results, while stressing the bird more than necessary, - generally, the Emlen's cage is extremely stressing the bird and should be avoided as much as possible in practice, because of animal welfare reasons.

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### **Elevated immune gene expression is associated with poor reproductive success of urban blue tits**

Pablo Capilla-Lasheras<sup>1,2</sup>, Davide Dominoni<sup>2,3</sup>, Simon Babayan<sup>2</sup>, Peter O'Shaughnessy<sup>2</sup>, Magdalena Mladenova<sup>2</sup>, Luke Woodford<sup>2</sup>, Christopher Pollock<sup>2</sup>, Tom Barr<sup>4</sup>, Francesco Baldini<sup>2</sup>, Barbara Helm<sup>2</sup>

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Urban and forest habitats differ in many aspects that can lead to modifications of the immune system of wild animals. Altered parasite communities, pollution and artificial light at night in cities have been associated with exacerbated inflammatory responses, with possibly negative fitness consequences, but few data are available from free-living animals. We investigate how urbanisation affects major immune pathways and experimentally test contributing factors in blue tits (*Cyanistes caeruleus*) from an urban and forest site. We compared breeding adults by quantifying the mRNA transcript levels of proteins associated with anti-bacterial, anti-malarial (TLR4,



LY86) and anti-helminthic (Type 2 transcription factor GATA3) immune responses. Adult urban and forest blue tits differed in gene expression, with significantly increased TLR4 and GATA3, but not LY86, in the city. We then experimentally tested whether these differences were environmentally induced by cross-fostering eggs between the sites and measuring mRNA transcripts in nestlings. The populations differed in reduced reproductive success, with a lower fledging success and lower fledgling weight recorded at the urban site. Because of low urban survival, robust gene expression data were only obtained from nestlings reared in the forest. Transcript levels in these nestlings showed no (TLR4, LY86), or weak (GATA3), differences according to their origin from forest or city nests. Prevalence of malaria parasites was invariably high across environments and not associated with immune transcript levels. Our results support the hypothesis that inflammatory pathways are activated in an urban environment and suggest that these differences are most likely induced by environmental factors.

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### Genetic identity and mitochondrial DNA diversity of the chiffchaffs in northwestern Russia

Raisa Chetverikova<sup>1,2</sup>, Olga Babushkina<sup>1</sup>, Julia Bojarinova<sup>1</sup>, Svetlana Galkina<sup>1</sup>, Aleksandr Dyomin<sup>1</sup>, Irina Dyomina<sup>1</sup>, Regina Lubkovskaya<sup>1</sup>

<sup>1</sup>Saint Petersburg State University, Saint Petersburg, Russia; <sup>2</sup>Carl von Ossietzky University, Oldenburg, Germany

In this work we studied chiffchaffs *Phylloscopus collybita*, trapped during autumn migration in the northwestern Russia (Ladoga Ornithological Station, Leningrad region, 60°41'N, 32°57'E). In the region of study, the two distinguishable subspecies of chiffchaffs are present: *P. c. abietinus* (scandinavian chiffchaff) and *P. c. tristis* (siberian chiffchaff). *P. c. abietinus* breeds in Scandinavia and European Russia and winters in Mediterranean and northeastern Africa. *P. c. tristis* breeds in Siberia, but also recorded in the region of study. Birds of this subspecies winters usually in the lower Himalayas, but occasionally recorded in Western Europe in winter as well. However, it is very likely that the numbers of birds of *tristis* subspecies in Europe have been underestimated due to uncertainties in identification criteria. In this case, only genetic analysis can provide precise data. Additionally, the trapping point is located on the crossings of the biggest migratory routes in northeastern Europe and it allows us to trap birds from different areas of this broad region. Thus, we can also estimate genetic diversity of birds. The aim of our study was to reveal the proportion of the two subspecies of chiffchaff during autumn migration period and estimate genetic diversity among individuals. We used mtDNA cytochrome b gene as a genetic marker to distinguish subspecies and genotyped 146 DNA samples of chiffchaffs using restriction analysis. Additionally, to estimate genetic diversity we sequenced 21 samples and performed the phylogenetic analysis. Obtained results were discussed. This research was supported by the Saint Petersburg State University (grant 1.37.149.2014).

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### Can remotely sensed vegetation indices predict forest species occurrence at the landscape scale?

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Along with plant species composition forest structural complexity is an important determinant of forest biodiversity, but difficult to predict in space from field data. We generated variables related to forest quality and structure derived from satellite imagery, such as the Normalized Difference Vegetation Index (NDVI), the Enhanced Vegetation Index (EVI), and the Leaf Area Index (LAI). We used them to predict the occurrence of

seven cavity-nesting birds (*Picus viridis*, *Dendrocopos major*, *Dryobates minor*, *Poecile palustris*, *Cyanistes caeruleus*, *Parus major*, *Sitta europea*) potentially sensitive to the quality of woodlands and to the presence of deadwood. In the study area, the central portion of Po Plain in Northern Italy, less than the 12% of the whole territory account for woodland, constituted for more than half of agroforestry plantations, whilst natural forests concentrate along main rivers. Data were collected during the breeding season 2015 and in order to gather a full picture on the considered forest birds ecological requirements, for each species we formulated a selection probability function assessing the effects of the vegetation indices. We conclude that recent advances in remote sensing allow for large-scale determination of forest structural characteristics suitable for developing species and habitat distribution models of considerable generality, while keeping an unprecedented level of detail. Our approach allows forest managers to amend regional and countrywide management plans with reliable maps depicting areas of high forest structural complexity and habitat quality, which will facilitate the integration of conservation-relevant information into multifunctional forestry.

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### Can behaviour buffer the impacts of climate change on an arid zone bird?

Susan Cunningham<sup>1</sup>, Rowan Martin<sup>1</sup>

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Behavioural thermoregulation reduces the exposure of animals to extreme temperatures, by allowing them to select thermally-buffered microclimates (“microsites”) within the landscape. It has been suggested that behaviour might therefore be able to “douse the fires of climate warming”. However, retreat into cool microsites like shady vegetation, burrows or cracks in rocks, could carry important lost-opportunity costs. These may include reduced opportunity for foraging, breeding or territorial defence; each of which carries implications for fitness. We looked at patterns of microsite use by southern fiscals *Lanius collaris*, a shrike species resident in the rapidly-warming Kalahari Desert, South Africa. We used Ivlev’s selectivity index to assess preference of breeding male fiscals for perch types with different thermal properties. We found that fiscals preferred to hunt from high, sunny perches at all times, except on hot afternoons (air temperature >35°C), when they switched their preference to high, shaded perches. Blackbulb thermometers indicated shaded perches were always cooler than sunny perches, but this difference was especially great on hot afternoons. As a result fiscals reduced thermoregulatory costs by switching foraging locations. However, fiscal foraging success rates were highest when hunting from sunny perches, and were reduced by ~50% on shaded perches. It therefore appears that fiscals traded off foraging opportunities in order to thermoregulate on hot afternoons. These lost foraging opportunities correlated with reduced nest provisioning and nestling growth rates. This suggests behavioural strategies to avoid heat stress can carry their own sublethal fitness costs, which could become increasingly important as the climate warms.

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### Wintering of some migratory bird species on the North of Ukraine as a result of global climate changes and human activity

Igor Davydenko<sup>1</sup>, Valentyn Serebryakov<sup>2</sup>, Vitalii Kazannyk<sup>2</sup>, Vadym Ianenko<sup>2</sup>

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During the last decades some migratory bird species stay in winter more often. It concerns migratory and transit migratory species. Some of them were recorded in winter once or several times, but other became regular wintering species. The main reason of this is available food and shelters, located mainly near warm waste waters

and power plants cooling ponds in large towns. So, due to higher average winter temperatures and industrial enterprises activities in towns, many water bodies stay free of ice, what allows many wetland and other species to wintering. In this way they extend to the North their winter grounds. For the last time on the territory of Northern Ukraine the stable situation and even increasing of numbers during winter is recorded for Mallard *Anas platyrhynchos*, Mute Swan *Cygnus olor*, Buzzard *Buteo buteo*, Caspian Gull *Larus cahinnans*, Black-headed Gull *Chroicocephalus ridibundus* and some other. Not so long ago wintering and regular records are known for Cormorant *Phalacrocorax carbo*, Grey Heron *Ardea cinerea*, Great Egret *Casmerodius albus*, Green Sandpiper *Tringa ochropus*, Moorhen *Gallinula chloropus*, Coot *Fulica atra*, Kingfisher *Alcedo atthis*, Chaffinch *Fringilla coelebs* etc. A rare recorded Wigeon *Anas penelope*, Water Rail *Rallus aquaticus*, Snipe *Gallinago gallinago*, Wood Pigeon *Columba palumbus*, Pied Wagtail *Motacilla alba*, Black Redstart *Phoenicurus ochrurus*, Chiffchaff *Phylloscopus collybita* are recorded as a new species for the winter period. This tendency of increasing number of bird species and their quantity in winter will remain in future, obviously.

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### The role of urban scale: studying Great Tits *Parus major* along a quantified urbanisation gradient

Jacques de Satge<sup>1</sup>, Frank Adriaensen<sup>1</sup>, Erik Matthysen<sup>1</sup>

<sup>1</sup>University of Antwerp, Flanders, Belgium

While numerous studies have reported negative effects of urbanisation on bird breeding success, few have examined the role of urban scale in influencing breeding success and many have been critiqued for small sample sizes, a lack of replication and study sites that are qualitatively defined. This study sought address these issues by testing the effects of urbanisation measured at two spatial scales on the breeding success of great tits *Parus major* along a quantified urbanisation gradient. A nested design, incorporating more than 400 nestboxes, was used in study sites across northern Belgium with *a priori* quantified degrees of urbanisation at both local and regional scales. Results of this study provided novel insight into how urbanisation at different scales influences great tits during the breeding season. Breeding success was found to vary at one or both spatial scales of urbanisation for all measured parameters: in urban areas great tits displayed advanced laying dates and breeding success was lower than in rural areas, with smaller clutch sizes, lower nestling masses and fewer fledglings per egg. Generalised linear mixed effects models found both regional-scale and local-scale urbanisation to be significant in influencing laying date, clutch size and nestling mass, while the number of fledglings per egg was influenced by local-scale urbanisation only. Results of this study therefore highlight the importance of utilising multiple spatial scales in analysing urbanisation effects, and shed light on how urban scale influences different elements of breeding success in great tits.

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### Has wintering grounds changed for facultative migratory bird species in Latvia during the last 50 years?

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We examined winter (December, January, February) recoveries of birds ringed in Latvia in order to reveal any potential changes in distance of wintering place over time (1951–2015). Following species were analysed: Great Tit (*Parus major*), Blue Tit (*Cyanistes caeruleus*), European Robin (*Erithacus rubecula*), Song Thrush

(*Turdus philomelos*), Blackbird (*Turdus merula*) and Fieldfare (*Turdus pilaris*). Five year average was calculated for recoveries of each species. The birds were recovered on average closer to ringing site in winter for the following species: Great Tit (by 220 km, n=840); European Robin (by 251 km, n=22); Blackbird (by 219 km, n=32) and Song Thrush (by 494 km, n=48). The 5 year average recovery distance in winter did not changed significantly for Blue Tit and Fieldfare.

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### Dynamics in temporal use of orchards by small passerines during the breeding season, case studies in UK and Spain

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A central feature of bird home ranges is that they include certain habitat structures to survive and reproduce. Here we determined the occurrence of small passerine species in orchards, as a clearly defined habitat structure, in UK (apple) and Spain (citrus) over 2 and 3 years, respectively. The study focused on the breeding season and was conducted by constant-effort mist netting. The Spanish orchards were rich in bird numbers and in species whereas the UK bird community was more uniform and scarce. However, only a few species were abundant in the orchard communities. Twelve and eleven species in Spain and UK respectively (out of 81 and 45 trapped) exceeded the 2% dominance value. From them, overall 15.4% (Spain) and 21.5% (UK) of the adult birds were re-trapped in the following year, although with great differences between species. Poisson generalized mixed effect models (GLMMs) were fitted for 6 species in citrus and 4 species in apple, including year as fixed factor and the day of year as linear, quadratic and cubic terms to allow for non-linear relationships between trapping success and season. Seasonality had a significant effect in 66.6% of the species in citrus and 75% of species in cider orchards. Results thus indicate a repeated use of the orchards between years and for some species, a distinct seasonal pattern of occurrence, suggesting a species-specific variation in the temporal use of a defined habitat along the progress of the breeding season. Flexibility in their home range appears as a key factor.

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### Haemoparasites of the pied flycatcher: the incidence of single infections and co-infections in relation to host age and sex

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Haemoparasitic infections are common in birds and often parasites representing different genera co-occur in a single host. Parasites from different genera may interact with each other leading to increased host's susceptibility to other parasites or their eradication. Co-occurrence of parasites may be affected by host characteristics, such as sex and age. We molecularly screened a population of a long distance migratory passerine - the pied flycatcher (*Ficedula hypoleuca*) - from central Poland for the presence of three genera of vector-transmitted haemoparasites: *Haemoproteus*, *Plasmodium* and *Trypanosoma*. Infection rates varied from very frequent with *Haemoproteus* (79.4%), through moderate with *Trypanosoma* (39.7%) to rare with *Plasmodium* (8.8%). Parasites from genera *Haemoproteus* and *Plasmodium* were represented by two and four lineages, respectively, while trypanosome community by four species and one parasite identified to a genus level. Only 2.9% and 1.5% of birds carried mixed infections composed of only haemosporidian or only trypanosome lineages/species, respectively. Host

age did not explain variation in the incidence of haemosporidian and trypanosome infections, while host sex was associated with the presence of trypanosomes: males had higher infection rates than females. Overall, 39.7% of birds carried simultaneous infections of haemosporidians and trypanosomes, however, there was no association between the occurrence of these parasites. Males much more commonly than females harboured co-infections. Difference between the sexes in the incidence of trypanosome infections and co-infection rates may be associated with an unequal exposure of the sexes to vectors and/or differences between males and females in immune-endocrine system.

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### **Mycobiota of house sparrow *Passer domesticus* in urban and rural populations in the breeding season**

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Birds are especially susceptible to being colonized by fungi owing to anatomical and physiological determinants which promote the growth and development of fungi. Colonization may proceed asymptotically or transform into an infection, when the biological homeostasis is disturbed between the fungi and the macroorganism. Data collected suggest that the size and condition of house sparrows *Passer domesticus* in urban populations are of lower values than in rural populations. The following hypothesis was adopted in this study: birds with a poorer body condition will be more intensively colonized by fungi on urbanized areas. A high degree of birds colonization by fungi was determined in both types of habitats (urban: 86%; rural: 92%). In total, 26 species of fungi were isolated (urban: 15 species; rural: 22 species). No significant difference was determined in the colonization degree between the two populations (beak: Fisher's exact test  $p=0.388$ ; cloaca: Fisher's exact test;  $p=1.000$ ). In both environments, *Candida krusei* turned out to be the prevalent fungus, with a clear preponderance in the urban population. The study demonstrated a significantly higher degree of colonization of the analyzed ontocenoses by fungi in the case of sparrows with poorer body condition and lower body mass inhabiting the urbanized areas. In addition, a significant difference in the colonization degree was found between adult and young birds. In turn, considering sex and age of birds, the urban and rural populations did not differ significantly in the species composition of fungi and in the degree of ontocenoses colonization by these fungi.

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### **Lower condition of House Sparrows *Passer domesticus* in poor foraging urban habitats and higher predation risk may be indicative of a declining population**

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According to the starvation-predation risk trade off theory, the body condition of small passerines can represent the population's status. In the urban area the credit card hypothesis explains, that urban exploiter species maintain a high population number at the cost of a lowered body condition (worse food's quality, pollution), but the increase of predation risk (sparrowhawk and other predators) creates a new predator-prey dependency. It was assumed that higher predation risk mostly concerns males during the breeding season, thus the lower condition. The body condition and biometrical characteristics of adult birds from urban and rural populations during the breeding season were analyzed. The condition indices of males were significantly lower in urban population, than rural. Males from urban populations had lower body mass, shorter tarsus, longer alula,

greater Kipp's distance and higher wing pointedness index in comparison to rural populations, whereas these differences were not found between females. Lower condition indices of urban males may point to nutritional stress connected to constrained feeding due to higher predation risk. However, biometric characteristics of urban males indicate a selection factor to adapt to a more maneuverable flight at lower energy costs. The credit card hypothesis does not offer a sufficient explanation for the low condition of urban males. We suggest that lower condition and biometric differences are a way of adapting to the new predator-prey scheme in accordance to the starvation-predation risk trade off theory.

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### Cold birds put more material in their nests

Sophie C. Edwards<sup>1</sup>, Tanya Shoot<sup>2</sup>, R. Jeff Martin<sup>2</sup>, David F. Sherry<sup>2</sup>, Susan Healy<sup>1</sup>

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There is vast variation in the design of nests that birds build, variation that is even observed within species. The general assumption is that birds respond to the local temperature when constructing their nest by adding more or less material. To test this assumption we used captive bred zebra finches building a nest at either 14°C or 30°C. Each pair was provided with string with which to build for four days. Males building in a temperature-controlled room held at 14°C added significantly more string to their nest than did the males building in a room held at 30°C. These data provide evidence that the nest a bird builds may be the outcome of the builders responding to the temperatures they experienced when building. More material in the nest may help to insulate the young from the cooler temperatures.

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### Effects of dietary arsenic exposure on oxidative stress, tissue damage, growth and survival of great tit nestlings

Tapio Eeva<sup>1</sup>, Pablo Sánchez-Virosta<sup>1,2</sup>, Silvia Espín<sup>2</sup>, Sandra Ruiz<sup>1</sup>, Antonio J. García-Fernández<sup>2</sup>

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Arsenic (As) is a common pollutant from metal industry, especially by copper-nickel smelters. We explored the potential effects of environmentally relevant As levels on oxidative stress biomarkers (antioxidant molecules [GPx, GST, SOD, CAT, tGSH, GSH:GSSG, vitamins A and E], lipid peroxidation, protein carbonylation, DNA lesions, telomere length) and growth and survival of great tits (*Parus major*). Nestlings were orally dosed with As (sodium arsenite) in three experimental groups (Control, Low and High groups: 0, 0.2 and 1 µg/g body mass/d) and were compared with those living in the vicinity of a copper-nickel smelter (Smelter group), an As source. As concentrations in birds (feces, liver) were significantly higher in the Smelter and High groups, followed by the Low group, and finally the Control group with significantly lowest levels. CAT activity was somewhat lower in the High As group, while GPx, vitamin A (retinol) levels and nestling mortality were significantly higher in the Smelter group when compared to the Control group. The other biomarkers did not show significant differences between groups. None of the parameters correlated directly with fecal As levels, but some of them were associated to growth (body mass at d14). Poorly growing nestlings showed higher GPx, SOD, and lipid peroxidation and lower CAT activity and GSH:GSSG ratio. The higher GPx activity and nestling mortality in the polluted environment may reflect higher level of oxidative stress, due to the exposure to a mixture of metals and/or the associated resource limitation (e.g. lower food quality).

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## Results of mid-winter waterbird counts in Turkey, 1967-2016

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Turkey's wetlands and waterbirds are unique in terms our wetlands host very important bird populations across Europe. Being aware of this since 1967 waterbird counts carried out at wetlands in Turkey to reveal wintering waterbird populations. This study aims to document population dynamics and important wintering sites for waterbirds. Data from 29 mid-winter waterbird counts performed between 1967-2016 is used for evaluation. So far, a total of 268 wetlands were counted. 178 wetlands were counted up to 5 times, while 32 are monitored regularly. Since 1990, 23 wetlands were not counted again because of drainage or degradation problems. Within the 14 Ramsar sites in Turkey Akyatan Lake, Burdur Lake, Uluabat Lake, Kızılırmak Delta and Göksu Delta were monitored regularly. Each year approximately 32% of total counted waterbirds were recorded at Ramsar sites. Some of the important findings are: in 1968 at 35 sites about 4 million waterbirds were counted-the highest record ever; between 1986-1988 while number of counted sites increased, waterbirds showed a decrease of about 1 million. At its most important wintering area, Burdur Lake, the number of *Oxyura leucocephala* decreased significantly for the last five years, whereas increase was noted at Manyas Lake up to 4000 birds. Since 2012 there is a significant increase of *Anas strepera* population, the reason of this increase is the increase of the population in the Kızılırmak delta.

