

Programme and Abstracts

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12th European Ornithologists' Union Congress

**26 – 30 August 2019
Cluj Napoca
Romania**

ORGANIZERS:



SPONSORS / EXHIBITORS:



STAR : ODDI

Logging Life Science



<https://conference.eounion.org/2019/>

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1. Welcome messages

1.1 Message from the EOU President

The European Ornithological Union is very happy to announce that the venue of the 12th EOU Congress will be in Cluj, Romania in August 2019. Cluj will be a perfect setting for the congress as being situated in a part of Europe that has not so far hosted our congresses. This will provide us with great opportunities to experience this very beautiful region and the visit will surely be a memory for life. We will be in the hands of a very devoted group of local organisers headed by Péter L. Pap ensuring that the congress in itself will also be memorable. The EOU Congresses aim at providing opportunities for avian researchers of all fields and from all corners of Europe and beyond, to meet in a friendly atmosphere to share ideas and discuss recent results and conservation concerns.

I will take the opportunity to encourage you to participate in this vibrating event and to warmly welcome you to the Cluj congress in 2019.

Jan-Åke Nilsson
President

1.2 Message from local organizers

It is a great honor for the three institutions, the Babeş-Bolyai University, the Milvus Group – Bird and Nature Protection Association, and the Romanian Ornithological Society, to take the responsibility of organizing the forthcoming European Ornithologist's Union congress in Cluj, Romania. As well, it is a great pleasure to host such a prestigious community of bird lovers from all over Europe, encompassing professional scientists and conservationists, experienced seniors and junior undergraduate or PhD students.

With this congress which will be organized in the eastern corner of Europe, some of our long lasting dreams appear to be fulfilled. Among these are: (1) to advertise the nature and bird diversity values we still have in this region, (2) to strengthen the connection between East and West and between South and North in the European ornithologists community, and (3) to direct the attention of national and local authorities, as well as the public, to our scientific and naturalist community in Romania, which has reached the maturity to bring to Cluj such a prestigious international congress.

We all are aware of the crisis of decreasing bird populations across Europe, which initially started in western European countries, and which later spread out to eastern regions of Europe. We, scientists and conservationists, are responsible for unraveling the causes of this negative process, for offering solutions, and for making progress to halt the loss of biodiversity across Europe and the whole Globe. By your presence at this conference, you highlight to Romanian people the value of the natural assets they still have, and show them that the rich biodiversity and healthy bird populations are worth preserving.

We are happy to welcome you in Cluj, where you will enjoy the warm hospitality of Romanians and our bird-friendly landscapes during the mid-congress excursion, and the vibrant cultural and social life of our city.

We are looking forward to welcoming you in Cluj for the 12th EOU congress in August 2019.

Péter L. Pap
Convener



2. Organisers

2.1 Local Organising Committee

- Péter L. Pap, Babeş-Bolyai University (President)
- Zoltán Benkő, Romanian Ornithological Society
- Gábor Máté Bóné, Milvus Group Bird and Nature Protection Association
- Teodora Domşa, Romanian Ornithological Society
- Judith Papp, Milvus Group Bird and Nature Protection Association
- Tamás Papp, Milvus Group Bird and Nature Protection Association
- Alexandru Stermin, Babeş-Bolyai University
- Zoltán Szabó D., Milvus Group Bird and Nature Protection Association
- Csongor I. Vágási, Babeş-Bolyai University
- Orsolya Vincze, Babeş-Bolyai University
- Local Volunteer Team (Denisa Kalisch, Anca-Ioana Margea, Andrei Dinu, Sara Botezan, Mihaela Miron, Andreea-Mihaela Pleşa, Raluca Pintea, Eszter Ilona, Mirela-Adriana Buda, Carla Andreea Culda, Janka Pénzés, Ana-Maria Neacă, Valentin Adrian Kiss, Anna Dénes, Attila Marton, Vlad-Ştefan Ghioci, Izabella-Katalin Sprîncenatu, Martina-Cristina Matei, Alexandru Cătălin Birău, Zsófia Tóth)
- Events Design, Cluj Napoca (Paula Coman, Olesia Matroş, Flavia Burlibaşa, Cristina Buzan, Marian Fangli)