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## Habitat selection of a dead wood specialist in managed forest: implications for forest management

Antonia Ettwein<sup>1</sup>, Pius Korner<sup>1</sup>, Gilberto Pasinelli<sup>1</sup>

<sup>1</sup>*Swiss Ornithological Institute, Sempach, Switzerland*

Habitat models are a common tool to assess the factors driving habitat selection, and are a prerequisite for many conservation measures. We investigated habitat selection of the white-backed woodpecker (*Dendrocopos leucotos*), a species highly dependent on dead wood and regarded as typical for primeval forests, in Western Austria, Eastern Switzerland and Liechtenstein. The species has recolonized the study region since the 1970s, probably because of increasing amounts of dead wood left in the forests. In contrast to most populations previously studied, forests in this region are mainly managed. Presence/absence of the species and various habitat variables were recorded in 62 study plots. We used site-occupancy models to compare a priori expectations as well as models built a posteriori. Occupancy probability was mainly related to variables concerning forest structure: it was positively related to the average dbh of live trees and snags, the mean diameter of lying dead wood, and the availability of saproxylic beetles, and additionally negatively related to elevation above sea level. Analyses at different spatial scales indicated that small patches containing habitat factors associated with high occupancy probability within rather intensively managed forests are important for the occurrence of white-backed woodpeckers in the study area. Altogether, forest management in white-backed woodpecker habitats is possible, but should not be done intensively. Patches with old, deciduous forests and high quantities of large dead wood should be retained or created to enhance habitat quality for this species.

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## Landscape heterogeneity affects foraging behaviour in European Nightjars (*Caprimulgus europaeus*)

Ruben Evens<sup>1</sup>, Natalie Beenaerts<sup>1</sup>, Thomas Neyens<sup>1</sup>, Nele Witters<sup>1</sup>, Karen Smeets<sup>1</sup>, Tom Artois<sup>1</sup>

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Landscape heterogeneity can affect the connectivity between essential resources, such as nesting sites and food, and can influence bird survival. In Flanders (Belgium), breeding (heathlands) and foraging sites (extensively-cultivated grasslands) of the European Nightjar (*Caprimulgus europaeus*) occur in fragmented landscapes and are separated by unsuitable habitats. Using nano-GPS-loggers, we tracked 210 foraging trips from breeding to foraging sites in two habitat types: a commercial pine forest and an extensive heathland. We studied the composition and configuration of available habitats close to the nesting sites, assessed differences in foraging behaviour and measured anti-oxidant capacity in birds' plasma as a biomarker for oxidative stress. Nightjars daily connected breeding and foraging sites by rapidly crossing unsuitable habitats ( $35 \pm 12$  km/h) in order to exploit a higher prey biomass in foraging sites. The availability of suitable foraging habitats was higher near the nesting sites for birds breeding in pine forests. Therefore, foraging distances were three times shorter ( $1201 \pm 1059$  m) than for birds breeding on extensive heathlands ( $3345 \pm 1921$  m). Foraging distance was longer when birds nested in clustered landscapes, because, complementary habitats could be further apart. Altogether, we found that birds that fly further, spend more time foraging. At the physiological level, plasma anti-oxidants, were higher as compared to the birds with shorter foraging distances, indicating more extreme stress levels. In summary, landscape heterogeneity clearly influences foraging decisions of Nightjars, and thus, affects levels of physiological stress. Improving the connectivity between essential resources will involve the design of new landscape scenarios that optimize composition and configuration of complementary habitats.

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## Avian Malaria in resident carrion crows (*Corvus corone*) in Germany

Katrin Facht<sup>1</sup>, Sandrine Schmid<sup>1</sup>, Anke Dinkel<sup>1</sup>, Friederike Woog<sup>2</sup>, Ute Mackenstedt<sup>1</sup>

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Avian Malaria is caused by haemosporidian parasites including the genera Plasmodium, Haemoproteus and Leucocytozoon. So far, few molecular studies exist on blood parasites of birds in Germany. Furthermore, birds of the family Corvidae were rarely subject of these investigations. Either blood samples were examined microscopically or just a small number was analyzed by PCR. In this study we had the opportunity to investigate over 100 resident carrion crows from three sample sites around Stuttgart (Germany) for the presence of haemosporidian parasites. Using a newly established PCR we amplified the mitochondrial Cytochrome b gene of Haemosporida. We identified many different lineages of blood parasites. We also analyzed whether sex, age or location had an effect on the prevalence in the birds.

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## Vocal activity of male Little Bittern *Ixobrychus minutus* in the breeding season

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The main purpose of Little Bittern male vocalization in the breeding period is to attracting a female and defending a territory in the pre-laying period (inter-sexual functions). Structure of male advertising-call consists of repeated every 3 seconds low sounds, which have a narrow range of frequencies and are given in a very long series. The aim of this study was to investigate the changes of vocal activity (seasonal and diurnal) of male Little Bittern during the breeding season. The study was conducted in 2010–2012 (May–August) at the fishpond complex Stawy Małe (60 ha), situated in the Łasy Janowskie Landscape Park, SE Poland. In the years 2010–2012, 6–12 pairs of Little Bittern nested on these fishponds. The advertising-call started to be uttered in May, when males arrive at the breeding grounds and finished in the second half of July. The first peak of calling activity occurred in the end of May in the pre-laying stage. The next peak was in the end of June and in the beginning of July when the replacement or second broods took place. The daily vocal activity is variable and depending on the time of day. Males call the most intensively in the morning and evening, with two peaks in vocal output occurred shortly before sunrise and before sunset. Higher vocal activity was visible in the evening than in the morning. The studies showed that the intensity of a male vocalization during the breeding season was not related with temperature.

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### **The relationship between wind direction and intensity and habitat selection by wintering waders in inland lakes**

Maycon Gonçalves<sup>1</sup>, José Antonio Gil-Delgado<sup>1</sup>, Germán López-Iborra<sup>2</sup>, Priscila Pons<sup>1</sup>

<sup>1</sup>University of Valencia, Valencia, Spain; <sup>2</sup>University of Alicante, Alicante, Spain

Environmental conditions and availability of resources are important factors to foraging habitat selection of wading birds. The aim of this study was to identify the effects of the wind direction and intensity on microhabitat selection of mixed groups of Dunlin and Little Stint in inland lakes of the Iberian Peninsula during the winter. Two habitats were defined: mud (muddy surface at the lake edge) and shallow water. The wind direction defined the sides "windward" and "leeward" of the lake. Birds were classified into four situations: mud/windward; mud/leeward; water/windward and; water/leeward. Two classes of wind were defined: smooth (speed less than 15 km/h) and strong (speed above 15 km/h). After observations, visual estimates of zooplankton in the mud surface and water column were done in the four possible situations. We obtained 85 observations between December and February 2014-2017. The relationship between wind direction and intensity had a significant effect on habitat selection. In strong wind events, the waders were observed most commonly in mud/windward sites (54%) followed by water/windward (32%). On the other hand, in situations of smooth wind, the birds tend to select water/leeward sites (80%). Visual estimation of zooplankton showed higher abundance values in sites preferred by waders. Our results suggests local adaptations in relation to the abiotic factors allowing the colonization of regions with harsh conditions, as it is the case of the Iberian Peninsula central during the wintering season.

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### **Improved sexing of *Phylloscopus* based on morphology**

Oscar Gordo<sup>1</sup>, José Luis Arroyo<sup>1</sup>, Rubén Rodríguez<sup>1</sup>, Antonio Martínez<sup>1</sup>

<sup>1</sup>Doñana Biological Station, Seville, Spain

Sexes cannot be distinguished with certainty by human observers in many avian species. However, some apparently monomorphic species have small but measurable sexual dimorphisms in biometry, which can be

used to determine sex. We developed a method based on multivariate probability to improve sexing in three *Phylloscopus* species (*P. collybita*, *P. ibericus*, and *P. trochilus*) during postnuptial migration. We estimated the probability of them being male or female based on a combination of the density distributions of wing and tarsus lengths. Density distributions were derived as two normal components of the mixture distribution in both traits. Up to 95% of *P. collybita*, 92% of *P. ibericus* and 87% of *P. trochilus* were sexed with a 95% confidence. Our method was not affected by changes between years in the degree of dimorphism or mixture of populations from different geographical origins. In the Iberian Chiffchaff and the Willow Warbler, sexing was improved when our method was applied to immatures and adults separately. Our sexing method based on multivariate probability could be used for other species with known and apparent dimorphism or to any data set of birds with biometric measures.

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### Trans-Saharan birds are establishing wintering populations in southern Europe

Oscar Gordo<sup>1</sup>, María Ruiz<sup>1</sup>, Luis García<sup>1</sup>, Héctor Garrido<sup>1</sup>, Fernando Ibáñez<sup>1</sup>, José Luis Arroyo<sup>1</sup>, Rubén Rodríguez<sup>1</sup>, José Luis Del Valle<sup>1</sup>, Antonio Martínez<sup>1</sup>, Manuel Máñez<sup>1</sup>

<sup>1</sup>*Doñana Biological Station, Seville, Spain*

Many migratory bird populations are advancing their arrival to their breeding grounds in response to climate change. Three mechanisms have been proposed to achieve this advancement: earlier onset of migration, faster progress throughout the passage areas, and shorter distances between departure and arrival sites. To test the last hypothesis, we have analyzed the occurrence of trans-Saharan birds during the winter censuses carried out in the Doñana Park (SW Spain) since the 60s. By definition, trans-Saharan species must spend the winter south of the Sahara. Thus, by remaining in the south of Europe, they would reduce markedly their migration distance. Overall, we found that the probability of finding a trans-Saharan species during the course of a winter census in the Doñana Park increased from almost 0 to a 35%. Moreover, the average number of trans-Saharan species per winter census rose to almost 2. At species level, all the 18 most common wintering trans-Saharan species showed tendencies to increase their populations, but only statistically significant for 11. In the particular case of the white stork (*Ciconia ciconia*) and the spoonbill (*Platalea leucorodia*), they have been increasing exponentially during the last three decades and have reached at present more than 1000 and 400 individuals every winter, respectively. Summarizing, the south of Spain is becoming an alternative wintering area for more and more trans-Saharan birds. This fact supports a major change in the behavior of these long-distance migrants and a potential adaptive way to advance their arrivals to their European breeding grounds.

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### Sustainable forest management: bird community patterns and trends in a commercial forest planation in England.

Ian Henderson<sup>1</sup>, Greg Conway<sup>1</sup>, Neal Armour-Chelu<sup>2</sup>

<sup>1</sup>*British Trust For Ornithology, Thetford, UK;* <sup>2</sup>*Forestry Commission, Santon Downham, UK*

The Forestry Commission in England wishes to understand breeding bird community and habitat associations in commercial forests, in order to inform future forest sustainability and 'resilience' planning to content with managemenmt responses to climate change. In eastern England, Thetford Forest is the largest lowland forest in England (19,000 ha) and forms part of a designated site under regional and EU directives, such as *Natura* 2000, being nationally important for Nightjar and Woodlark. The majority of the forest is commercially managed conifer plantation but some areas of semi-natural broad-leaved woodland exist, including important

river corridor habitat. Previous breeding bird surveys were coordinated by BTO in 2008, 2013 and 2015, and have shown that Thetford Forest supports regionally important numbers of species identified as being of national conservation concern (e.g. Turtle Dove, Willow Warbler, Yellowhammer, Willow Tit, etc) and indeed the forest is a local 'reservoir' for terrestrial bird biodiversity. A further survey in 2017, has allowed the BTO and Forestry Commission to re-assess breeding bird population estimates and associations with habitat and management and also to provide and estimate of population change since 2008. With the 2017 data added, the aims are to provide an up-to-date representative analysis of species composition, population size and different forest habitat associations of the breeding bird assemblage within Thetford Forest over a period of nine years. The results are expected to guide recommendations for targeted management of the forest for key species and to maintain species variety.

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### Survival costs of reproduction and the role of food availability in the collared flycatcher

Márton Herényi<sup>1,2</sup>, László Zsolt Garamszegi<sup>3</sup>, Rita Hargitai<sup>1</sup>, Gergely Hegyi<sup>1</sup>, Miklós Laczi<sup>1</sup>, Gergely Nagy<sup>1</sup>, Balázs Rosivall<sup>1</sup>, Eszter Szöllősi<sup>1</sup>, János Török<sup>1</sup>

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The cost of reproduction appears in subsequent reproductive events or in future survival. It is a frequent subject of life-history studies. Recent work highlighted that the identity of the fitness component that is affected the most by current reproduction varied with pace of life. It is mainly future reproduction in long-lived but survival in short-lived species. Most studies dealing with costs of reproduction focus on females. Studies on males often suggest costs of producing or maintaining sexual traits on future survival. The aim of our work was to examine the cost of parental investment on survival in a Hungarian population of the fast-living collared flycatcher (*Ficedula albicollis*). We studied non-manipulated females and males between 1988 and 2007. We also investigated how parental effort and survival were influenced by food supply. We found that survival was positively related to the availability of food in the current year in both sexes. There was a negative relationship between the survival of males and their forehead patch size and also between the survival of females and the forehead patch size of their mates. On the other hand, parental investment as estimated by clutch size, hatchling and fledgling number, had no detectable survival costs. Our results suggest that the strategy of attractive and less attractive individuals is different, but further analyses are needed to clarify the background of relationships between parental investment, survival and food availability.

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### Do atmospheric conditions affect wing length increase according to sex and age of the Reed Warbler *Acrocephalus scirpaceus*?

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Weather conditions influence directly food availability and food abundance, and may determine phenotype-dependent survival; consequently a correlation between phenotype features and the intensity of such environmental factors could be established. We try to describe the variation of the wing length in a population of Reed Warbler *Acrocephalus scirpaceus* over the years and explain this variation as a dependent fact on change of environmental factors. We measured the wing length of 189 Reed Warblers (120 males and 69 females) during

five breeding seasons in a reedbed of Central Spain. In females a significant differentiation in wing length among years was found. Afterward, running linear models analysed the effects on wing length of rain and temperature during the months of April, May and June. Our results suggested that on June both factors affect the phenotype, however only the temperature is significant on June and May. Food availability as a consequence of changes in wing length due to weather conditions is highly probable. The wing length on flight is an important adaptive feature in birds influencing energetic expenses. As a consequence, a change in trophic conditions could select the optimal wing length. This phenotypic change is only statistical significant in the female, perhaps the males longer wings do not need to enlarge so much.

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### Seasonal and annual variation in predation rates and predators of natural and artificial nests

Katrine Hoset<sup>1</sup>, Magne Husby<sup>1</sup>

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Nest predation is the most important factor causing reproductive failure in open-cup nesting birds and can affect life history strategies and therefore represent a strong selection agent shaping reproductive strategies. To understand how predation affects avian populations it is crucial to understand how predation effects on nesting success varies in space and time, and which ecological factors determine variation in predation rates. Artificial nests are commonly used to evaluate nest predation rates, but are criticised for not being comparable with predation rates on natural nests, either in timing of predation or which predators target the nests. Here, we present data from several experiments that explore how nest predation rates varies according to season, between years, and between 4 different types of nests (natural nests, artificial nests, natural nests with foreign egg and artificial nests imitating natural nest placements), and how predator identity affects nest predation rates. We show that predation rates between natural nests and artificial nests are similar across different ecological conditions (habitat, forest type, nest position, visibility), and vary little between years. Furthermore, predation rates on artificial nests show clear seasonal variation with low to non-existent predation rates outside the breeding season to peak predation rates in the middle of the breeding season, with different patterns for avian and mammalian predators. This study highlights that natural and artificial nests can result in similar predation rates, and indicate how differences in ecological conditions between study sites may determine whether predation rates between natural and artificial nests are comparable.

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### Targeted sequence capture to resolve phylogenetic relationships of haemosporidian parasites

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The phylogenetic relationship of haemosporidian parasites have been studied for decades, but have not reached a consensus yet. This research has so far been dominated by sequencing fragments of cytochrome b (cyt b) gene, but this information can only resolve some of the nodes with confidence. Recent studies using multi-genes have helped to settle some phylogenetic issues, and meanwhile showed that mitochondrial genes are evolving much more slowly than genes in the nuclear genome. However, genome-wide analysis are required to resolve the real evolutionary pattern and to confidently root the phylogenetic tree of haemosporidian parasites. In this study, we successfully sequenced 16 samples belong to ten different lineages, using targeted sequence capture and next generation sequencing of up to 1000 genes based on the genome data of *Haemoproteus tartakovskyi*. This will open a new door for further studied on comparative analysis of haemosporidians evolution.

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### Generalist vs. specialist: what could tell us the case of interspecific joint nesting in hole-breeding passerines?

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The analysis of consequences of unusual behavior of birds in nature could be useful for better understanding of their specific adaptations. We found the case of joint nesting of the Coal Tit *Periparus ater* (CT) and the Pied Flycatcher *Ficedula hypoleuca* (PF) in the Moscow region. PF male had attracted the female in the nest box that was already occupied by CT pair. Females of both species incubated mixed clutch sitting side-by-side. CT chicks hatched earlier than PF chicks and parents of both species started to feed them. At the 4th day of joint feeding CT chicks began to die one-by-one and at the day 11 last nestling was dead. This case pushed us to compare the diets of nestlings of PH and CT at the same local region by collecting food portions delivered to nestlings and by analysis of video recordings. Prey compositions and size of food items are discussed. We suppose that the revealed presence of poisonous insects (*Cantharidae*, *Melyridae* etc.) in FH diet and its absence in CT diet is the essential characteristic of their foraging. The resistance to cantharidin and some other possible insect toxins could be one of the causes of broad food niche in PF.

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### Impacts of grazing on mountain bird populations: A meta-analysis

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High altitude biodiversity is threatened by climate change and changes in land management. In the European Alps, both climate-induced upward shifts in the treeline and abandonment of pastoral practices have already resulted in the loss of high altitude open habitats (shrub-grassland mosaics and alpine meadows) in many areas. Grazing could be used as a conservation tool to maintain open habitats, but grazing management targeted in the wrong areas, or applied at intensive levels, could also be detrimental to biodiversity. In order to inform management strategies, we undertook a meta-analysis on the effects of grazing on mountain birds. Standardized effect sizes were calculated from studies carried out within objectively-defined mountain regions. There was no overall consistent effect of grazing. However, when species were defined according to their main nesting habitat (forest, forest-shrub ecotone, grassland), there were significant differences. Forest birds responded negatively to grazing, but ecotone nesting species were positively affected. There was no consistent response for grassland birds. This suggests that grazing could be a useful tool to maintain open habitats for shrub-nesting species around the treeline. Many of these species nest in shrubs that are unpalatable to livestock (e.g. rhododendron and juniper), hence grazing may maintain open grassy areas which are beneficial foraging habitats, whilst minimising damage to key shrub species, thus maintaining a habitat mosaic. Grazing could therefore be a key tool in preventing forest encroachment in the forest-shrub ecotone, which is typically the most biodiverse habitat within the mountain environment.

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### Foraging in a poor environment: linking nestling diet, parental behaviour, and breeding success in urban and rural blue tits

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Passerine birds in urban environments often have lower fitness and reproductive success than their counterparts in more natural environments. It has been argued that this is due to the lower abundance and quality of food resources in cities during the critical stage of offspring development. However, it is unclear whether the ability of parents to modulate their foraging behaviour when provisioning their young could mitigate the negative effects of a poor environment. Using a holistic approach, we investigated foraging and provisioning of parent blue tits at an urban and a forest site in Scotland. We found that abundance of caterpillars was lower in the city environment than in the forest. Radio-telemetry revealed a significant positive relationship between foraging distance and the biomass of caterpillars delivered to the nest, and parents in the poorer city environment tended to forage over longer distances. Despite the greater distances flown, the diet provisioned to the nestlings was significantly different between the two environments, as indicated by analysis of video footage and of stable isotopes from nestling blood. All measures of breeding success resulted lower in the urban environment, though the only significant difference was in the weight of nestlings. We suggest that the limited caterpillars in the urban environment may force adult birds to modify their behaviour by foraging further afield and by providing nestlings with alternative prey items. Despite the ability of parents to modulate their behaviour, we argue that the city is detrimental to the overall reproductive success of blue tits.

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#### **Dear-enemy effect within interspecific relationships: a preliminary results for two Rallidae species**

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The effect of interspecific territorialism usually occurs between closely related species with similar ecological niches, which compete for space, food or breeding site. Therefore, it can be suspected that the dear-enemy phenomenon (less aggressiveness of territory owner against neighbours than strangers to short-time intrusion) occurs not only within intraspecific relations but may be also found among individuals belonging to competing species. In the present study this hypothesis is tested on the example of the relationship between two Rallidae species - water rail *Rallus aquaticus* and little crane *Zapornia parva*. The study is conducted in the Masurian Lakeland (north-eastern Poland), where these two species co-occur at small mid-field ponds and demonstrate strong intra-and interspecific territorial behaviour competing for similar nesting sites and food resources. The main aims of the project, that start in 2016, is to experimentally determine: 1) whether rallids are able to recognize individual specimens of other species, and 2) whether the dear-enemy phenomenon exists within interspecific relationships in birds (water rail reduce aggression against neighbouring little crane, and vice versa). The preliminary results based on data collected in 2016-2017 will be presented.

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#### **Geographic variation in throat colour pattern in males of a migratory game bird: the common quail (*Coturnix coturnix*).**

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The common quail (*Coturnix coturnix*) is a migratory game bird that breeds widely in the Palearctic. Males show a highly variable throat design, typically resembling an anchor, whose underlying colour variation has been related to migratory behaviour. Here we describe the male quail throat colour pattern and compare a resident and short-distance migratory population of the SW Iberian Peninsula with a long-distance migratory population in NE. We captured 188 second-year males in NE and 76 in SW during the breeding season. We divided the throat in 7 areas and gave them a category, according either to its darkness for (1) cheeks (from 0, white, to 6, rufous/black) and (2) neck (from 0, white, to 2, rufous/black) or to its conspicuousness (i.e. contrast to other areas) for (3) shank, (4) arms and (5) crown of the anchor, (6) central spot in neck and (7) stripe above the chest, from 0 to 2. The two firsts components of a non-linear PCA explained 68% of the variation. The first one related positively to throat darkness (cheeks and neck) and negatively to the anchor horizontal pattern (arms and stripe above chest); the second one related positively to the vertical pattern (shank, crown and neck spot). The two regions differed statistically in the first dimension (Mann-Whitney test,  $W = 4987.5$ ,  $p = 0.00012$ ) but not in the second one. SW males had a darker throat and a less apparent anchor, thus suggesting that this variation is associated with migratory behaviour.

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### **Tail flicking and distance to cover in the Black Redstart (*Phoenicurus ochrurus*)**

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Tail flicking is a common behavior in many bird species, but its functional importance often remains unknown. Apart from intraspecific communication, tail flicking could be used during predator-prey communication, e.g. as a signal of prey vigilance or quality. We studied this behavior in the Black Redstart (*Phoenicurus ochrurus*), a species that frequently shows tail flicking and is prone to attacks by ambushing predators that hide in bushes or trees. Hence, Black Redstarts might perceive cover as dangerous. Hence, we assumed birds to tail flick with decreasing distance to cover to signal to a predator that it got spotted. We counted the number of tail flicks of single individuals (to avoid group size effects and interactions with conspecifics) and measured their distance to the nearest cover for possible ambushing predators. We found that distance to cover had an effect on tail flicking behavior as flicking increased with decreasing distance, but did not find a difference in flicking frequency between adults and juveniles nor between sexes. Consequently, tail flicking is unlikely to signal submission or to be sexually selected in the Black Redstart. Since tail flicking in our observations also occurred in the absence of predators, we consider tail flicking in Black Redstarts to display vigilance to ambushing predators what potentially could decrease the predation risk.

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### **Abundance of food resources delay frugivorous bird migration**

Anna-Maria Kanerva<sup>1</sup>, Aleksi Lehikoinen<sup>2</sup>, Kai Norrdahl<sup>1</sup>, Jukka Suhonen<sup>1</sup>

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Bird partial migration - a part of a population migrates while another part stays resident near the breeding site - is a common type of migration in birds. Frugivorous birds are assumed to delay their autumn migration when there is plenty of food available. The main food resource of frugivorous birds in northern Europe is fruits of the rowanberry, *Sorbus aucuparia*, which crop size varies inter-annually. We tested whether the timing of frugivorous birds' autumn migration depends on rowan fruit crop size using 29 years data in Finland. We estimated yearly rowanberry fruit crop size in Finland and the yearly median migratory period of the two most common frugivorous bird species, Bohemian waxwing, *Bombycilla garrulus*, and the Fieldfare, *Turdus pilaris*, in Hanko peninsula, southernmost Finland. We found that fieldfare and waxwing migrated away from Finland later when the rowan fruit crop was large. Our results support the hypothesis that the timing of autumn migration in the frugivorous birds depends on the availability of food.

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### Causes of population change in German indicator bird species

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Bird-based indicators form a central tool for environmental monitoring in Europe. In Germany, the national indicator "Species Diversity and Landscape Quality" is based on population trends of 59 bird species - representing 6 main habitat types (agricultural, forest, urban, wetland, coastal and alpine habitats). Disentangling the simultaneous effects of different environmental and anthropogenic drivers on changes in population size is critical when drawing conclusions from monitoring data. We analysed which weather and land use variables best explain variation in bird population indices from 1990-2013 at the level of individual species and ecological guilds. While a lack of suitable quantitative data hampered a comprehensive analysis for several habitat types, comparatively good data were available for farmland habitats. The negative trends seen for farmland birds were best explained by changes in land use due to agricultural intensification. Especially changes in the extent of grassland, set-aside land and maize impacted strongly on farmland bird species. Individual species however varied in their response to changes in land use variables. Weather effects were estimated to be of smaller magnitude, but proved more consistent across species. For robust and detailed causal analyses, bird monitoring data critically depend on a variety of other data. Increased fine-scale monitoring of environmental variables likely determining the state of bird populations could greatly expand future inference from monitoring schemes. The work presented is supported by the Federal Agency for Nature Conservation (BfN) with funds provided by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB).

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### Buzzard's migration in Polissya and Steppe-Forest zone of Left Bank Ukraine

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Buzzard is a one of the most numerous birds of prey in Ukraine. Articles dealing with the topic are less or they contain little information on the migration of this species. Our studies were conducted during 2012-2015. Data were collected on the territories of mentioned nature zones in Kyiv, Chernigiv, Sumy and Poltava regions along observation of all bird migration. Buzzard spring migration in Sumy region at first was recorded 9.III.2013, 26.II.2015, in Kyiv region – 21.III.2013, 10.III.2014, 15.III.2014, but the last migrants here were observed 15.IV.2014 and 7.IV.2015. 149 birds were fixed. Single birds and groups up to 6 individuals were recorded. The main directions of migration were NE (48.3% birds) and N (44.3%). Average altitude of migration was equal



to 120 m. In autumn in Sumy region first migrants was observed 1.IX.2012, 23.VIII.2013, 29.VIII.2014 and 29.VIII.2015, but the last one – 30.X.2013. The first migrants in Kyiv region were recorded 6.IX.2014 and last one – 21.X.2013, 16.XI.2014. 493 birds were fixed. Most birds flew alone or in groups of 2-10 individuals, though flocks of 33, 42 and 45 Buzzards were also observed. The main directions of migration were as follows: S (54.8% birds), SW (28.8%) and SE (11.8%). Average altitude of migration was near 130 m.

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### Estimate of the Corncrake (*Crex crex*) population in Latvia – two methods, three estimates

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We used annual night bird survey data as well as early morning survey data used for breeding bird monitoring in Latvia to estimate Corncrake population size in Latvia. For the first method the habitat specific „breeding density” (=calling males per squarekilometer of each specific habitat) was calculated: (1) after two surveys number of territories were determined – if 2 males were observed >250 m apart, they were considered two individuals; (2) territory density per habitat area in each plot and country average was calculated; and (3) total population size were calculated by the use of national agricultural land use data open to public after each year. For the night bird survey we attributed each Corncrake to one of the following (consistent to the categories used in the land use data): (1) cultivated meadows; (2) uncultivated meadows; (3) cultivated pastures; (4) uncultivated pastures; (5) spring crops; (6) winter crops; (7) other arable land; (8) abandoned agricultural land; (9) clearcuts in forests; (10) other. For the second approach, the same data (night bird survey) as for the first method was used. We used hierarchical modelling to relate Corncrake counts to site level habitat composition while accounting for imperfect detection. The obtained model was used for prediction over a grid covering the whole country. The third approach used the same hierarchical modelling method as above but a different data source – the common breeding bird monitoring bird survey. Obtained estimates vary greatly and we discuss the strength and weaknesses of each estimate (approaches used).

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### EBBA2: New information on the distribution of breeding birds in Europe

Verena Keller<sup>1,4</sup>, Marti Franch<sup>2,4</sup>, Sergi Herrando<sup>2,4</sup>, Marina Kipson<sup>3,4</sup>, Pietro Milanese<sup>1,4</sup>, Petr Vorisek<sup>3,4</sup>

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Across Europe, data collection for the second European Breeding Bird Atlas EBBA2 is advancing rapidly. From 2013 to 2017 data have been collected and fieldwork has been carried out by national teams which will allow comparison with the first atlas at the level of the 50x50 km grid. Pilot data already documented changes in the distribution for 15 species. In addition, "timed visits" provide standardised data that will allow modelling the probability of occurrence, which can be interpreted as an indicator for relative abundance, at a smaller resolution. Up to 2016, national coordinators provided nearly 100'000 species lists from timed surveys carried out during atlas or breeding bird monitoring projects. Modelling the probability of occurrence across the whole of Europe is challenging because of the heterogeneity of the available data. Not only is geographical coverage much lower in eastern Europe than in the west but field methods vary from country to country. Environmental variables used in the models had to be chosen from data available at continental scale. Based on bird data collected, a selection of climate, land use and other variables, taking into account sampling effort, detection probability,

spatial autocorrelation and information from the surveys at the level of 50x50 km, we developed a modelling procedure (based on 10 different presence/absence Species Distribution Models, SDMs) to predict the probability of occurrence for a large number of species at continental scale.

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### **The high basal metabolic rate in passerines: only a feature of oscines?**

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The superiority of passerines in basal metabolic rate (BMR) over animals from other taxa was one of the main observed taxonomic differences in energetics of endotherms. With the exception of few recent tropical studies, this asymmetry was based mainly on temperate species and only on oscine representatives of Passeriformes. The high BMR in passerines could be one of the key physiological adaptations, which allowed them to occupy multiple ecological niches and reach high diversity. One could expect that more primitive Old World suboscine passerines (Eurylaimides), which are poor in species number, would have a lower BMR in comparison with oscines. Using allometric analysis of mean species' BMRs in sedentary birds from southern Vietnam, we did not find significant differences between Old World suboscine and oscine passerines. However, the size range of all five measured suboscine species was too narrow to obtain reliable allometric coefficients. Therefore, we also analyzed large individual data set using body mass, season, reproductive status and other variables as predictors. According to analysis of individuals, subocines had significantly lower BMR than oscines. Taking into account the rich diversity of the New World suboscines, our result emphasized the need to compare the energetic difference between oscines and suboscines in two hemispheres.

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### **Loop migration in adult European rollers (*Coracias garrulus*) from the Carpathian Basin**

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European roller is a long-distance migratory species which population has underwent a serious decline in 1980s in the whole breeding range. Besides the shortage of food and suitable breeding sites, the mortality during the migration might have contributed to this decline. The migration of the western population is well-studied; however eastern population's route has been inferred mostly from ringing recoveries. The aim of this study was to reveal the migration routes and wintering areas of the central-eastern population of rollers by satellite tracking. Within the framework of LIFE13/NAT/HU/000081 LIFE+ project six adults were tagged with solar powered satellite transmitters in Hungary, during the incubation period in 2015 and 2016. Most of the rollers migrated through the Balkan peninsula, but proceeded on a broad front across the Sahara. Stopover sites in Sahel belt were located in Chad and Sudan, four birds used the same region. Rollers followed a westward and an eastward path to cross the rainforest zone. Botswana, Namibia and Angola were found as wintering area of the rollers. We found counter-clockwise loop migration through the Arabian peninsula during the spring migration. Our result also showed that crossing rain forest zone and wintering can be challenging for adult rollers and highlight the importance of conservation measures in the countries of the Middle-East.

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### **Intrinsic and extrinsic factors explain the departure direction of Northern Wheatears (*Oenanthe oenanthe*) from a coastal stopover site during autumn**

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Nocturnal songbird migrants rely on their innate migration program to reach their breeding and wintering grounds. The endogenously controlled spatiotemporal schedule is, however, modified by intrinsic and extrinsic factors experienced en route. This is exemplified in migratory directions of free-flying birds which are not always directed towards the seasonally appropriate migratory destination. Birds follow detours when circumventing large ecological barriers and they allow drift in crosswinds over land but compensate for crosswinds close to coastlines. In this study, we investigated whether intrinsic and extrinsic factors explain variation in the departure direction of Northern Wheatears (*Oenanthe oenanthe*) from the island Helgoland during autumn. We tracked free-flying birds setting off from the island to obtain individuals departure directions, using an automated digital radiotelemetry system. We found that body condition as well as weather experienced during take-off significantly influenced departure direction. Departure directions towards the east were mainly observed in birds with low fuel loads, while most birds in good condition departed towards south-southwest. In addition, variation in departure direction was explained by the west-east component of the wind indicating that birds allow for wind drift. However, with increasing wind speed in this component, birds commenced compensating to avoid further displacement or drift towards the ocean. Those individual responses indicate that fuel load and wind conditions are key factors determining departure direction from Helgoland.

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### **Factors affecting begging calling behaviour in Tengmalm's owl (*Aegolius funereus*) fledglings during post-fledging dependence period: Scramble competition or honest signalling of need?**

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Begging behaviour of nestlings has been intensively studied for several decades as a key component of parent-offspring conflict. There are essentially two main theories to account for intensity of food solicitation among offspring: that intensity of begging is related to some form of scramble competition between nest mates or that it offers honest signalling of need to parents. The vast majority of studies which have addressed begging behaviour have been based on observations of, and experiments on, nestlings and have not considered begging behaviour, during the post-fledging period. Begging vocalizations in this post-fledging phase of dependence have rarely been studied, despite the importance of vocalizations as a communication method between offspring and parents, particularly for nocturnal species. We radiotracked 39 fledglings of the Tengmalm's owl in two years with different availability of prey: 2010 (n = 29 fledglings) and 2011 (n = 10 fledglings) and made 1320 nightly localizations in which we recorded presence or absence of begging calls. Within years, the most important measures related to the probability of vocalization were body condition at fledging, time of night, number of surviving siblings, age and weather conditions. Begging intensity increased with age in both years; however, in the year with low prey availability fledglings vocalized significantly more often. The main factor causing

these differences between years was probably the different availability of prey, affecting breeding success, post-fledging behaviour, and thus also both short- and long-term needs of offspring. We believe that our results suggest honest signalling of their fledgling's need.

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### Population genomics of the European Nightjar (*Caprimulgus europaeus*)

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The European Nightjar (*Caprimulgus europaeus*) is a key breeding species associated with heathlands. It has undergone historical population declines across Europe, mostly due to habitat loss and fragmentation. To support future decisions on conservation actions, it is important to know the genetic variation within and among the different populations, and understand the processes that shape it. In this study, we sampled 64 nightjars from 9 localities in Western Europe. Using Restriction site-Associated DNA sequencing (RADseq), Single Nucleotide Polymorphisms randomly distributed across the genome will be detected. Then, we will describe genetic variation and population structure at different spatial scales. We also intend to reconstruct demographic histories. These population genomic analyses will provide valuable insights into the conservation management of the European Nightjar through the assessment of population connectivity and population sizes as well as the identification of populations of conservation concern.

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### Sex ratio, polygamy and extra-pair paternity in Willow Warbler (*Phylloscopus trochilus*) populations in European Russia

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We studied the sex ratio, polygamy and extra-pair paternity (EPP) of Willow Warblers (*Phylloscopus trochilus*) in different parts of their breeding range in European Russia: in the Murmansk Region (67°06'N, 32°42'E), Karelia (60°46'N, 32°49'E) and Mordovia (51°37'N, 39°33'E) in 2006 – 2008 and 2015 – 2016. Males were prevailed in number in all sites, and some adult males remained unmated during the breeding season. Although social monogamy dominated in these populations, occasions of polygamy were not rare. Thus, in Karelia, where the biology of Willow Warblers has been studied for over 40 years, there have been multiple registrations of polygyny (5–17% in different years). An application of molecular-genetic methods revealed EPP in socially monogamous pairs. The amount of EPP in Willow Warblers in Karelia was 15.3% (n = 98), and the share of families with EPP (1–2 offspring in a brood) was 68.4% (n = 19). The proportion of EPP in the Murmansk Region amounted to 37.5% (n = 32), and the share of families with EPP (1–4 offspring in a brood) was 83.3% (n = 6). The sample size in Mordovia was only 2 families, but even there each of the broods contained one extra-pair offspring (mean EPP proportion of 33.3%). Given the small sample size in Mordovia, definite conclusions would be precocious, but the results may provisionally indicate that a substantial proportion of EPP is a feature shared by all the surveyed populations. *The study was supported by the RFBR (projects NN 06-05-64368-a, 15-05-03493-a).*

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### Migration ways and wintering areas of the greylag goose (*Anser anser*) from the Kuma-Manych Depression, southern European Russia

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Migration timing and wintering areas of some species changed during warm climatic period. Migration routes and wintering area of the greylag goose population from western part of the Kuma-Manych Depression still have not been clarified. In 2014-2016 22 geese have been marked with GPS/GSM-loggers. Features of diurnal movements of young geese before and during migration and wintering, the timing and speed of autumn and spring migration have been clarified. For example, young male covered the distance of 750 km per day. Ways of autumn migration of males and females in 2014 differed from ways in 2015 and 2016 when winters were warmer. Females started in easterly direction along the Kuma-Manych Depression to far warm wintering, delayed on the long stop in the Volga delta. One female migrated along the western coast of the Caspian Sea and wintered in the valley of the Tigris River (Iraq) to the middle of March 2015. Males begin autumn migration to distant winter area later than females and flew in a south-easterly direction through the Stavropol Upland. One male directly crossed the Great Caucasian Ridge, stopped at the Kura-Arax lowland and wintered on the border of Azerbaijan and Iran on Khudaferin reservoir created on the Arax River in 2009-2010. This is a new, not previously existed wintering site of waterfowl. In 2015 and 2016 all marked geese wintered in the cold wintering area in the Kuban River floodplain (Black Sea region). Geese of studied population are able to change migration timing, routes and wintering areas.

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### The origin of juvenile Long-eared Owls (*Asio otus*) migrating through Pape, Latvia.

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Since 1966 studies of bird migration are carried out at Pape Ornithological Station. The station is located in a typical bottleneck site between Lake Pape and the Baltic Sea in the SW corner of Latvia. 6 920 Long-eared owls were captured in Pape during 1968-2016. Valuable data were obtained regarding wintering places in Central and Western Europe - birds ringed in Pape have been found in more Southern countries. However, almost no data have been obtained regarding the origin of owls migrating through Pape - since very little ringing activity is performed in NW Russia and the number of Long-eared owls ringed in Finland or Estonia and captured in Pape is not very high. To be able to predict more precise the origin of juvenile Long-eared Owls migrating through Pape, another method - stable Hydrogen isotope analyses, was used. Feather samples of 135 juvenile Long-eared Owls have been collected and stable isotope analyses performed by IZW (Berlin). Analyses show significant differences in dH results, indicating large geographic variation in the origin of the birds. It can be also hypothesized that birds migrating through Pape later in October have slightly more Nordic-NE origin (lower dH values) than the birds migrating earlier. To be able to perform more precise calibration, it would be necessary to measure dH value of nestlings of Long-eared Owl in several geographic regions - there is a potential for future international cooperation between owl experts in several countries that can provide more precise results on owls' origin.