2.2 Scientific Programme Committee

- Erik Matthysen, University of Antwerp, Belgium (Chair)
- Jan-Åke Nilsson, University of Lund, Sweden
- Tamer Albayrak, Mehmet Akif Ersoy Üniversitesi, Burdur, Turkey
- Jan Engler, University of Ghent, Belgium
- Arne Hegemann, University of Lund, Sweden
- Alfonso Marzal, University of Extremadura, Spain
- James Reynolds, University of Birmingham, UK
- Judy Shamoun-Baranes, Universiteit of Amsterdam, Netherlands
- Toni Laaksonen, University of Turku, Finland
- Mark Mainwaring, University of Montana, USA



3. Related events

MIGRANT LANDBIRD STUDY GROUP SYMPOSIUM

- August 24th-25th, EOU2019 Cluj-Napoca, Romania

BIOLOGICAL DATABASES AND DATA STORING PRE-CONGRESS MEETING

- August 25th, EOU2019 Cluj-Napoca, Romania

ECOTONE TELEMETRY WORKSHOP

- August 25th, EOU2019 Cluj-Napoca, Romania



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4. Monday, 26th August, 2019

Registration

14:00 - 18:00 | *Student's Cultural House*

Opening Session

18:00 - 18:30 | *Plenary Hall*

4.1 Plenary

18:30 - 19:30 | *Plenary Hall* | *Peter L. Pap*

Bird conservation efforts in Romania

Dan Hulea, Tamás Papp

P-0, p. 47

Reception

19:30 - 21:00 | *Student's Cultural House*



5. Tuesday, 27th August, 2019

5.1 Plenary

09:00 - 10:00 | Plenary Hall | Barbara Helm

09:00 | **The small pelagics: ecology of prions and storm-petrels**
Petra Quillfeldt
P-1, p. 47

Coffee break

10:00 - 10:30 | University Building

5.2 Parallel symposia I

Symposium: Shifting the focus: avian life-history stages from the perspective of understudied hormonal systems

10:30 - 12:05 | Wryneck | Sara Lupi and Pablo Salmón

10:35 | **The role of thyroid hormones in coordinating avian life-histories**
Suvi Ruuskanen, Bin-Yan Hsu, Tom Sarraude, Antoine Stier
S2-1, p. 68

11:00 | **Role of the gut-hormone ghrelin during flight in a long-distance passerine migrant**
Sara Lupi, Leonida Fusani, Scott MacDougall-Shackleton, Christopher Guglielmo
S2-2, p. 68

11:15 | **Prolactin as a mediator of parental investment in birds: an understudied hormonal mechanism**
Frédéric Angelier, Olivier Chastel
S2-3, p. 68

11:30 | **The role of the insulin-like growth factor 1 in the mediation of life history decisions in birds**
Ádám Lendvai
S2-4, p. 69

11:45	Growing up and old: are early-life IGF-1 levels associated with later-life cellular ageing? <i>Pablo Salmón, Caroline Millet, Ádám Lendvai, Colin Selman, Pat Monaghan</i> S2-5, p. 69
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Symposium: Birds and plant volatile organic compounds

10:30 - 12:05	<i>Nightjar</i> <i>Elyna Mäntylä, Katerina Sam and Luisa Amo</i>
10:35	What do we know about birds' use of plant volatile cues in tritrophic interactions? <i>Katerina Sam</i> S1-1, p. 50
11:00	Attraction of birds to tropical <i>Ficus</i> and <i>Macaranga</i> trees treated with methyl jasmonate or its inhibitor <i>Elina Mäntylä, Bonny Koane, Heveakore Maraia, Katerina Sam, Simon Segar, Martin Volf, Alexander Weinhold, Vojtech Novotny</i> S1-2, p. 50
11:15	Olfactory detection of caterpillar infestation in oak trees by an insectivorous songbird <i>Jessica Graham, Francesco Bonadonna, Samuel Caro</i> S1-3, p. 51
11:30	Are wild insectivorous birds attracted to methyl-jasmonate-treated Pyrenean oak trees? <i>Irene Saavedra, Luisa Amo</i> S1-4, p. 51
11:45	Are farmland birds attracted to herbivore-induced plant volatiles? <i>Diana Rubene, Velemir Ninkovic, Matthew Low, Malin Leidefors, Sönke Eggers</i> S1-5, p. 52

Symposium: Invasive birds in Europe: trends, drivers and impacts as a mediator of trade-offs