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### Offspring desertion by females in the Whiskered Tern *Chlidonias hybrida*

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In species with biparental care a conflict of interests can arise if one mate tries to maximize its own reproductive success at the other's expense. For a number of benefits enhancing its own fitness one of the mates can desert the brood, leaving parental care to the remaining one. This study describe the desertion pattern of females in the Whiskered Tern *Chlidonias hybrida*, a species with semi-precocial chicks. Fieldwork was carried out during six breeding seasons between May and September (2006, 2007, 2012-2015) in the Upper Vistula River Valley (S Poland). The rate of female desertion during chick rearing period did not differ significantly between years. Offspring desertion was recorded during both chicks and post-fledging period. Desertions started when chicks were five days old and no longer required intense brooding. Desertions before fledging did not affect fledging success. Because of the very long breeding season (May-September) deserting female Whiskered Terns can possibly reneest in the same year. As a result of desertions, some females can also depart earlier on migration. Given the ready availability of food and low predation pressure, benefits appear to accrue to females that desert; selection forces may therefore not be acting against female desertions.

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### Protected areas enhance expanding populations and mitigate declines on range edges under climate change

Petteri Lehikoinen<sup>1,2</sup>, Andrea Santangeli<sup>1</sup>, Kim Jaatinen<sup>3</sup>, Ari Rajasärkkä<sup>4</sup>, Aleksi Lehikoinen<sup>1</sup>

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Warming climate is changing geographical distributions of species but keeping pace with the climate may be complicated. The climate is indeed changing faster than species are following it. Moreover other environmental changes can hamper species' ability to move as they may face difficulties when following climatic preferences in a fragmented landscape. Protected areas are the main cornerstone of our conservation strategies. However the role of a static protected area network on mitigating climate change impacts has been debated. To assess the effects of protected areas against climate change we compared density changes inside and outside protected areas in the distributions edges of Finnish land birds on a time span ranging from 1970s to 2000s. For southern species we studied the northern distribution edges, and for northern species the southern distribution edges. The densities of southern species on their northern distribution edge increased more inside the protected areas and the trend was more positive the more the species preferred protected areas. On the southern edge of northern species densities declined less inside protected areas than outside them. The results suggest that protected areas help southern species - especially of those of conservation concern - to expanding their distribution. Thus protected areas can act as corridors or stepping stones for species spreading north. Protected areas also seem to mitigate the retreatment of northern species yet they are not able to prevent it. Therefore a network of protected areas seem to help maintaining biodiversity under climate change.

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## Inferring the intensity of territorial response from male Tawny Owl calls

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Bird song is of interest in behavioural studies, both as a potential honest signal of individual or territory quality and as a measure of breeding effort. Ideally, the song alone could be used to assess the intensity or aggressiveness in territorial advertisement or disputes. Here we aimed to quantify the intensity of territorial responses of Tawny Owls (*Strix aluco*) solely on bioacoustic measures of hooting males. Ultimately, we wanted to test whether birds of the red colour morph are more aggressive than grey ones, but the method presented has applications beyond that. During spring 2016 we recorded hoots of 29 males in Southern Finland. Males responding after 5 min playback were recorded during 10 min. After briefly applying more playback (3 hoots) we further recorded for 5 min more. To construct an index of aggressiveness we fitted mixed effects models with  $(-1) \times$  elapsed time as the response variable, various temporal and frequency measures of the hoot as explanatory variables, and individual ID as a random effect. This model was first fitted to data before more playback. Based on the fixed effects prediction we calculated an aggressiveness index for the whole data. As expected, we found that the index, naturally first decreasing with time, bounced up to a higher level after more playback. This supports our interpretation as a measure of territorial response intensity. Contrary to our expectations, and despite obvious individual variation, we found no differences in the hoots or total territorial responses between the two colour morphs.

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## Fine-tuning the acoustic discrimination of individuals in little owls

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Animal vocalizations contain information about individual identity that could potentially be used for the monitoring of individuals. Owls are particularly good taxonomical group to study the potential of acoustic monitoring due to consistent, long-lasting, individual differences found in many owl species. With discriminant analysis and territorial call recordings from 54 males, we investigated several study design factors that might affect the potential of acoustic monitoring in little owls and selection of the most cost-effective study design. Discrimination at the level of calls (percentage of calls correctly classified) did not lead to the same results as discrimination at the level of individuals (percentage of individuals correctly classified). Hence, studies interested in individual discrimination should optimize methods at the level of individuals. We used three different call description methods based on call frequency spectrum, frequency modulation and cross-correlation. Call description based on frequency modulation allowed reliable individual discrimination in at least double-sized population than other two call description methods. Furthermore, recording of more calls increased linearly the discrimination of individuals. Recording of many calls did not seem necessary for getting the correct discriminant function. Large number of calls could help when we need to assign the sequence of calls to one of two males with similar call parameters. Unfortunately, the available pre-screening individuality index allowed only imprecise estimation of the population size that could be reliably monitored with a given methods. Overall, projects on individual acoustic monitoring need to consider the limitations regarding the population size that can be reliably monitored.

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### Tawny owls and roads: a 12-year study of road-kills and abundance

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Owls are strongly affected by roads, including collision with vehicles and disturbance. The tawny owl *Strix aluco* is a common species across Europe and a frequent victim of road-killing. We studied road mortality and abundance of tawny owls in southern Portugal from 2005 to 2016. We considered two road types with varying traffic load: main roads and secondary roads. Mortality was checked daily or weekly along 37 km of roads. Abundance was studied using point counts with call-playbacks. We measured the behavioural response to conspecific intrusions during capturing attempts. Road mortality of tawny owls showed a decreasing trend along the study period. Mortality was greater during the post-fledging dispersal period (June-October). Mortality hotspots seem to be influenced by overall roadkill patterns and landscape connectivity. Tawny owl abundance was negatively affected by main roads. Abundance near secondary roads and far from roads is similar. The tawny owl population shows a negative trend in the study area, despite its apparently stable trend in Portugal. The local population trend was slightly positive far from roads, and negative near main and secondary roads. Roads seemed to affect territorial occupancy between years, with territories near main roads showing greater turnover. Sites near secondary roads showed greater variation in the number of territories. Secondary roads also showed greater intra-year variation in occupancy, losing more potential territories along the breeding season. Areas near roads apparently are of low quality for tawny owls, as suggested by lower territory occupancy and lower aggressive response to intrusions by the territory holders.

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### Predictors of adult sex ratios in songbirds

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The adult sex ratio (ASR) is a key component shaping evolution of life history strategies, population dynamics and sex roles, and biased ASRs are likely to have implications for wildlife conservation. In birds, observed ASRs often are biased towards males, which could arise because of sex differences in capture probability, in dispersal, or in survival. A study by Székely et al. (2014) suggested that adult mortality is an important predictor of ASR. We propose a Bayesian approach, applying a multi-state capture-recapture model, for comparing how capture probability, dispersal, and survival of males and females influences observed ASR. We used data on 11 passerine species, covering 12 years and 40 constant effort ringing sites (CES) in Hungary. Our results suggest a high average probability that survival is indeed higher in males than in females, while the average probability that capture probability and dispersal differs between sexes was lower. However, consistent with our previous findings, we found that higher capture probabilities for males than for females are likely for Common Blackcap (*Sylvia atricapilla*), Blackbird (*Turdus merula*), and Chaffinch (*Fringilla coelebs*).

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## A nocturnal migrant songbird regularly makes prolonged non-stop flights of 12-60 hours when migrating over the Mediterranean-Sahara barrier.

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The Great Reed Warbler (*Acrocephalus arundinaceus*) is a medium-sized songbird that breeds in reed marshes across Europe and Western Asia. It is a long-distance nocturnal migrant wintering in sub-Saharan Africa. Like many other tropical migrants, great reed warblers have to cross large barriers, notably the Sahara Desert and Mediterranean Sea. Whether songbirds use night-time flights (8-11 h long; landing and resting during intervening daytime periods) only, or prolonged (into day-light; 12-24 h) or even longer (24-64 h) non-stop flights when crossing these barriers remains a controversial issue. In this study, we analysed geolocator data collected from migrating great reed warblers breeding in southern Central Sweden. In total, data from 28 individuals in 2012-2016 were analysed. By combining data on light level variation during the day and changes in temperature before/after vs. during flight (collected with the same geolocator), we found compelling evidence that a large proportion (68% in autumn and 78% in spring) of the great reed warblers prolonged their flights beyond the normal norm of a one-night flight (i.e., 8-11 h) when crossing the Mediterranean-Sahara barrier. Our findings showed that the most commonly used migration strategy for this medium-sized nocturnal songbird when crossing large barriers was to prolong the migration flight at least several hours into day-light, and that a large percentage (34%) even continued their flights during night and day for 24-60 hours non-stop, despite the considerable physiological strains predicted by such a strategy.

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## Visual cues of systemically herbivore-damaged pine branches attract insectivorous birds

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So far studies have shown that insectivorous birds are attracted to herbivore-damaged trees even when they cannot see or smell the actual herbivorous arthropods, damaged leaves or faeces. Thus, the birds could only sense the systemic induction of the trees. There have been also some studies trying to find out whether the vision or the olfaction is more important for the birds in locating herbivore-induced trees. We wanted to provide more information to this question and conducted an experiment to study the role of avian vision with Scots pines (*Pinus sylvestris*), pine sawfly larvae (*Diprion pini*), great tits (*Parus major*) and blue tits (*Cyanistes caeruleus*). Birds were released individually to a study booth where they could choose between two pine branches: one systemically herbivore-induced and one intact control. The branches were inside transparent, air-tight polymethyl methacrylate cylinders, so the birds could only see the branches and not smell them. The results show that birds significantly more often flew or jumped first on the cylinder with the herbivore-induced branch than the control branch (33 vs. 15;  $\chi^2 = 6.75$ ,  $p = 0.009$ ). There were no differences in the time the birds spent sitting on the two cylinders or number of visits the birds did on them. Needles of herbivore-damaged pines reflect less light than needles of intact pines, and the birds could react to this difference.

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## Larders of pygmy owls for over-winter survival: inter-individual variation under fluctuating food conditions

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Hoarding behaviour evolved in few small species to reduce starvation risk, especially in response to harsh winter condition or food shortage. Some species of owls, such as Eurasian pygmy owls (*Glaucidium passerinum*), store prey in natural cavities or in nest-boxes. Despite storing habits of pygmy owls being already documented at the population level, there are no earlier studies at the individual level under varying food conditions. There is substantial variation in size and composition of larders, but the reasons for this variation are currently unknown. This could be due to fluctuations in the abundance of main prey (voles of the genera *Microtus* and *Myodes*) in relation to their 3-year population cycle and/or individual differences between owls induced by their sex and age. Data on pygmy owl hoarding behaviour were collected for 15 years in western Finland. In late October to early December during 2002-16, a total of 997 larders was found and a total of 326 individual pygmy owls were caught in the study area. The owls were ringed, aged, sexed and measured. Prey animals collected in larders by pygmy owls were identified to species level, sexed, aged and their body mass estimated. Abundances of main prey available were estimated in spring and autumn by snap-trapping. Number and characteristics of storage sites per each individuals and their spatial distribution across the landscape were analysed. Here, we investigate alternative explanations accounting for the variations in larder size and prey species, and their association with owl body condition, sex and experience.

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## Little owl - its protection and distribution along the German-Czech border

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The aim of the project “Athene” is to stabilize the endangered population of the little owl, *Athene noctua*, and to promote its further distribution along the border between Saxony (Germany) and Bohemia (Czech Republic). In both countries, the little owl was once a common species with a wide range and large total population (and it still is in other areas). Especially due to a massive loss of its natural habitats, the species is, in Germany, currently threatened with extinction. The number of breeding pairs is estimated to be 11 in Saxony and around 100 in Bohemia, and stocks are still decreasing. First steps in the project will include a vast monitoring of the current population density and distribution, the analysis of its population genetics and the evaluation of little owl's biotope connections, as well as their hunting grounds and breeding habitats. Furthermore, all those possible measures have to be taken on, which ensure an effective protection of the little owl in the study area, e.g. by providing predator-safe incubators. These will be provided in areas where the little owl is already located, but also in biotopes where good living conditions are likely to attract the species. But effective protection measures can only be realized in cooperation with strong regional stakeholders and the public. The project therefore also directly needs to address these groups, first to raise awareness and second to educate people how they can contribute to little owl's protection.

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## Habitat management and waterbird populations on Lake Engure, Latvia

Aivars Mednis<sup>1</sup>, Māra Janaus<sup>1</sup>, Antra Stūpniece<sup>1</sup>, Roberts Šiliņš<sup>2</sup>

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In the beginning of study period (1980s) work area in the central part of the lake sheltered about 200 duck nests, 20-70 wader nests, 5000 larids, <30 Greylag Geese broods, no cormorants. Different habitat management activities (creating new islands, avian and mammal pest control, controlling vegetation by mowing and grazing) has been carried out in different extent, being the lowest in 1990s. This coincided with decrease of larids, increase of Greylag Goose and arrival of Great Cormorant. The present situation (30-60 duck nests, 20-50 wader nests, 800 larids, ca 50 Greylag Goose broods, 1000 Great Cormorants), the vegetation management effort intensified since 2002 and their interactions are discussed.

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### **The faster the better? The relationship between oxidative status and growth rate in wild passerine nestlings.**

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The trade-offs occurring along the life history of many organisms are a fundamental aspect of evolutionary ecology. Such trade-offs have been broadly assumed to be tightly related to several physiological processes. However, in most cases, the proximate causes and the mechanisms involved are not yet fully understood. A prime mechanism connected to these trade-offs is oxidative stress, defined as an imbalance between the concentration of reactive oxygen species and antioxidants in favor of the former. Our aim was to study the relationship between growth rate and oxidative status of nestlings of a wild population of great tits (*Parus major*) during two consecutive years. In order to do so, on day 6 and day 12 after hatching we collected blood samples from each individual and measured morphological traits. The oxidative status of nestlings was determined by measuring both reactive oxygen metabolites (ROMs) and non-enzymatic antioxidants (OXY) in plasma. We found that on day 6 there were no differences in oxidative status for individuals with different growth rates. However, on day 12 nestlings with higher mass had higher concentration of ROMs, while OXY concentrations remained similar. Thus, we show that individuals exhibiting a higher growth rate from days 6 to 12 had higher levels of oxidative stress. Given this finding, despite the fact that body condition is often used as a proxy of fitness, our results raise the question of whether other traits, also related to fitness, are being overlooked.

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### **Breeding Lesser Spotted Eagles *Aquila pomarina* and windfarms - some insights from GPS tracking**

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No comprehensive studies employing GPS telemetry have been conducted on breeding Lesser Spotted Eagle, which is threatened in Germany. Since 2003 we have collected 116,715 GPS data from 26 adult Lesser Spotted Eagles. Numbers and spatial distribution of wind farms in Germany are expanding, which can increase risk of interactions with birds, including Lesser Spotted Eagle. Female Lesser Spotted Eagles use markedly larger home ranges than males. Most locations were within about 6 km of the breeding site, but the size of the core home range and the foraging area are highly variable from year to year for both sexes. When the brood is lost, the

male spends less time foraging, and consequently the size of the home range shrinks considerably. Because of the increased risk of collision, we recommend that wind farms should not be erected within a radius of 6 km from Lesser Spotted Eagle breeding sites; where these exist, they should not be re-powered or recommissioned at the end of their permitted operational life. Also, because of the high individual and annual variation in home range and core area sizes, assessments for new developments in areas potentially used by breeding Lesser Spotted Eagles should be conducted over at least four years, and be carefully considered on a case-by-case basis. Additionally, in order to support the conservation of the remaining small population of Lesser Spotted Eagles in Germany, other changes resulting in fragmentation of habitat should not occur within at least 6 km of the breeding site.

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### European jays' *Garrulus glandarius* preferences in characteristic of used oaks and in size of taken acorns

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The European jay *Garrulus glandarius* L. is considered the most important factor in the dispersal and spread of oaks species. In oak stands birds collected acorns not from random trees, but selected specific individuals of trees. We conducted study in oak forests in four countries (Hungary, Poland, Romania, Ukraine) in 2015-2017. We observed birds, followed them and noticed position of tree on which Jays foraged on acorns. We collected 50 acorns from this tree and measured length and width used sliding calliper. Additionally characteristic of used trees were measured: height, size of crown and diameter of trunk. To find preferences of Jays in acorns and trees, we compared size of acorns and trees characteristics between used and the closest unused oak. We found that acorns from used oaks were smaller than these from unused trees and no differences in characteristic of used and unused oaks. This results indicate that size of acorns can be one of the most important indicator for choice of foraging birds.

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### Interspecific competition for breeding sites between gull and tern species on inland wetlands and consequences for conservation

Claudia Mueller<sup>1</sup>

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The breeding sites of gulls and terns are often limited and several species compete for them. The colonization of Switzerland by a large, competitive species, the Yellow-legged Gull *Larus michahellis* challenged the smaller species and compromised conservation efforts. Our example shows the flexibility of gulls and terns in breeding site selection, as well as the importance of offering alternative breeding sites. After a population increase in the Mediterranean, the Yellow-legged Gull reached Switzerland and started breeding in 1968. Prior to this colonization, only Common Terns *Sterna hirundo* and Common Black-headed Gulls *Larus ridibundus* bred in this landlocked country, in a few, often mixed and rather small colonies. The terns lost their natural breeding sites due to the embankment of rivers and the destruction of wetlands. Due to the installment of breeding platforms and rafts, however, the population has recovered since the 1950s. The Common Black-headed Gull started to use artificial islands in the 1960s and moved later to platforms and rafts. In the last few decades, the Yellow-legged Gull has spread to many lakes and some rivers. Here they have monopolized part of the structures originally set up for the smaller species. In some larger colonies Black-headed Gulls managed to prevent the settlement of

Yellow-legged Gulls on platforms and rafts. Where artificial structures are primarily targeted at terns, nesting of Yellow-legged Gulls could also be prevented by putting rafts to the water only just before arrival of the Common Terns. Yellow-legged Gulls increasingly breed on roofs.

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### **Feasibility of different compass systems in avian long-distance migration**

Rachel Muheim<sup>1</sup>

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Migratory birds have been shown to use various compasses, like the sun, star and magnetic compass, for orientation during migration. Birds relying on any of these compass systems will follow quite different migration routes, like great circle routes, rhumb lines or constant magnetic routes. There is convincing evidence that migrants regularly calibrate different compass systems with each other. However, there is an ongoing debate over which of these compasses birds primarily rely on, and whether specific compasses are more favourable than others on different continents. Here I explore the feasibility of different compass systems by simulating migration routes and comparing them with actual tracks of birds. More specifically, I will investigate which compass system(s) most closely guide birds along known tracks to their goal, whether birds can reach their goals following a single compass setting, or whether they have to reset their heading or even change to a different compass system along the route. I will also analyse magnetic field properties along known migration routes on different continents to evaluate whether it is more feasible for birds to use a magnetic, as compared to one of the celestial, compasses in specific regions on the globe.

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### **The early bird... considered its fuel? Timing of nocturnal departures is affected by a flexible reaction norm to fuel load**

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Most migratory songbirds travel between their breeding and wintering areas by a series of nocturnal flights. The timing of their departures within the night defines the potential duration of the migratory flight bout. The flight duration has a direct effect on the distance covered during a migratory night, which in turn may affect the time required to complete migration. Therefore, migrants are assumed to depart shortly after sunset. However individual departure times vary substantially within the night. This variation is thought to be explained by fuel load to some extent, with birds departing early when carrying high fuel loads. However, this effect is far from being understood, because previous studies provided contradictory results. We hypothesize that these contradictions in the effect of fuel load on the timing of departures are explained by a flexible reaction norm to this departure cue. This reaction norm may be adjusted in relation to the upcoming challenges of the migration route (e.g. remaining migration distance and ecological barriers). To assess this hypothesis we tracked departures of a long-distance songbird migrant (Northern Wheatear, *Oenanthe oenanthe*) using an automated radio-telemetry system (www.motus.org). We found the predicted effect of fuel load on departure timing in birds facing short remaining migration distances and no extended ecological barrier. In birds with long remaining migration distances and an obligatory ecological barrier ahead we found no such effect. This is the first evidence for a flexible reaction norm to fuel that affects timing of nocturnal departures in relation to pending migratory challenges.

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### Conservation genetics of the dwindling European roller (*Coracias garrulus*) population in Austria

Carina Nebel<sup>1,2</sup>, Kerstin Kadletz<sup>1,3</sup>, Anita Gamauf<sup>1,4</sup>, Elisabeth Haring<sup>1,4</sup>, Michael Tiefenbach<sup>5</sup>, Peter Sackl<sup>6</sup>, Hans-Christoph Winkler<sup>7</sup>, Frank Zachos<sup>1</sup>

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Due to broad-scale habitat loss European rollers (*Coracias garrulus*) have been decreasing rapidly during the 20th century in Austria. As of 2016, only a relict population of two breeding pairs and a few non-breeders remain in Styria out of about 270 pairs in the 1950s. The geographically closest population is 250km away in Hungary. Since 2002 all nestlings and adult birds in Austria have been ringed and no exchange with neighbouring populations has been observed. Up to now, no population genetic analysis of this (or indeed any other) roller population has been conducted, but given the small census size in Austria, combined with missing (or low) immigration from other populations, genetic depletion seems likely. The aim of this study is to assess the genetic variability in the population of European rollers in Austria. Blood samples of nestlings from recent years are compared with museum samples from historical times when rollers were more common and widespread in Austria. To put the Austrian results into perspective, roller samples from other European populations are also included. The results may help to arrive at informed management decisions and prevent the rollers from getting extinct by identifying the most appropriate potential donor population for nestlings which could be translocated to Austria to increase genetic variation. The mitochondrial control region sequence showed a decrease until monomorphism, while genetic diversity based on microsatellites is equivocal. These results indicate drift effects in this relict European roller population caused by a fast population breakdown and small population size.

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### Short-term responses of bird populations to disturbance - forest management effects in lowland forests in Poland

Grzegorz Neubauer<sup>1</sup>, Przemyslaw Chylarecki<sup>2</sup>, Tomasz Chodkiewicz<sup>2</sup>, Arkadiusz Sikora<sup>3</sup>, Tomasz Wilk<sup>4</sup>

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In managed forests, timber harvest affects structure and composition of forests, leading to changes in abundance and key demographic parameters. Existing studies indicate that responses to forest management are species-specific: for instance, forest interior species are expected to decline in response to management activities, while species preferring gaps or semi-open stand structure could colonize area where gaps occur due to clearcuts. In 2016-2017, a team of observers performed repeated bird counts on 300 small- to medium-sized (5-35 ha) plots. The plots, representing State Forest sections, were distributed across lowlands and included various forest types of various age. Treatment group included plots with forest management activities of various types and intensity, all performed outside the breeding season, while remaining plots were treated as controls. With dynamic N-mixture models for open population applied to abundance data in a typical BACI design, we have assessed effects of forest management activities on bird abundance. Several habitat variables included stand and undergrowth composition, stand age and structure and humidity also allowed to outline species-specific habitat requirements so that forest management practices leading to stand characteristics preferred by a given

species can be applied. The study also emphasizes the usefulness of the approach for the population sizes estimation on local and regional scales.

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### **New data on Black Stork nest predators in Latvia.**

Linda Ose<sup>1</sup>, Māris Strazds<sup>2,3</sup>

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We used trail cameras to collect more accurate data on Black Stork phenology, to collect ring recoveries of adult birds and to improve knowledge on the behaviour of Black Storks in Latvia since 2011. The total amount of data to be used for analyses comprises 3345 camera days, with 1759 days of stork presence, more than 708 400 pictures in total. These data among other things also document numerous visits of predators and show some depredation cases in detail. There have been four main predator species recognised so far - lynx, pine marten, white-tailed Eagle and goshawk. The new data have added one more species to this list - the raven, and have changed our understanding of significance of some of these species. We discuss the differences in patterns of attacks of various predator species and relations of those with fragmentation of forests (by clearcuts).

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### **Insights into the rock dove natural and artificial history gained from population genomics**

George Pacheco<sup>1</sup>, Thomas Gilbert<sup>1</sup>, Filipe Vieira<sup>1</sup>

<sup>1</sup>*Natural History Museum of Denmark, Copenhagen, Denmark*

Archaeological evidence suggests that the rock dove (*Columba livia* Gmelin, 1789) was the first domesticated bird. This process probably occurred in the Middle East up to 8,000 years ago. Initially used as a food source and in religious rituals, it has since then served other purposes including communication, medicine and navigation aid. Since the eighteenth century, the interest in fancy breeds has increased around the world, and now around 350 breeds are recognized. Such artificial selection generated an incredible morphological and even behavioral diversity within a single species that famously captured the fondness of Darwin himself. However, since the commencement of domestication, pigeons have escaped from captive stocks, populating human habitats and becoming ferals. In addition to these unintentional releases, during the colonial period the species experienced an extreme range expansion. Taking advantage of these human-mediated introductions, the bird is now ubiquitous in the world's urban landscapes. Nonetheless, despite a long history of proximity between men and pigeons, little is known concerning both their domestication and feralisation. With these puzzles in mind, we amassed more than 700 samples representing numerous feral populations, populations thought to be of wild rock doves, 65 breeds and two out-groups. Employing the GBS approach, we identified thousands of polymorphic loci across the pigeon genome. We report several genetic analyses performed on this dataset, which demonstrate that global samples show considerable population genetic structure and a pattern of phylogenetic proximity between colonizers and their respective colonies, making clear the human influence in the global pigeon dispersion.

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## Nesting of Black Storks on artificial platforms in Ukraine

Oleksandr Panchuk<sup>1</sup>

<sup>1</sup>*Kyiv Zoo, Kyiv, Ukraine*

Although Black Stork is a rare species in Ukrainian forests, the amount of old trees suitable for nesting reduced due to the intense deforestation. Therefore six artificial platforms were installed during the period of 2009-2014 on the territory of Teteriv forestry (Kyiv region) in order to increase the amount of suitable nesting places. The project was carried out together with Teteriv forestry with the financial support of Kyiv Zoo. As a result three out of six platforms were inhabited. The first one, built in 2011, was inhabited by Black Storks in 2012, but the nest was destroyed by a falling tree. The second one, built in 2010, was inhabited by Black Storks which had offspring in 2013, but they had no nestlings in 2014-2015. The third one was inhabited by birds of prey. The platforms, preferred by Black Storks, were installed in places where nests were laid before. Consequently, the most effective method of constructing platforms is to place them on the spots of previous nesting. The platform construction must be durable enough to support the great weight of a nest. Besides, the platforms are to be installed far away from human settlements, but in close proximity of river, swamp or other pond.

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## On subspecies of willow warblers

Kristaps Sokolovskis<sup>1,2</sup>, Miriam Liedvogel<sup>3</sup>, Diana Solovyeva<sup>4</sup>, Max Lundberg<sup>1</sup>, Susanne Åkesson<sup>1</sup>, Staffan Bensch<sup>1</sup>

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Willow warblers (*Phylloscopus trochilus*) are small old world leaf warblers that breed in Eurasia from the coast of Atlantic to the coast of the Pacific. Three subspecies have been recognised based on plumage, size and migration route. *P. t. trochilus* breeds in central and western Europe, *P. t. acredula* breeds in northern and eastern Europe, *P. t. yakutensis* breeds in the east from the Ural mountains. *Trochilus* are assumed to be small and yellow, while *acredula* are described as larger and greyer but extensive field work in Scandinavia has shown considerable overlap in plumage and size between the two subspecies. By using the same standardized methods for the first time we present comparable phenotype data of far NE *yakutensis*; most of the birds have distinctively grey breasts without trace of yellow and larger body size and wing length on average, however not larger than of the largest *acredula*. We used stable isotope signatures from winter grown feathers as a proxy of wintering grounds and present support to the well known assumption that *trochilus* overwinters in western, *acredula* in eastern/southern and *yakutensis* in southern Africa. In addition, we present and discuss data on genetic differentiation, population structure and post glacial dispersion of willow warblers.

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## The result of The Parakeet Census of Turkey 2016

Esra Per<sup>1</sup>, Kiraz Erciyas-Yavuz<sup>2</sup>

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The Rose-ringed Parakeet (*Psittacula krameri*) and the Alexandrine Parakeet (*P. eupatria*) have been intentionally or accidentally introduced to Turkey. These alien species are now considered to be resident as they have a healthy breeding population in Turkey. To understand their recent distribution, population size, behaviour, habitat preferences, intra and interspecific competition, social and economic impacts we collected all the available observations through an internet based citizen science study called "The Parakeet Census of Turkey 2016". The present study gives preliminary results of the 2016 observations. We collected a total of 1,218 observations, which came from 27 cities. 1,209 of these are evaluated as accurate records (the Rose-ringed Parakeet 92%, the Alexandrine Parakeet 8%), as they have been supported by videos and photos. According the current findings their population is increasing yearly. All parakeet sightings were recorded generally around urban areas, the only rural record came from Izmir. The most numerous population is in Istanbul for both parakeets. They are alien species which compete for food and nesting sites with resident species. They can influence the distribution and the population numbers of the resident species. The Rose-ringed Parakeet has showed interactions with the Hooded crow, Magpie, Starling, Sparrow, Sparrowhawk, Caucasian Squirrel and the Jackdaw while attacking them. They have been mainly recorded while roosting (35%) followed by flying (27%) and singing (25%). Their sounds do not disturb people in Turkey. The Parakeet Census of Turkey is The Citizen Science Project and continues in 2017 for more detailed assessment.

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#### Activity pattern, body reserves and leukocyte profile in the Reed Bunting (*Emberiza schoeniclus*) during seasonal migrations and wintering

Nadezda Pogodina<sup>1</sup>, Irina Demina<sup>1</sup>, Olga Babushkina<sup>1</sup>, Raisa Chetverikova<sup>1</sup>, Julia Bojarinova<sup>1</sup>

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In northern Europe the Reed Bunting is a short-distance migrant. During autumn and spring migration periods predominantly diurnal movements of the species are widely recorded. The pattern of migration is poorly understood, since Reed Buntings are known also to migrate at night. It is possible that in such species as the Reed Bunting the nocturnal component may vary within migration season and between seasons. The aim of our laboratory study was to uncover the migration pattern of the Reed Bunting. We evaluated the ratio between the diurnal and nocturnal activity of captive individuals in relation to the time of the year and physiological parameters. Reed Buntings were trapped in the beginning of migration at the Ladoga Ornithological station, Northwestern Russia (60°41'N, 32°57'E). Birds were housed individually and were exposed to light conditions simulated the natural photoperiodic changes during migration and wintering. The activity of Reed Buntings was registered by infrared sensors 24 hours a day. Body mass and fat scores were measured weekly. Blood samples were collected once in three weeks to analyze leukocyte profile (heterophils/lymphocytes ratio and numbers of white blood cells). We will discuss the dynamics of physiological parameters during migrations and wintering in the studied species. This research was supported by the Saint Petersburg State University (grant 1.37.149.2014).

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#### Nestling growth in an obligate brood parasite: Are males heavier than females?

Milica Požgayová<sup>1</sup>, Petr Procházka<sup>1</sup>, Radka Piálková<sup>2</sup>, Marcel Honza<sup>1</sup>

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<sup>2</sup>*Faculty of Natural Sciences, University of South Bohemia, České Budejovice, Czech Republic*

Growth is a fundamental life-history trait closely related to individual fitness. In altricial birds, growth is restricted to a relatively short nestling period and depends primarily on the amount and quality of food and hence on parental care. Obligate brood parasites do not care for own offspring but force other individuals (hosts) to bear this burden. As many brood parasites exploit various host species, their progeny is often subjected to different levels of parental care. Parasite growth has thus been explored mainly in the context of quality or intensity of host parental care and only little is known about whether it is sex specific or not. We fill this gap in knowledge and explored sex-related differences in growth performance of the cuckoo (*Cuculus canorus*) parasitizing two *Acrocephalus* warbler hosts. As adult cuckoo males are about 10% heavier than females, we assumed that male and female cuckoo chicks will also differ in size and thus in their development. Although both sexes exhibited similar hatching mass and grew at similar rate, males reached significantly higher asymptotic mass and fledged significantly heavier than females. Nevertheless, the sexes did not differ in fledging age. This implies that male chicks have higher needs than female chicks. To meet their requirements, males are thus expected to obtain more food from hosts than females. How successful in food solicitation they are and what means they use to trick the hosts into a higher feeding effort remains open to future research.

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### Effects of light-level geolocators on migratory birds: a meta-analysis

Petr Procházka<sup>1</sup>, Vojtech Brlík<sup>1</sup>, Jaroslav Koleček<sup>1</sup>, Sanja Barišić<sup>2</sup>, Davor Cikovic<sup>2</sup>, Bohumír Chutný<sup>3</sup>, Tamara Emmenegger<sup>4</sup>, Kevin C. Fraser<sup>5</sup>, Steffen Hahn<sup>4</sup>, Diana L. Humple<sup>6</sup>, Tosha Kelly<sup>7</sup>, Dmitry Kishkinev<sup>8</sup>, Kent McFarland<sup>9</sup>, Václav Pavel<sup>10</sup>, Makiko Takenaka<sup>11</sup>, Dirk Tolkmitt<sup>12</sup>

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The use of tracking devices is currently one of the most rapidly developing approaches to study bird migration. The recent advent of miniature light-level geolocators has led to a massive increase in the number of studies employing these devices, especially in small species, whose direct tracking was virtually impossible in the past. Although several meta-analytical and single-species primary studies have already examined the influence of geolocators on birds, their results are equivocal. Therefore, the evaluation of the effect of geolocators on birds clearly deserves more attention. Here, we test for the effect of geolocators on passerine and near-passerine birds by comparing return rates, body condition, phenology and breeding performance between around 7000 geocator-tagged and 9000 control birds from more than 100 published studies. In addition, we include numerous unpublished data to evaluate a likely publication bias resulting from a lower probability of publishing studies where only few or no geolocators were retrieved. In the presentation, we will specifically examine the effects driven by species traits (such as body size and migration distance) and geocator design. Our preliminary results showed a slight negative effect of geolocators on the return rate. Moreover, the effect tended to be stronger in unpublished compared with published studies. We also revealed that the information essential for rigorous testing for geocator effects is often missing. We thus strongly recommend establishing procedural control groups in future geocator studies.

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### Long-term changes in the body condition of wintering Great Tits *Parus major*

Kalle Rainio<sup>1</sup>, Esa Lehtikoinen<sup>1</sup>

<sup>1</sup>*University of Turku, Turku, Finland*

This far, the focus of studies concerning climate change and the life of birds has been mostly in migration and breeding phenology as well as breeding performance. Changes occurring during wintering periods have gained less attention, apparently due to lack of long-term studies. However, if we want to understand the whole picture of the effects of climate change on e.g. the population dynamics, we need to know how winter survival and condition have changed during the last decades. I have studied long term changes in the body condition of wintering Great Tits (*Parus major* L.), using trapping data from Turku, SW Finland (60°25' N, 22°10'E). The data spans years 1971 - 2009. I will explore changes in body condition, estimated by weight and fat scores. The condition in wintering birds affects the overwintering survival as well as the breeding success, thus my results add to the knowledge of drivers of avian population dynamics.

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### Spatio-temporal variation in the body condition of female pied flycatcher (*Ficedula hypoleuca*) in a polluted environment

Miia Rainio<sup>1</sup>, Suvi Ruuskanen<sup>1</sup>, Tapio Eeva<sup>1</sup>

<sup>1</sup>*University of Turku, Turku, Finland*

Food-chain changes in urban and industrial sites may limit breeding-time resources for small insectivorous passerines. We used a long-term data set of pied flycatchers (*Ficedula hypoleuca*), collected from one of the most polluted sites in Finland during the past 23 years to study the effects of metal pollution on body condition of breeding females. Our results show that body mass started to decline already some days before hatching, indicating a preparation of females to forthcoming chick feeding period. We did not find long-term temporal trends in female body condition index (BCI) in spite of considerably reduced metal emissions during the study period. However, females had higher BCI in polluted than in unpolluted areas during the incubation period. For both incubation and nestling periods the body condition was lower for later breeders, though the condition index decreased slightly faster in relation to hatching date in polluted areas, which may be due to more drastic decrease in nutrition rich food abundance. Temperature and clutch size were positively associated with BCI during the incubation period, but not in the nestling period. Overall, our data suggest that environmental pollution modifies important life-history traits, potentially via indirect effects of higher environmental variability and changed phenology in polluted environment.

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### Timing of breeding of passerines in southern Lapland over the last 32 years

Dafne Ram<sup>1</sup>, Erik Nyholm<sup>2</sup>, Åke Lindström<sup>1</sup>

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Birds are adapted to time their breeding so that the most demanding part of breeding coincides with food availability. There are numerous examples of how populations in temperate regions have advanced their timing of breeding in response to a warming climate in the last decades. We investigated the timing of breeding of 14

passerines species in Swedish Lapland over a period of 32 years. Hatching date was estimated from the progress of post-juvenile moult of young birds mist-netted in the period around independence from the parents. Of 14 species, 11 did not advance their hatching times significantly. Between-year variation in hatching times was almost exclusively related to local May temperatures and no relation to precipitation or NAO index was found. Whereas temperature in April, July and August increased, temperatures in May and June did not change. This is most likely the reason why there were no pronounced advancements of hatching dates in most of the species. In the same period, spring arrival in southern Sweden, an area the Ammarnäs birds pass during migration, has advanced due to warmer climate. Although birds might be able to advance their spring migration due to better conditions *en route*, their timing of breeding may be limited by the climate at the breeding area. Possibly advancement of breeding is limited by food availability that is not affected by the current state of climate change in this area. If future climate change will be more pronounced in May, this might have considerable effects on these populations.

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### Satellite-derived ecosystem functional variables and temporal transferability of bird species distribution models

Adrián Regos<sup>1,2</sup>, Laura Gagne<sup>3</sup>, Domingo Alcaraz-Segura<sup>4,5</sup>, Jesús Domínguez Conde<sup>2</sup>, João P. Honrado<sup>1</sup>

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Species distribution models (SDMs) are today mainly used to predict the impacts of global environmental change on species distribution. However, temporal transferability of SDMs (i.e. the ability of accurately predict species distributions in time) is rarely evaluated prior to predicting species distribution to a different time. In this study, we tested if ecosystem functioning variables derived from remote sensing can improve our ability to predict the distribution of 27 bird species within the model calibration period (year 2000), and in a different time frame (year 2010) in a highly dynamic landscape of NW Iberia (Gerês-Xurés Mountains). To do so, we compared the predictive accuracy of models based on (1) climate, (2) land-cover (LCT) and (3) ecosystem functional variables (EFAs), and (4) their combination. Our results showed that models developed with the three sets of predictors were all useful for describing the distribution of our target species ( $AUC_{Climate} = 0.919 \pm 0.104$ ;  $AUC_{EFA} = 0.918 \pm 0.117$ ;  $AUC_{LCT} = 0.878 \pm 0.71$ ). The combination of climate, land cover and ecosystem functional variables increased substantially the model performance within the calibration time frame ( $AUC_{mean}$  up to 0.98). However, the low temporal transferability ( $AUC$  higher than 0.7 for less than 25% of species) indicates that our ability to predict distributional shifts is limited. We strongly emphasize the need for caution when using SDMs to predict shifts in bird distributions since a high discriminative power within the calibration timeframe does not guarantee a model's ability to predict the future.