10:30 - 12:05	<i>Corncrake</i> <i>Diederik Strubbe</i>
10:35	Human-habitat associations in the native distributions of alien bird species <i>Laura Cardador, Tim Blackburn</i> S3-1, p. 60
11:00	Quantifying and categorising the environmental impacts of alien birds <i>Thomas Evans</i> S3-2, p. 60
11:15	Population dynamics and decision-making models of the monk parakeet to investigate alternative management scenarios <i>Juan Senar, Tomas Montalvo, Michael Conroy</i> S3-3, p. 61
11:30	Niche filling rather than competition: the success of rose-ringed parakeets in Europe <i>Liviu G. Pârâu, Bernadette Gross, Michael Braun, Michael Wink</i> S3-4, p. 61
11:45	Sharing the burden – transport of alien bird species from established populations to less successful regions of 19th century New Zealand <i>Pavel Pipek, Petr Pyšek, Tim M. Blackburn</i> S3-5, p. 62

Symposium: Forest bird ecology and conservation: research advances and future directions

10:30 - 12:05	<i>White Stork</i> <i>Nico Arcilla and Maris Strazds</i>
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10:35	Forest bird ecology and conservation: recent advances and future directions <i>Nico Arcilla, Michael Manton, Maris Strazds, Per Angelstam</i> S5-1, p. 52
11:00	The effects of forest management on cavity-nesting birds in the Białowieża forest, Poland <i>Dorota Czeszczewik, Wiesław Walankiewicz, Tomasz Stański</i> S5-2, p. 53
11:15	Biomarkers of oxidative status as a tool to evaluate tropical birds' response to forest selective logging <i>Simone Messina, Marcel Eens, Hamada AbdElgawad, Gerrit Beemster, Suzan Benedick, Suzanne Tomassi, David Edwards, David Costantini</i> S5-3, p. 53
11:30	Do natural cavities limit the population density of pygmy owls in managed boreal forest? <i>Daniele Baroni, Erkki Korpimäki, Vesa Selonen, Toni Laaksonen</i> S5-4, p. 54
11:45	Importance of clutch predation risk for local capercaillie populations - a large-scale experiment in the Austrian Alps <i>Barbara Magdalena Waringer, Nina Gallmetzer, Felix Meyer, Julia Paterno, Katharina Neugebauer, Christian H. Schulze</i> S5-5, p. 54

Symposium: From genes to behaviour: what mechanistic studies can tell us about migration

10:30 - 12:05	<i>Collared Dove</i> <i>Zoltán Németh and Cas Eikenaar</i>
10:35	Peeking in the black box: what physiology can tell us about bird migration <i>Cas Eikenaar, Zoltán Németh</i> S4-1, p. 55
11:00	From genes to behaviour: a functional genomic approach to study phenotypic flexibility of migratory birds <i>Valeria Marasco, Steve Smith, Leonida Fusani</i> S4-2, p. 55
11:15	Understanding the molecular machinery shaping migratory phenotypes in the European blackcap <i>Miriam Liedvogel</i> S4-3, p. 56
11:30	Immune function and blood parasites as mechanistic regulators of stopover ecology <i>Arne Hegemann</i> S4-4, p. 56
11:45	Evaporative water loss as a determinant of stopover strategies in spring migrants during desert crossing <i>Ivan Maggini</i> S4-5, p. 57

Lunch

12:05 - 13:30 |

5.3 Plenary

13:30 - 14:30 | *Plenary Hall* | *Jim Reynolds*

13:30	Towards the understanding of the drivers of long-term population trends in European birds <u>Jiří Reif</u> P-2, p. 47
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Poster Pitches

14:30 - 15:00 | Plenary Hall | Arne Hegemann

Coffee Break

15:00 - 15:30 | University Building

5.4 Parallel oral sessions I

Oral Session: Bird communities

15:30 - 17:00	<i>Corncrake</i> <i>Mattia Brambilla</i>
15:30	Multi-scale approaches are needed to infer true species-climate relationships: implications for research and conservation <u>Mattia Brambilla</u> , Marco Gustin, Luca Ilahiane, Michele Cento, Davide Scridel, Paolo Pedrini, Claudio Celada OS-13, p. 76
15:45	Impact of invasive Caucasian hogweeds on bird assemblages in the agricultural landscape of Poland <u>Emilia Grzędzicka</u> OS-14, p. 77
16:00	Abundance of titmice is a potential ecological indicator of forest bird abundance in European forests <u>Mira Kajanus</u> , Jukka Forsman, Maximilian Vollstädt, Vincent Devictor, Merja Elo, Aleksi Lehikoinen, Mikko Mönkkönen, James Thorson, Sami Kivelä OS-15, p. 77
16:15	Effects of Eucalyptus plantations on avian species richness and composition in North-West Spain <u>Sandra Goded</u> , Johan Ekroos, Jesús Domínguez, José Á. Guitián, Henrik G. Smith OS-16, p. 78
16:30	Species richness, diversity and total density patterns of breeding bird assemblages of primeval and natural forests of the Western Carpathians <u>Martin Korňan</u> , Ľudovít Kocian, Karel Pavelka, Rudolf Kropil, Jan Pavelka, Peter Lešo, Marek Svitok OS-17, p. 78
16:45	Biotic interactions and temperature gradients contribute to differences in elevational range limits of Bornean mountain birds <u>Ryan C. Burner</u> , Andy J. Boyce, Thomas E. Martin, Frederick H. Sheldon OS-18, p. 79