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### Reedbed edge utilization by the Eurasian Bittern *Botaurus stellaris*: spatial preferences revealed by satellite tracking and mapping of booming males

Janis Reihmanis<sup>1</sup>, Arturs Laubergs<sup>2</sup>, Roberts Šiliņš<sup>3</sup>, Laura Zvingule<sup>1</sup>

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Habitat preference of satellite-traced birds during post-breeding season and spatial distribution of booming males of the Eurasian Bittern *Botaurus stellaris* were studied in Lake Engure, Latvia from 2014 to 2017. Two counts of booming males were conducted each year and the best count for the year was used to assess habitat choice and spacing of Bittern males. Set of random sites were used to assess significance of spatial preferences. Airborne hyperspectral and topographic LiDAR data were used to classify lake habitats. Our study demonstrate that Bittern males prefer Common Reed *Phragmites australis* habitats for booming and reed density and productivity at booming sites were higher than at random sites. We found that booming sites were located closer to the water and to the edge of reedbed, i.e. birds avoided dry interior parts of large reedbeds. We also found that booming sites tend to be located closer to the aggregations of fragmented reed patches. GPS tracking revealed that during the post-breeding season foraging activity of bitterns strongly associated with the reedbed edges exposed to the open water. Our results show that Bittern preferably utilize reedbed ecotone zones in both, breeding and post-breeding seasons. We hypothesise that spacing are mostly related to prey partitioning and availability. The study was conducted within the framework of the EU-funded LIFE+ project COASTLAKE (Restoration of Bittern habitats in two coastal lakes in Latvia, LIFE12 NAT/LV/000118).

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#### **Dietary habits of four raptor species in Central Europe: the role of *Microtus* voles and *Apodemus* mice**

Jan Riegert<sup>1</sup>, Matej Lovy<sup>1</sup>, Vaclav Luka<sup>1</sup>, Markéta Zárybnická<sup>2</sup>

<sup>1</sup>University of South Bohemia, Faculty of Science, Ceske Budejovice, Czech Republic; <sup>2</sup>Czech University of Life Sciences Prague, Faculty of Environmental Sciences, Prague, Czech Republic

We studied diet composition of one diurnal and three nocturnal raptors: Eurasian Kestrel *Falco tinnunculus* (9 years), Long-eared Owl *Asio otus* (5 years), Boreal Owl *Aegolius funereus* (12 years) and Tawny Owl *Strix aluco* (7 years) in the Czech Republic in relation to changing availability of small mammals. Small mammals (especially Microtinae voles and *Apodemus* mice) comprised the main diet component of all species (FT: 90%, AO: 96%, AF: 90%, SA: 54%). Diet composition significantly changed with availability of small mammals, but the role of *Microtus* voles and *Apodemus* mice in the diet differed among the species. Diurnal kestrels almost lacked *Apodemus* mice in their diet. However, we also did not find a significant relationship between proportion of *Microtus* voles in their diet and its availability in the field, which was probably caused by presence of alternative insect and bird prey in the city. Urban Long-eared owls showed a positive relationship between *Microtus* voles in diet and in the field, but they exploited *Apodemus* mice during bad vole years. Forest populations of Boreal and Tawny Owl showed strong positive relationships between the proportion of *Apodemus* mice in diet and its availability in the field. However, this relationship was not found for *Microtus* voles. Our results suggest that *Apodemus* mice in Central Europe are due to their nocturnal activity more suitable prey for owls compared to cathemeral *Microtus* voles. Our suggestion is supported by positive relationships in Boreal and Tawny Owl between reproductive output and field availability of *Apodemus* mice.

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#### **Preliminary molecular analysis of the Eurasian Curlew (*Numenius arquata*): is the Iberian breeding population different?**

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The Iberian Peninsula harbours an "Endangered" population (3-5 breeding pairs) of Eurasian Curlew (*Numenius arquata*), located in Galicia (NW Spain). This population has been present in Iberia since, at least, the beginning of the 20th century. Here we aim to shed light to the phylogeographic context of this population, and quantify the current levels of genetic diversity. We sequenced one mitochondrial gene, and two nuclear introns for Eurasian Curlew sampled during the breeding season in Spain, Germany, Sweden and Russia. Overall, we observed low genetic variation among loci, including a monomorphic intron. The results of the mtDNA suggest that the species suffered a recent population expansion and both, mtDNA and nDNA, do not show differentiation between the Iberian population and the nominal subspecies. The Iberian birds share a single mtDNA haplotype, which is the most common among populations, and the four nDNA haplotypes present in Iberian birds are shared with other populations, including the far most Siberian Curlew (*N. a. orientalis*). Despite this lack of differentiation from other Curlew populations, we find evidence for a lack of variation in the Iberian genepool during the last decade, which suggests no current recruitment from other populations, and thus a risk of regional extinction. Given that, and following the IUCN guidelines, we argue that the conservation status of this population should be urgently updated to "Critically Endangered". So, a management/recovery plan should be immediately implemented.

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### **Not just a black and white issue: The role of *ASIP* expression in plumage colouration in the Black Sparrowhawk.**

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The Black Sparrowhawk (*Accipiter melanoleucus*) is a widespread sub-saharan African raptor. Adults occur in two distinct plumage morphs, which differ in the extent of white plumage on the neck, chest and belly, while juveniles have rufous plumage distinct from that of adults. The genetic basis of the plumage polymorphism in this species is currently unknown, but is believed to be caused by differences in the production and distribution of the pigments eumelanin and pheomelanin. This study aimed to compare the expression of five candidate genes involved in the melanin production pathway (melanogenesis) in developing breast feather tissue between adult dark and light morph birds and juvenile birds. The five candidate genes were cloned and sequenced, and expression of four out of the five genes was detected in developing feather tissue. The expression of these four candidate genes was quantified by RT-qPCR, and preliminary results show that *agouti signalling protein* (*ASIP*), a negative regulator of melanogenesis, is expressed at higher levels in juvenile and adult light morph breast feathers than in adult dark morph feathers, while *tyrosinase* (*TYR*), a key melanogenesis gene known to be regulated by *ASIP* in other species, is expressed at correspondingly lower levels in juvenile and light morph feathers than in dark morph breast feathers. This suggests that *ASIP* plays a role in regulating melanogenesis in black sparrowhawk, and that differential expression of *ASIP* may play a role in the plumage polymorphism seen in this species.

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### **Thermal impact of ospreys' wing color on their flight performance**

Svana Rogalla<sup>1</sup>, Matthew Shawkey<sup>1</sup>, Liliana D'Alba<sup>1</sup>

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Flight performance is a critical aspect of avian biology. Therefore, it is surprising that the effects of wing coloration on flight have not been tested. In this study, we test whether darker coloration of upper wings directly exposed to solar radiation enhances warming, thereby reducing the drag force and improving flight performance. The western osprey (*Pandion h. haliaetus*) is a long distant migrant, mostly wintering in sub-Saharan Africa. Interestingly, the larger female ospreys show a darker wing coloration than males. A more rapid temperature increase on the upper wing could compensate for higher energetic costs during their long flights. We tested the thermal impacts of ospreys' wing color in three steps. First, we modeled the wing temperature during flight for differently colored wings. Secondly, we took standardized thermograms of juveniles in a hacking tower to find temperature variance in differently colored body parts under natural environmental conditions. And third, we measured the heat load of differently colored feather samples that were heated up by a bulb imitating direct solar radiation. This study may therefore address a new important factor in avian flight and migration.

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### Where the European Robin *Erithacus rubecula* breeds in primeval forest (Białowieża National Park)?

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Although the European Robin *Erithacus rubecula* is a common and widespread species in Europe and parts of Asia, there is amazingly little information in the literature about its breeding biology and ecology. Furthermore, part of the data comes from highly transformed environments, where it could be difficult to observe the bird's behaviour as a result of natural adaptations. The aim of this study is to characterize nest sites of the European Robin in the primeval forest in Białowieża National Park (BNP). The study was conducted in 2016-2017 on three sample plots, in the strict reserve in BNP. The choice of sample plots had been dictated by consideration of main forest's types, diverse structure and location. The numbers of pairs and their location of territories on sample plots were evaluated by direct observation. Birds were individually marked with coloured rings. Nest sites was characterized by location and parameters of a hole or other type of a nest. Nest height above the ground, nest hiding degree, species of tree (bush) and tree state were recorded. In the case of the tree-hole also others parameters was determined. Preliminary analyses in the BNP indicate that in the primeval conditions of oak-hornbeam forest Robin mostly nests in tree-holes whereas in wet ash-alder forest it prefers other type of nesting places like root-patch. Most of nests was located up to 2 m above the ground.

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### Metal pollution effects on micronutrient profiles in two free-living passerines supplemented with calcium

Sandra Ruiz<sup>1</sup>, Silvia Espín<sup>1,2</sup>, Pablo Sánchez-Virosta<sup>1,2</sup>, Juha-Pekka Salminen<sup>1</sup>, Thomas Lilley<sup>1</sup>, Tapio Eeva<sup>1</sup>

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Vitamins and carotenoids are essential micronutrients for growth, antioxidant defense and calcium metabolism in free-living birds. Thus, deficiency may compromise the development of young nestlings. Moreover, such deficiency can be intensified in populations inhabiting environments polluted by metals. We therefore investigated the effect of air metal pollution on plasma micronutrient profiles in two passerines with different calcium requirements. For this, vitamins and carotenoids were quantified from blood plasma of great tit (*Parus major*)

and pied flycatcher (*Ficedula hypoleuca*) nestlings. Metal concentrations were measured from feces of the same nestlings and from soil samples around a copper-nickel smelter, to assess the metal pollution exposure. Our results indicate that generally higher concentrations of vitamins and carotenoids circulate in blood of great tits than in pied flycatchers. Furthermore, these concentrations were generally found at lower levels in birds inhabiting the polluted zone, suggesting that the two passerine species respond differently to metal-related nutrient disturbance.

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### Cost and benefits of elevated maternal thyroid hormone levels

Suvi Ruuskanen<sup>1</sup>, Tom Sarraude<sup>1</sup>, Bin-Yan Hsu<sup>1</sup>

<sup>1</sup>University of Turku, Turku, Finland

Maternal effects are currently acknowledged as important causes of phenotypic variation, and a potential mechanism to adapt offspring prevalent environmental conditions - thus having a pivotal role in ecology and evolution. Hormones, such as steroid hormones, transferred from the mother are a key mechanism underlying maternal effects, affecting phenotype, physiology and fitness. In biomedical research, maternal thyroid hormones (THs: thyroxine, T4 and triiodothyronine, T3), have been shown to be of critical importance on child development, but they have been largely ignored in ecological research. We previously showed that in birds, maternally-derived hormones in eggs vary in relation to key environmental factors. To understand the consequences of such variation, we studied the effects of maternal THs on offspring development in an avian model, the Japanese quail (*Coturnix japonica*). We experimentally elevated egg TH levels within natural range. Elevated egg THs showed both benefits and costs for the offspring: Elevated pre-natal TH levels improved hatching success, but simultaneously increased intracellular oxidative stress. If not counteracted by antioxidants, oxidative stress can lead to damage to various biomolecules, and ultimately fitness. These findings make THs an interesting mechanism underlying maternal effects, which may shape offspring phenotypes.

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### Epidemiological parameters of parasitic flatworms Digenea (Platyhelminthes, Trematoda) in the area of the mouth of the Odra River during breeding and migration periods of mallard *Anas platyrhynchos*

Izabella Rząd<sup>1</sup>

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There were parasitologically studied 133 mallards acquired in the county of the mouth of the Odra River (NW Poland) in the years 2008 - 2011 (VIII-XI). Occurrence of trematodes in mallards was compared between post-breeding (August to the first days of September; 67 mallards) and autumn migration periods (IX-XI; 66 mallards). Species structure is similar in both periods - includes 18 species, 16 of which are common to both study periods. The prevalence in both periods is high, amounts to 95.52% in mallards during post-breeding period and 90.90% during the migration period, while intensity of infection respectively 40.36 and 28.43. During the post-breeding period the most mallards are infected by *Bilharziella polonica* (prevalence 70.15%, intensity of infection 29.79), *Echinostoma revolutum* (56.72%, 7.61) and *Notocotylus attenuatus* (41.79%, 5.96); in the migration period *B. polonica* (59.09%; 19.33), *N. attenuatus* (50%; 6.30) and *Echinoparyphium recurvatum* (30.30%; 10.60). Ducks in the post-breeding season differ from ducks in the migrating season by higher prevalence of *E. revolutum* (difference between seasons 32.48%), *Hypoderaeum conoideum* (13.31%),



*Prosthogonimus ovatus* (11.72%) and *B. polonica* (11.06%). From the post-breeding season to the period of the autumn migration decreases the intensity of infection for most of the species, mainly: *Leucochloridiomorpha lutea* (from 23.80 to 4.00), *Parastrigea robusta* (from 15.20 to 1.00), *Psilotrema simillimum* (from 8.00 to 3.33), *B. polonica* (from 29.79 to 19.33), *H. conoideum* (from 8.71 to 2.60), and increases the intensity of infection by *Australapatemon minor* (from 9.52 to 12.94) and *E. recurvatum* (from 3.94 to 10.60).

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### Vocalizations of *Notiocyhla* reed warblers

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Acrocephalid reed warblers are among the most complex and variable singers in songbirds. They are also the most monomorphic passerines which make them difficult to identify and the most reliable marker for their field identification is the song. Using the comparison of molecular and acoustical data we might have a glimpse of how this structurally complex songs have evolved. We analyzed time-and-frequency parameters of songs of 5 species from subgenus *Notiocyhla* that includes species with richest repertoires. It appears that the basal species of the group, the Blyth's reed warbler (*Acrocephalus dumetorum*), tend to have longer elements and pauses between them and less variability of elements. Discriminant analysis showed that two species of the basal group are distinguished quite clearly while the division of the rest is not that clear. Still, there are also some interesting trends there as well. For example, two subspecies of Paddyfield warbler (*A. agricola*) are divided quite clearly while the sister species Blunt-winged warbler (*A. concinens*) is not clearly distinguished from *A. agricola septima*.

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### Sex ratio at hatching of wild ducklings in the south of Western Siberia

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There is growing evidence that offspring sex ratio in some avian species differs from equality and evidence that females are able to modify the sex of their offspring. Bias in sex ratio may be driven by both environmental and internal factors. Most ducks have a male-biased adult sex ratio although some studies have shown that offspring sex ratios tend to be equal. We tested selected reproductive and environmental factors with potential influence on sex ratio at hatching of ducklings. The location of the study was Krotovo Lake, Western Siberia, Russia (53.72 N; 77.88 E), where a long-term study of breeding ecology has been carried out since 1970. We determined the sex of 1557 one-day-old ducklings of Mallards (*Anas platyrhynchos*), 384 - Gadwall (*A. strepera*), 1280 - Common Pochards (*Aythya ferina*), and 2093 - Tufted Ducks (*Ay. fuligula*) by cloacal examination between 1986 and 1988, and between 1995 and 2005. There were no significant differences in mean body mass and size between male and female ducklings, hence similar resources were invested into each of the sexes. The sex ratio of complete broods and broods with partial mortality did not differ significantly. The sex ratio did not vary in relation to local and global (NAO) environmental conditions, hatching date, and clutch size. Significant variation in the sex ratios among years was not found, but the proportion of sons increased with increasing nest numbers in all species, except Gadwall.

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### Do Rooks of one breeding colony winter together in the same flock?

Valentyn Serebryakov<sup>1</sup>, Igor Davydenko<sup>1</sup>, Vadym Ianenko<sup>1</sup>

<sup>1</sup>*Shevchenko National University, Kiev, Ukraine*

During our spring expedition in the Lower Danube River region it was recorded that different breeding Rook colonies were occupied by birds in different time even those which were close to each other. In this southern part of Ukraine Rooks are breeding and migratory species which winter grounds are proved with ringing in Balkan countries. In winter in the Lower Danube River region there are many Rooks which came from the North, but they do not breed here. The question is why all nests of one colony are occupied by birds while on the colony 1 km aside there is no bird at all? If birds of one colony are wintering in different places how they can arrive to their colony at the same time? Maybe they winter together and their colony instinct prolongs during wintering period? Only special studies can clarify this phenomenon.

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### Breeding success depends on the total nest density in open-nesting passerines

Dmitry Shitikov<sup>1</sup>, Tatiana Vaytina<sup>1</sup>, Tatiana Makarova<sup>1</sup>, Svetlana Fedotova<sup>1</sup>, Vera Volkova<sup>1</sup>, Stanislav Samsonov<sup>1</sup>

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A large part of the variation in the bird reproductive success is often explained by nest predation. Many studies report negative link between breeding density and reproductive success. In this study, we tested the hypothesis that the total nest density should affect nest predation stronger than density of single species. We used a large sample (n=320) of Booted Warbler *Iduna caligata* and Whinchat *Saxicola rubetra* nests obtained during six years in abandoned fields. We used the distances to the nearest conspecific neighbor and to the nearest neighbor of any passerine species as measures of the conspecific density and the total density, respectively. To evaluate temporal scale of nest predation, we further analyzed the effect of nearest simultaneously existing nest distances. We found strong evidence that density affects reproductive success. Both species nests were more likely to be predated when neighboring nests were closer. Whinchat and Botted Warbler daily nest survival rates were better predicted by heterospecific nearest neighbor distances. Only distance to the nearest simultaneously existing neighbor affected nest survival of Booted Warbler significantly. Both species total nest predation rates predicted by nest density rather than partial nest predation rates. We suggest that generalist predators performed area-restricted search after finding a nest may play an important role in nest predation in abandoned fields. The study was funded by Russian Foundation for Basic Research, grant number 16-04-01383

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### Effects of ephemeral stream vegetation clear-cutting on bird diversity in the Northern Negev, Israel

Eyal Shochat<sup>1</sup>, Or Sitkov<sup>1</sup>, Adi Domer<sup>1</sup>, Ofer Ovadia<sup>1</sup>

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At the semi-arid Northern Negev desert, most of the vegetation grows along ephemeral streams, providing birds with nesting sites, shelter, food, and adequate microclimate conditions for feeding and breeding. During

the last decade, the Israeli Drainage Authority began clear-cutting natural vegetation along various ephemeral streams in this area. Whereas this activity may reduce flood negative outcomes, it also results in habitat loss for various bird species. We explored clear-cutting effects on bird species abundance, richness and diversity (Fisher's alpha). Birds were surveyed monthly (July 2014 – May 2015) using line transects in disturbed (clear-cut) and adjacent natural corridors. Temperature, radiation and humidity were also measured along these transects. Bird abundance, richness and diversity were all higher in vegetated than in clear-cut corridors. Bird community composition also varied between the vegetated and clear-cut corridors, resulting in a shift from woodland- to ground-dwelling bird community. The most contributing species to this dissimilarity were House Sparrow (8.51%), Collared Dove (7.54%), Common Myna (7.10%), Chiffchaff (5.31%), Spur-winged Lapwing (4.95%), Crested Lark (4.47%) and Spanish Sparrow (3.97%). Three species highly associated with tamarisk forest (Chiffchaff, Olivaceous Warbler, Willow Warbler), were more abundant in the vegetated corridors. Based on these results, we suggest that ephemeral stream management should conserve riparian vegetation along streams. Our results can help formulating an effective conservation plan for riparian bird species in this fragile ecosystem, particularly for the endangered Trumpeter Finch and Rufous Bush Robin, which have substantially declined during the last decades.

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### Large-scale surveys of roding woodcocks (*Scolopax rusticola*) in Central Europe

Andreas Skibbe<sup>1</sup>, Andrzej Batycki<sup>1</sup>, Artur Golawski<sup>2</sup>, Tomas Kniola<sup>1</sup>, Bogdan Kotlarz<sup>1</sup>, Kathrin Schidelko<sup>3</sup>, Darius Stiels<sup>3</sup>, Mateusz Szymanski<sup>1</sup>

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Surveys of the woodcock are often accompanied by several methodological problems that lead to abundance estimations with unknown errors. Especially large-scale population data on country level are probably often underestimated and difficult to compare due to differing methodologies. In order to assess large-scale population data we determined relative densities of woodcocks in extensive forests (n=45) between western Germany and eastern Poland based on 84 single surveys. We define the relative density as the number of roding males per evening and plot. Surveys took place during suitable weather conditions and were restricted to the main breeding period in order to exclude migrants. The average relative density was 4.7 males per evening (0-11 individuals). Our results indicate that the density depends on local habitat factors rather than on geographical location. Comparison between small-scale synchronous point counts and parallel surveys of relative densities allow for a conversion of relative to effective abundances. First results indicate large scale densities that are noticeably higher than previously known. Thus, published population sizes for Germany and Poland point to largely underestimated numbers of breeding birds. Our data indicate that large-scale densities for Central Europe are rather in an order of magnitude which has been shown for Great Britain based on a similar methodology. Over the next few years, the calculation of conversion factors is going to be verified by a larger sample size and the number of surveys is going to be increased while spatial gaps in the sampling design will need to be filled.

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### Phenotypic flexibility of digestive organs during staging in a long-distance migrant

Julia Slezacek<sup>1</sup>, Tess Handby<sup>1</sup>, Richard Inger<sup>1</sup>, Stuart Bearhop<sup>1</sup>

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Avian long-distance migration is not only fascinating for the great distances that individuals travel, but also for their phenotypic flexibility. During migratory periods, long-distance migrants can reorganise the architecture of digestive organs in response to changes in their environment. Some species of shorebirds atrophy their gut before migrating, presumably to reduce costs of carrying these expensive organs during flight. However, measuring changes in digestive organ size in wild birds is difficult. To study the phenotypic flexibility of organ architecture prior to migratory departure, we focus on the stopover behaviour of a High Arctic migrant, the light-bellied Brent goose (*Branta bernicla hrota*), in Alftanes (Iceland). We investigate whether digestive organs atrophy by collecting individual focal samples and building mass trajectories through visual assessment of fat deposition of individually marked birds. Geese that atrophy digestive organs prior to departure are expected to decrease intake rates and defecation rates before peak-mass is reached. Additionally, individuals are expected to rest more to allow restructuring of digestive architecture. Our preliminary data suggests that birds reaching a plateau in fat deposition just before departure reorganise digestive organs to gear up for a 3000km flight to the High Arctic where they continue relying on endogenous resources until fledging of offspring. With our non-invasive study, we contribute to the understanding of nutritional and digestive adaptations to avian migration. Knowledge gained on the flexibility and rapid changes in organ size may be relevant to a range of other research areas including cell proliferation, cell death and obesity in humans.

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### From one extreme to another: Svalbard snow buntings winter in the Western Steppe

Katherine Snell<sup>1</sup>, Kasper Thorup<sup>1</sup>, Frode Fossay<sup>2</sup>, Arne Moksnes<sup>2</sup>, Bård Stokke<sup>2</sup>

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The Svalbard population of snow buntings (*Plectrophenax nivalis*) the most northerly breeding passerine, were tracked using geolocators. We reveal that they not only breed in environmental extremes but spend the winters in the severe cold of the Siberian steppe. Migratory movements of birds breeding near Longyearbyen, Svalbard reveal a flexible strategy with wintering grounds in the Asian western Steppe, utilising vast crop- and grasslands while enduring low ambient temperatures. Timings of significant long distance movements were consistent between individuals and the routing of the >1000 km open water flight incurred favourable wind assistance and less potential precipitation compared to the shorter alternative. These snow buntings exhibit adaptations to sustain their breeding niche in the circumpolar Arctic by utilising resources of the Asian Steppe, in contrast to more southerly European breeding populations that winter in the temperate conditions of the Atlantic coast.

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### Avifauna and ornithocomplexes of Natural Reserve "Birds harbor" in urbanized territories zonobiom steppe of Northern Eurasia

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"Birds harbor" is one of a few Natural Park of Russia, which stay in the center of city Omsk and has the status of regional importance. We met 62 bird species in Natural Reserve "Birds harbor" from 2013 to 2015. Natural Reserve is a habitat for rare and endangered species, which included in the Red Book. There are nesting species: Red-necked grebe, Little bittern, Eurasian kingfisher, Thrush nightingale; species flying over: Great

egret, Whooper swan, Mute swan, White-tailed eagle; and wintering species: Snowy owl and Long-tailed rosefinch. Also was research abundance of Caspian gull and in a period of 2015 was marked that number of Caspian gull doubled, because improved effort of custom mode. Number of Black-headed gulls is increasing threefold every year, because of the improved biotical condition of restored wetlands in Natural Reserve “Birds harbor”. In spring-summer period we counted 96 chicks of Black-headed gull and 98 chicks of Caspian gull. We used metall Russian rings and plastic yellow and white rings in 2015. In the result, in Februar 2016 an Indian birdwatcher found Caspian gull, which had our yellow ring HC101 on a coast of Arabian Sea (state Karnataka, India). Thus, perspective of further researches of avifauna and ornithocomplexes in Natural Reserve “Birds Harbor” in urbanized territories zonobiom steppe of Northern Eurasia is research season dynamic of number avifauna. Here rare and dominant birds are indicator of anthropogenic influence on natural landscapes.

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### Avian species distribution models: current state, challenges, and opportunities

Darius Stiels<sup>1</sup>, Jan O. Engler<sup>1,2</sup>, Kathrin Schidelko<sup>1</sup>, Diederik Strubbe<sup>2,3</sup>, Petra Quillfeldt<sup>4</sup>, Mattia Brambilla<sup>5,6</sup>

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Understanding the factors and processes behind the extent and limits of species distributions fascinates scientists since the beginning of ecological research and forms the heart of biogeography. One of the major developments of current biogeography are species distribution models (SDMs) – empirical models that link species occurrence data with spatial environmental information. These models have led to thousands of studies over the past decade spanning the entire tree of life, and birds are among the most prominent study organisms. This corresponds with the general high interest in ornithology leading to a large number of freely accessible bird occurrence data. Despite their popularity for ornithological studies, SDMs suffer from a number of methodological and conceptual criticisms but also provide us with a lot of opportunities to learn more about past, current, and future species distributions – if data and tools are handled with care. To this end, we review the current state of avian SDMs and point to challenges and future opportunities for a number of typical applications, ranging from conservation and biological invasions, to modelling seabirds, to more general topics such as modelling avian diversity, niche evolution and seasonal distributions at a biogeographic scale. We finalize our review by highlighting general shortcomings and giving an outlook to future prospects and synergies with other disciplines.

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### Foraging strategies in city-dwelling birds under fluctuating conditions

Miqkayla Stofberg<sup>1</sup>, Susan Cunningham<sup>1</sup>, Arjun Amar<sup>1</sup>, Robert Thomson<sup>1</sup>, Petra Sumasgutner<sup>1</sup>

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Current rates of urbanisation pose a major threat to biodiversity. Some species cope well with the urban environment, especially those capable of exploiting anthropogenic food resources. However, abundantly available urban food items might be of lower quality than the natural diet, which could have negative health impacts. The natural diet of Red-winged Starlings (*Onychognathus morio*) consists mainly of fruit and invertebrates, but the

species is highly opportunistic and known to heavily exploit low-quality anthropogenic food resources. Our study population is resident at the campus of University of Cape Town, South Africa, where food availability exhibits high temporal fluctuation in relation to the academic calendar ('human days': high availability of anthropogenic food during semester terms and week days vs. 'non-human days': low availability of anthropogenic food during holidays and weekends). These temporal fluctuations in food supply provided the platform for a natural experiment to focus on the impact of highly variable nutrition (quality and quantity) on foraging behaviour and daily body mass gain. For this purpose we colour ringed (to date 98 individuals) and trained habituated starlings of the campus population to stand on a scale to measure their daily mass gain between human days and non-human days. Additionally, we quantified their time spend foraging and the proportion of anthropogenic and natural food items via focal observations. Indeed, starlings spend more time foraging on non-human days (42% versus 30%), but gained more weight when the proportion of anthropogenic food items was high.

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### **Taxonomic revision of the genus *Synallaxis* Vieillot, 1818 (Passeriformes: Suboscines: Furnariidae)**

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The Neotropical genus *Synallaxis* Vieillot, 1818 encompasses 12% of the species of Furnariidae. It is one of the largest and most widely distributed genus of the family. According to contemporary literature, the genus *Synallaxis* is formed by 36 valid species and about 58 additional valid subspecies. The aim of our study is to review the taxonomy of the genus based on morphology. To reach this purpose we have analyzed about five thousand taxidermized specimens, including the majority of the types, belonging to 30 scientific collections. All color patterns were mapped and the morphometric data received statistical treatment. Our results pointed to 38 valid species of *Synallaxis*, including the taxa *S. omissa*, *S. terrestris*, *S. carri*, *S. fulviventr*, *S. chinchipensis* and *S. atrigularis*, which were previously treated as subspecies. The other subspecific taxa and some species, that are currently considered as valid, were synonymized due the lack of diagnosis. Furthermore, this revision brought to the light the necessity of many nomenclatural acts such as the designation of neotypes to the names *S. gujanensis* (Gmelin, 1789); *S. maranonica* Taczanowski, 1879; *S. brachyura* Lafresnaye, 1843; *S. moesta* Sclater, 1856, and the substitution of the name *S. cinnamomea* Lafresnaye, 1843 by the name *S. laemosticta* Sclater, 1859. Lastly, this study has indicated that further investigations, involving additional approaches (e.g. molecular, bioacoustics), are necessary to reach a better understanding of the causal processes behind the complex geographical pattern presented by some of the studied taxa, such as *S. albescens* and *S. azarae*.

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### **Male quality and brood sex ratio: does extra-pair paternity explain the variation in effect sizes?**

Eszter Szász<sup>1</sup>, László Zsolt Garamszegi<sup>2</sup>, Balázs Rosivall<sup>1</sup>

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It has been repeatedly argued that females may benefit from overproducing male offspring when mated to an attractive partner, because future reproductive success of sons may be more dependent on attractiveness, than that of daughters. However, the relationship between male quality and brood sex ratios varies strongly among

songbird species. The reason for this variation is not yet clear, however, differences in the ecological or social environment may provide some explanation. For example, the degree of extra-pair paternity varies strongly among species and populations. The presence of extra-pair young in the broods may reduce the adaptive value of adjusting sex ratio to the social mate's phenotype because extra-pair young will inherit attractiveness genes from another male. Using meta-analytic approach and controlling for phylogenetic relatedness, we tested if the effect size for the relationship between mate attractiveness and offspring sex ratio is indeed smaller in populations where the proportion of extra-pair paternity is larger. Though there was considerable variation in the effect sizes, our results did not support the prediction. The mean effect sizes were small, but significantly different from the null expectation, suggesting that male attractiveness may play a role in sex ratio adjustment.

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### **Haemoproteus infection status of collared flycatcher males changes within a breeding season**

Eszter Szöllősi<sup>1</sup>, László Zsolt Garamszegi<sup>2</sup>, Gergely Hegyi<sup>1</sup>, Miklós Laczi<sup>1</sup>, Balázs Rosivall<sup>1</sup>, János Török<sup>1</sup>

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In ecological studies of haemosporidian parasites, prevalence is typically considered as a stable attribute. However, little is known about the possible within-host dynamics of these parasites that may originate from environmental fluctuations, parasite life cycles and the ability of hosts to suppress or clear infection. We sampled the blood of male collared flycatchers *Ficedula albicollis* twice within a breeding season and investigated the determinants of initial infection status and change in infection status. We found that older males tended to be initially more infected at courtship. Change in infection status was unrelated to male traits but a widespread disappearance of *Haemoproteus pallidus* infection from the blood was detected between courtship and nestling rearing. The probability of change in infection status increased with the time elapsed between sampling occasions. This suggests that the disappearance of infection from the blood was due to either an active parasite suppression mechanism, or the beginning of the latent phase in the parasite life-cycle. Initial infection status or disappearance of infection from the blood showed no correlation with breeding success. These results show that *H. pallidus* infection status and thus prevalence are dynamically changing attributes and this has widespread practical and ecological implications.

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### **Understanding variability in bird stress responses**

Zulima Tablado<sup>1</sup>, Yves Bötsch<sup>1</sup>, Veronika Bókony<sup>2</sup>, Ádám Zoltán Lendvai<sup>3</sup>, Frédéric Angelier<sup>4</sup>, Lukas Jenni<sup>1</sup>

<sup>1</sup>*Swiss Ornithological Institute, Sempach, Switzerland;* <sup>2</sup>*Lendület Evolutionary Ecology Research Group, Plant Protection Institute, Centre for Agri-cultural Research, Hungarian Academy of Sciences, Budapest, Hungary;* <sup>3</sup>*Department of Evolutionary Zoology, University of Debrecen, Debrecen, Hungary;* <sup>4</sup>*Centre d'Etudes Biologiques de Chizé, CNRS, Villiers en Bois, France*

Human outdoor activities are increasing in diversity and intensity throughout the world, leading to an ever-increasing number of human-bird encounters. These encounters often cause stress in wild birds, which in turn may have consequences for their body condition, breeding activity, or survival. Scientists and conservationists are getting concerned about the consequences of this increase in "threatening" situations. Therefore, numerous studies about stress responses (behavioural and hormonal) in birds are being performed. However, in order to correctly interpret the observed variability in hormone levels and behaviour it is important to first understand the

effect of factors, other than human presence, modulating adrenocortical and behavioural responses in wildlife. The objective of this study was, thus, to investigate the factors affecting stress responses in birds. We analysed literature data on stress responses (i.e. corticosterone levels and flight initiation distance) of birds from different species, habitats, and seasons. Our results, although preliminary, showed important variation in the way birds respond to stressful situations according to species-specific characteristics and life-history traits, habitat and season. These findings could have important implications for the interpretation and prediction of actual impacts of human disturbance on wildlife.

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### **Nigeria Bird Atlas Project (NiBAP) mapping the distribution of birds in Nigeria**

Talatu Tende<sup>1</sup>, Sam Ivande<sup>1</sup>, Ulf Ottosson<sup>1</sup>

<sup>1</sup>*A.P. Leventis Orn. Res. Inst, Department of Zoology, University of Jos, Jos, Plateau, Nigeria*

NiBAP is an initiative of the A.P. Leventis Ornithological Research Institute (APLORI), University of Jos, Nigeria with technical support from the Animal Demography Unit (ADU), University of Cape Town. The project primarily aims to update the distribution of birds and publish a bird atlas for Nigeria with the help and valuable input from Citizen Scientists, and also to contribute to improve local capacity and increase conservation and environmental awareness in Nigerian citizens. The methodology for NiBAP is largely adapted from the ongoing Southern Africa Bird Atlas Project (SABAP2). The basic protocol involves spending at least two hours in a pentad to record every bird species encountered on a list. The unit of data collection is small grid square known as a 'pentad' which measures 5 x 5 minutes of latitude and longitude which translates to 9 km x 9 km. There are 11,141 pentads across Nigeria. Species, both resident African birds and migrants, are recorded in the order that they are encountered and from as many habitats as possible within the pentad. Observation can proceed beyond the minimum two hours although completion of every observation hour should be noted by drawing a line on the list. So far about 15 states have been visited during our outings, 634 cards from 466 pentads have been submitted by 42 observers, though more than 100 people have been involved in fieldwork. With time the result will be analyzed in view of climate change and anthropogenic effects.

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### **Survival and habitat use of the endangered Yellow-breasted Bunting in Far East Russia**

Alexander Thomas<sup>1</sup>, Wieland Heim<sup>2</sup>, Johannes Kamp<sup>2</sup>

<sup>1</sup>*University of Leipzig, Leipzig, Saxonia, Germany;* <sup>2</sup>*Westfälische Wilhelms-Universität Münster, Münster, North Rhine-Westphalia, Germany*

The Yellow-breasted Bunting was once one of the most populous birds of the Palearctic, but in the last decades the population has crashed by 90 % and the breeding range has retracted by 5000 km to the east. Since 2013 this species is listed as ENDANGERED by the IUCN. The large-scale trapping in China during migration contributes heavily to the decline of this species, but data on possible threats on the breeding grounds is virtually lacking. Dam constructions and global warming are causing the Amur river valley to dry out and manmade wildfires annually burn large areas in the region, possibly affecting breeding bird populations. Since 2013 the Amur Bird Project examines the ecology of the Yellow-breasted Bunting on its breeding grounds in Muraviovka Park, Far East Russia. A colour-ring project was started in 2015 to estimate survival rates. In spring 2016 we conducted extensive territory mapping and recorded habitat parameters at points of presence. We found that more than 90% of the territories are situated in low (<2m) willow shrubs in the wetlands. Fire did not negatively impact re-occupation of territories from the previous year in willow shrub habitat, but it might have a negative



impact in Artemisia-steppes. Males showed a high return rate (43%), and occupied their former territories even if they were burned. The continuation of this project is going to be the basis for future population viability analysis.

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### Next-generation insights into the Blackbird blackbox

Dieter Thomas Tietze<sup>1</sup>, Daronja Trense<sup>1</sup>, Sven Koglin<sup>1</sup>, Michael Wink<sup>1</sup>

<sup>1</sup>Heidelberg University, Heidelberg, Germany

The Common Blackbird (*Turdus merula*) is one of the most common bird species in Europe. It has independently populated many cities and other human settlements in the last 200 years. The Blackbird is furthermore a partial migrant: Populations further southwest in Europe and urban populations tend not to migrate in contrast to more continental and shy forest populations. Recently, this passerine species turned out to be among the most susceptible to USUTU virus infection. For all these reasons, the Blackbird has been intensively studied. Nevertheless, neither a reference genome nor transcriptome has been made publicly available to study the genomics and functional genomics of the various adaptive and phenotypic differences observable between and within species. We extracted total RNA and sequenced mRNA from 14 different tissues from urban and rural Blackbirds as well as genomic DNA. We assembled and annotated a *de novo* transcriptome and a draft genome, but also mapped reads on the genomes of well investigated species. We present preliminary results of our first downstream analyses.

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### Potential spatio-temporal mismatching in trophic relationships of Alpine Chough (*Pyrrhocorax graculus*) in North-Western Italy

Cristina Vallino<sup>1</sup>, Enrico Caprio<sup>1</sup>, Fabrizio Genco<sup>1</sup>, Dan Chamberlain<sup>1</sup>, Claudia Palestini<sup>1</sup>, Angela Roggero<sup>1</sup>, Rolando Antornio<sup>1</sup>

<sup>1</sup>University, Turin, Piedmont, Italy

Climate change has already had significant impacts on animal communities including habitat loss and phenological mismatches. Mountain ecosystems are expected to be particularly subject to the effects of global warming, but the impacts on bird populations inhabiting these environments are poorly known. This project concerns the potential mismatching between the Alpine Chough (AC), a widespread mountain bird species that occurs almost exclusively above the treeline, and grasshoppers, their most important food source during the reproductive period. A pilot study carried out in summer 2016 in North-Western Italy showed that AC decreased while grasshoppers increased with altitude. This may lead to a potential spatio-temporal mismatch between AC and grasshoppers. We also observed that local ACs didn't feed only on natural grasslands and pastures, but rather they exploited human food scraps (e.g. at bars and restaurants). In assessing these dynamics, it is clear that further studies need to evaluate the influence of human food sources on the behaviour and body condition of the individuals and on the Choughs' spatio-temporal responses to natural grasshopper prey by comparing populations subject to different levels of anthropogenic influence. We will assess: i) the abundance of grasshoppers along altitudinal transects; ii) the foraging behaviour, diet, movements and habitat use of Choughs through isotope analysis, radiotelemetry and direct observations; and, iii) individual bird body condition indirectly measured through analysis of contaminants and antioxidant levels in blood plasma and feathers.

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### How a small furnariid cope with a large latitudinal gradient in the Southern Hemisphere?

Rodrigo Vasquez<sup>1</sup>, Esteban Botero-Delgadillo<sup>1</sup>, Veronica Quirici<sup>2</sup>, John Wingfield<sup>3</sup>

<sup>1</sup>*Institute of Ecology and Biodiversity, Faculty of Sciences, University of Chile, Santiago, Chile;* <sup>2</sup>*Universidad Andres Bello, Santiago, Chile;* <sup>3</sup>*University of California at Davis, California, USA*

Much research has been carried out on reproductive, behavioural and physiological traits in Northern Hemisphere passerines, giving place that most if not all generalizations about passerine knowledge come from that hemisphere. Similar research from the Southern Hemisphere is lacking and much needed, particularly if we want to produce world-wide generalizations about avian biology. We have studying the furnariid *Aphrastura spinicauda* inhabiting Patagonian forests in Southern South-America, and have found particular traits and trends not found in other species. At high latitude, this species experiences huge changes in photoperiod, and in the extreme north of its distribution, desert conditions prevail that could also affect its reproduction. Research has found that clutch size increases with latitude, but there is a large variability, possibly due to the cost of producing eggs. Eggs size is much larger than in similar sized northern-hemisphere passerines. Results show that arid environments set a higher cost to reproduction compared to temperate populations. (FONDECYT 1140548)

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### Age-dependent song repertoire size and song sharing in Whinchat

Tatiana Vaytina<sup>1</sup>, Dmitry Shitikov<sup>1</sup>

<sup>1</sup>*Moscow Pedagogical State University, Moscow, Russia*

In many passerines males song repertoire size increases with age. At the same time it often remains unknown when and where males learn new songs. To infer Whinchat song learning strategy we examined the relationship between song sharing among males and geographic distance between their nests. Over four breeding seasons, we recorded 40 singing males, classified their song repertoires, quantified male song sharing and determined age (the second calendar year males or older). Whinchat males had complex repertoires including from 9 to 37 song types. In total 45 song types were allocated. Males' age significantly influenced the repertoire size. The second calendar year (firstly breeding) males had a lower repertoire size than the older males. There were no relationship between males' song sharing and geographic distance between their nests. Thus, Whinchat males do not learn new songs from their neighbors, perhaps they keep songs in memory from last year, or remember new songs on their wintering sites. The study was funded by Russian Foundation for Basic Research (grant number 16-04-01383).

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### Stable isotopes ( $\delta^{13}\text{C}$ , $\delta^{15}\text{N}$ ) in feathers of Kentish Plover (*Charadrius alexandrinus*) breeding in the Iberian coast

María Vidal<sup>1</sup>, Jesús Domínguez<sup>1</sup>

<sup>1</sup>*Universidade de Santiago de Compostela, Santiago de Compostela, Spain*

Geographically segregated breeding populations that exhibit migratory connectivity are predicted to exhibit similar isotopic signatures in autumn or winter grown tissues, as feathers. Such patterns in isotopic signatures

are frequently interpreted as evidence for migratory connectivity, but they could also arise if individuals winter at different sites but exploit isotopically similar diets. We performed carbon ( $\delta^{13}\text{C}$ ) and nitrogen ( $\delta^{15}\text{N}$ ) isotope measurements on flight feathers (outer primary, P1) of 44 Kentish Plover (*Charadrius alexandrinus*) adults (17 males and 27 females) breeding along the Spanish Mediterranean coast (18 birds) and the Spanish and Portuguese Atlantic coast (26 birds). Plovers were captured at nest using a funnel-trap. Plovers nesting on the Mediterranean coast and the Atlantic coast of southern Spain showed greater variability in isotope values than northwestern plovers, both in  $\delta^{15}\text{N}$  (10.5 to 20.9 vs. 12.6 to 15.9) and  $\delta^{13}\text{C}$  (-21.9 to -6.2 vs. -16.8 to -11.9). This suggests a greater fidelity of northwestern plovers to coastal environments, previously corroborated by ringed birds. In Mediterranean and southern plovers the isotope variability may be due to different individual strategies, with birds making latitudinal movements in coastal environments, and others moving to freshwater environments, implying  $\delta^{13}\text{C}$  isotope values lower than those of coastal areas. The northwestern Iberian breeding population showed a moderate increase between 1988 and 2009, although more recent counts (2014-2015) reflected a troubling decline. These isotopic results suggest the need for a supranational management of this population, given the connectivity previously suggested by genetic analysis and recoveries of banded birds.

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### Effects of EU „greening" on bird diversity in two landscapes in Latvia

Viesturs Vigants<sup>1</sup>, Oskars Keišs<sup>1</sup>, Laura Sutcliffe<sup>2</sup>, Péter Batáry<sup>2</sup>, Ainārs Auniņš<sup>1</sup>

<sup>1</sup>University of Latvia, Riga, Latvia; <sup>2</sup>University of Göttingen, Göttingen, Germany

The study was done in 2016 in two sample plots with 60 points for bird counts and 180 points for invertebrate samplings at 2 locations in Latvia – Jelgava (intensive agriculture for Latvian conditions) and Skulte (moderate to non-intensive agriculture for Latvian conditions). At each location there were observation points attributed to one of 3 treatments – (1) for legume fields in 2016; (2) for legume fields in 2015 (previous season) and (3) no legume fields neither in 2015, nor in 2016. We collected about 2329 data points for birds (2,329 individual bird observations of 79 species) and collected approximately 45,000 invertebrate specimens (including ca. 13,000 spiders of at least 80 species and ca. 25,000 beetles of at least 50 species – the analyses of invertebrate data are still in progress). Bird species richness estimated by Shannon-Wiener index was higher in Skulte in comparison to Jelgava comparing both – all species and farmland species only. Legume fields 2016 has also higher Shannon-Wiener index in Jelgava for both – all bird species and farmland species only, and higher value for all bird species in Skulte plot (not for farmland bird species at Skulte). Bird species richness in Latvia is influenced more prominently by the landscape, not by the “greening” treatment.

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### The Danish Bird Atlas III - preliminary results

Thomas Vikstroem<sup>1</sup>

<sup>1</sup>DOF/BirdLife Denmark, Copenhagen, Denmark

Three and a half years into the four year Atlas III Project we are able to present preliminary results of population estimates for a few species. So far, 360,000 observations have been entered into the atlas database by 1,432 volunteers. One positive result is the population increase and distribution expansion of Raven *Corvus corax*. Also the Common Wood Pigeon *Columba palumbus* so far has experienced a large population increase. Preliminary winter population estimates of seven of the most common Danish birds indicate that 3.5-4.1 mill. individuals of Tree Sparrow *Passer montanus* overwinter in Denmark. With one winter season left we will work

towards covering the data gaps. This will be possible e.g. by arranging a winter weekend for many participants in an area of low coverage.

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### **Large scale variation in demography and population dynamics of a long-distance migratory bird – the Barn Swallow**

Jan A.C. von Rönne<sup>1</sup>, Ulrich Köppen<sup>2</sup>, Heikki Lokki<sup>3</sup>, Sönke Martens<sup>4</sup>, Pertti Saurola<sup>3</sup>, Michael Schaub<sup>1</sup>, Martin Grüebler<sup>1</sup>

<sup>1</sup>Swiss Ornithological Institute, Sempach, Switzerland; <sup>2</sup>Hiddensee Bird Ringing Centre, Greifswald, Germany; <sup>3</sup>University of Helsinki, Helsinki, Finland; <sup>4</sup>KH, Itzehoe, Germany

Widely distributed species experience highly diverse levels of environmental variation across their range. This is especially true for those long-distance migratory bird species in which distant breeding populations use different flyways during migration and exhibit varying degrees of migratory connectivity between the breeding and the non-breeding area. Large scale environmental variation in the breeding area typically leads to manifold local adaptations in the reproductive biology of widely distributed species. Additionally, biotic and abiotic variation experienced during the non-breeding season should fuel further adaptations with respect to migration and the conditions in the wintering area. However, we only have limited knowledge about how local adaptation translates into differences in demography and population dynamics at different sites of a wide species distribution. We used the Barn Swallow as a model species and analysed time-series data of population size, reproduction and mortality collected in breeding populations in Northern and Central Europe. In a first step, we estimated various demographic rates (e.g. brood size, productivity & survival) by using Integrated Population Models. Thereafter we estimated the contribution of the different demographic rates to the local population dynamics using life table response experiments. We discuss the results in the light of local adaptations to environmental variation in the breeding area and the differences in the non-breeding distribution of our study populations. Our results provide interesting insights into intra-specific variation of life history evolution in widely distributed bird species.

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### **Are there safe tree cavities? Case of the Collared Flycatcher.**

Wiesław Walankiewicz<sup>1</sup>, Grzegorz Bednarczyk<sup>1</sup>, Anna Kapusta<sup>1</sup>, Dorota Czeszczewik<sup>1</sup>

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The Collared Flycatcher *Ficedula albicollis* is a secondary cavity nester, which breeds in high density in old deciduous forests. This species suffer heavy predation pressure – in some years even >80% of broods was depredated. The main predators of flycatchers' broods are the Pine Marten, rodents and the Great-spotted Woodpecker. We study the Collared Flycatcher population breeding ecology in lime-oak-hornbeam old-growth stands of the Białowieża National Park (Poland) where there are no nest boxes and all flycatchers breed in tree cavities. The observers searched systematically breeding flycatcher cavities in years 1989-2016. Then nests were checked and cavity characteristics were described. We measured height above the ground, entrance diameter, depth and determined origin of cavities (excavated vs. natural) etc. Then we compared two categories, i.e. cavities with destroyed broods and those from which birds have fledged. Aim of the study was to determine which parameters of tree cavity affected the breeding success. In other words, whether the females by the choice of suitable breeding cavity can increase the survival rate of broods? Among many traits analyzed, only two had a significant impact on the safety of broods i.e. the cavity depth and its origin (excavated or non-excavated).

Broods in the natural, not excavated by woodpecker cavities were safer than those placed in shallower or woodpecker-made cavities. It suggests that excavated cavities can be a trap for the Collared Flycatcher.

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### **Mallard maladies: a chronic case of cloacal papillomavirus**

Richard AJ Williams<sup>1</sup>, Jonas Waldenström<sup>1</sup>

<sup>1</sup>*Linnaeus University, Kalmar, Smaåland, Sweden*

Papillomaviruses infect several vertebrates, including birds. Infections are usually asymptomatic or cause benign tumours, though some strains cause cancer. Sometimes extensive, persistent tumours are recorded – notably in chaffinches and humans. About 25% of Human Papilloma types are sexually transmitted. In 2016, a Papilloma type was characterized from a duck, in Bhopal, India; the 6<sup>th</sup> novel Papilloma genome from class Aves. No information exists for prevalence, duration of infection, mode of transmission, severity, etc. We screened 1128 cloacal swabs and faecal samples collected from 300 asymptomatic ducks sampled at Ottenby Bird Observatory, Sweden in 2015, using a newly designed real-time PCR. Significance was tested using Fisher's Exact Test. 6 individuals (2%) were positive. All sequences were identical to the published genome. One lure duck had a chronic infection lasting at least 86 days. All positive birds were adult ( $P < 0.01$ ). Significantly more positive samples were detected from swabs than faecal samples ( $P < 0.05$ ). Sample type data suggests transmission is likely via direct contact, and only infrequently, if at all, via the oral-faecal route. Infection in only adult birds supports the hypothesis that this virus is sexually transmitted, though much work is required for corroboration.

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### **Progressive synanthropisation and synurbization of magpie *Pica pica* L. in central Poland between 2013 and 2016**

Agnieszka Wojciechowska<sup>1</sup>, Zbigniew Wojciechowski<sup>1</sup>

<sup>1</sup>*University of Lodz, Lodz, Poland*

The work presents a scheme of progressive synanthropisation and synurbization of magpie *Pica pica* L. in central Poland between 2013 and 2016. Thirteen towns and four rural areas, over a total area of 812 km<sup>2</sup>, were examined and 2285 magpie nests were found. To determine the synanthropisation degree, the average distance between a nest and a building was measured. The opposite sites of reference to the synanthropisation degree were the Kacap Valley in the eastern Poland (no sign of synanthropisation) and the center of Lodz (a highly synurbic population). In addition to spatial analysis, comparisons within years were made, since similar studies had been carried out between 1977-79 and 2003. It has been shown that the density of magpie nests in city centers depends on the density in the peripheral areas and their proximity. Similarly the growth rate of nest density varies in different cities and depends on the conditions in the neighborhood of the city. Factors that positively influence the synanthropisation process are food limiting factors (poor quality soil connected with the height above sea level) and nest determining factors (lack of suitable shrubs as well as the proximity to large forest areas). Based on the J' dominance index, the authors have shown that the magpies on low-synanthropic areas mainly nest on bushes of grey willow and blackthorn. As synanthropization increases, there is a rapid decline in domination of these species, followed by a gradual increase in the specialization in a few different tree species.

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### **Bird migration routes and waterfowl habitat protection in southwest China**

Zhaolu Wu<sup>1</sup>, Haotian Bai<sup>1</sup>, Xuebing Zhao<sup>1</sup>, Kang Luo<sup>1</sup>

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In the global perspective, there was few scientific report on the bird migration and habitats in the southeastern foothills of Qinghai-Tibet Plateau. Based on literature analysis and field investigation in the last decade, we gained the following results. Nearly 1000 bird species (73.5% of China's birds) were found surviving in this area, of which, resident, winter and summer birds accounted for 60%, 22% and 11% respectively; We suggested 2 bird migration routes: the east route is from the Lake Baikal of Siberia region via the east foothills of Qinghai-Tibet Plateau to the central Yunnan Plateau and extending to the Red River Delta; the west route is from the southeast Tibet Plateau via the Hengduan Mountains to the Bay of Bengal. This suggestion was supported by two facts. One is the data from satellite tracking and bird ringing showed the relationship of birds in this area and those in Siberia Lake Baikal, Qinghai-Tibet Plateau, the Bay of Bengal. Another is the obvious difference of waterfowls between the east and west wetlands within this area, by analyzing bird similarity. Twenty-four waterfowl new-records were found and some of large and medium-sized waterfowls changed their habitats, implying the suitable wetland habitats for more waterfowls. Many exciting activities initiated by the public and governments benefited waterfowls and their habitats protection, but too much human intervention caused changes of bird species and populations. Therefore, we claimed that the plateau of southwest China is one of key areas for bird migration research and deserves attention around the world.

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### **Fledgling adoption in European Blackbirds: an unrecognised phenomenon in a well-known species**

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Adoption behaviour is well-known in birds, but the majority of adoption studies concern the nestling phase of birds' lives, whereas fledgling adoption is a much less well-known phenomenon, especially in passerines. Our long-term study of blackbirds has indicated that adoption could ensue from an error on the part of parent birds in recognizing their own progeny, an intergeneration conflict won through the effective begging behaviour of fledglings directed at adult blackbirds other than their parents, and also hormonal priming. Some findings suggest that active kidnapping of fledglings younger than their own should not be ruled out.

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### **The availability and usage of tree hollows by Tawny owls in Oak forest of Eastern Ukraine**

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Tawny owl is a popular subject of nest box studies. However, most birds in Europe still inhabit natural tree hollows, which provide wider range of conditions, but are affected by forest management. There are few studies

analyzing preferred hollow characteristics and availability of natural shelters for Tawny owls. Since 2002, nest box study was started in the National park "Gomilsha forest" (Kharkiv region, Ukraine). The Tawny owl density on a 870 ha plot was 2.5 pairs/ha, with 0.8 nest boxes/territorial pair, but birds used only 35-70% of nest boxes for day roosting, and 0-20% for nesting. A study of natural hollow availability was started, including searching and regular checks of all potentially available big tree hollows. Totally, 51 hollow used by Tawny owl were found, with minimal density 2.1 hollows/territorial pair. There are two main groups of hollows available for the birds. The first is the vast pool of small hollows in heavily damaged or dying trees with short lifespan, suitable only for day roosting (90% of cases). Hollows suitable for nesting comprised more limited resource (10%). They were located in older trees and had stricter requirements for size and shape of cavity, but these hollows had longer lifespan. Owls tended to use hollows of the second group more constant. The key factor of nesting hollow formation was falling out polypore fungi fruiting bodies on late decay stages. Tawny owls avoided hollows in decayed standing deadwood and preferred more firm dying or heavily weakened, but living trees.

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### BirdsOnline - A New Step for Citizen Science

Markéta Zárybnická<sup>1</sup>, Petr Kubizňák<sup>1</sup>, Jiří Šindelář<sup>1</sup>, Vlastimil Osoba<sup>1</sup>, Pavel Junek<sup>1</sup>, Tomáš Kotek<sup>1</sup>, Jan Bartoška<sup>1</sup>, Michal Hruška<sup>1</sup>, Václav Klapetek<sup>1</sup>, Petr Sklenicka<sup>1</sup>

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We present a webcast of bird nesting as an example of a successful interdisciplinary project - called 'BirdsOnline'. The cornerstone of the project is the Smart Nest Box (SNB), i.e., a bird box equipped with a computer, one or two cameras, an optical sensor for activity detection, temperature and light sensors, and a microphone. Every bird activity is detected by a light barrier placed in the opening of the SNB. This activates video recording for 30-120 sec, depending on the user settings. The video records are stored in the computer embedded in the box, from which they are transmitted by the user's local Internet network to the central server. The nesting activities can be watched either in form of a live webcast or recorded videos presented with a delay of one day on a webpage accessible to the public without registration (birdsonline.cz). During a four-month period in 2016, we stored over 100 000 video records of bird activities from twenty-five nests located mainly in schoolyards. We have documented a range of unique information on bird nesting, including predation of a Tengmalm's owl nest by a pine marten *Martes martes*; predation of a starling nest by a house sparrow; starling courtship accompanied by singing and nest decorating, and great tit chicks dying from an infection caused by parasites of *Ornithonyssus* sp. We conclude the BirdsOnline project - with its educational, scientific and popularizing benefits - presents a new approach for Citizen Science in the future.

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### Birds of the medieval Novgorod (Russia): diversity and economic value

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Archaeological layers of the medieval Novgorod (AD X-XIV) yield a significant number of avian bones, which indicate the profound role that birds played in the life of the medieval city. The most numerous osseal remains belong to the domestic birds - chicken and ducks. Chicken were mainly represented by forms that are smaller than modern breeds. Ducks are almost as numerous as chicken. Such a situation stays in contrast with that in most of the other Russian medieval cities. The reason is an abundance of water bodies near and around Novgorod. Game waterfowl, such as ducks, geese and swans were hunted and therefore are well-represented

in the medieval layers. Some of the birds might have been occasionally used for food; this is an example of the Great Crested Grebe, which was caught from time to time into the fishing nets. Bones of White-Tailed Eagle indicate that its feathers were used in an arrow production. An assemblage of the bones of the raptorial birds, uncovered recently near the Trading Side of the medieval Novgorod, indicate the presence of the yard, related to the falconry. Bones of the Great Eagle Owl, found on the same spot, suggest the use of this species as the lure to attract other birds, mostly corvids, which were used in the training procedure of the hunting birds. The phenomenon of a significant number of the bones of young cats associated with the site requires further examination

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**Nest location of the Black and Red Broadbill (*Cymbirhynchus macrorhynchus*, Eurylaimidae) in the southern Vietnam**

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Despite the small number of species, breeding biology of broadbills (Eurylaimidae – a family of the Old World Suboscines passerines) is still poorly studied. I explored characteristics of nest locations in the Black and Red Broadbill (*Cymbirhynchus macrorhynchus*) in Cat Tien National Park (southern Vietnam). I searched for nests in the forest, paying special attention to forest clearings of natural and artificial origin. For each nest (n>200) I recorded several characteristics: height above the ground, nest site, habitat type, illumination, entrance orientation, etc. Broadbills preferred to build nests in the relatively open, light-filled forest areas like openings, wide stream beds and ponds, and especially forest roads. I will discuss factors, which affect the choice of nesting location in the *C. macrorhynchus*.







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