Oral Session: Birds and Humans

15:30 - 17:00	<i>Collared Dove</i> Arjun Amar
15:30	The cultural identity of birds in particular human communities <u>Liviu Pripon</u> , Valentin Kiss OS-19, p. 79

15:45	Small-scale but long-term grassland nutrient depletion on military airfields results in source populations of red-listed birds <i>Karen Krijgsveld, Hans van Gasteren</i> OS-20, p. 80
16:15	Bird-window collisions: can UV markings solve the problem or is avian obstacle detection a UV-blind process? <i>Martin Rössler, Wolfgang Laube, Alexander Bruckner</i> OS-21, p. 80
16:30	Patterns of satellite tagged hen harrier disappearances suggest widespread illegal killing on British grouse moors <i>Arjun Amar, Megan Murgatroyd, Steve Repath, Stephen Murphy, David Douglas, Richard Saunders</i> OS-22, p. 81
16:45	Eating from the rubbish: good for today, a problem for tomorrow <i>Javier Pineda-Pampliega, Amparo Herrera-Dueñas, Ellis Mulder, José I. Aguirre, Ursula Höfle, Simon Verhulst</i> OS-23, p. 81
16:00	Variability in foraging patterns of griffon vultures influences the collision risk at wind farms <i>Juan Manuel Pérez-García, Martina Carrete, Eneko Arrondo, Ainara Cortés-Avizanda, Manuel de la Riva, José Antonio Sánchez-Zapata, Jose Antonio Donázar</i> OS-24, p. 82

Oral Session: Energy and Metabolism

15:30 - 17:00	Wryneck <i>Andreas Nord</i>
15:30	Effects of food availability on the energy budget of wintering great tits <i>Sachin Anand, Hannah Watson, Johan Nilsson, Jan-Åke Nilsson</i> OS-7, p. 93
15:45	Insights into the motor of bird cells –seasonal adaptation of mitochondrial respiration in three sympatric species of tits <i>Andreas Nord, Anna Huxtable, Jennifer Page, Dominic J. McCafferty, Neil Metcalfe, Neal Dawson</i> OS-8, p. 93
16:00	Keep cool and cool down: indications of torpor in free-ranging common swifts <i>Apus apus</i> revealed by flow-through respirometry <i>Arndt Wellbrock, Natalie Kelsey, Gerhard Heldmaier, Jan Rozman, Witte Klaudia</i> OS-9, p. 94
16:15	Ecological determinants of blood oxygen-carrying capacity in birds <i>Piotr Minias</i> OS-10, p. 92
16:30	Winter food supply and body temperature regulation in a small bird <i>Hannah Watson, Jan-Åke Nilsson, Juli Broggi, Johan Nilsson</i> OS-11, p. 92
16:45	Measuring power input, power output and energy efficiency in flying birds <i>Linus Hedh, Christopher G. Guglielmo, Christoffer Johansson, Jessica Deakin, Christian C. Voigt, Anders Hedenström</i> OS-12, p. 93

Oral Session: Migration

15:30 - 17:00	White Stork <i>Will Cresswell</i>
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15:30	The importance of connectivity to long-distance migrant population dynamics <i>Will Cresswell, Tom Finch, Robert Patchett</i> OS-25, p. 104
15:45	Spatial and temporal use by a Palearctic migrant during the non-breeding season in Africa <i>Claudia Tapia-Harris, Will Cresswell</i> OS-26, p. 104
16:00	Influence of environment and landscape on population genetic structure between migratory and resident blackcaps in Spain <i>Tania Garrido-Garduno, Guillermo Fandos, Richard A.J. Williams, Javier Pérez Tris, Miriam Liedvogel</i> OS-27, p. 105
16:15	Wing morphology and migration distance predict pre-migratory fattening of birds: a comparative study <i>Orsolya Vincze, Csongor I. Vágási, Péter L. Pap, Colin Palmer, Anders Pape Møller</i> OS-28, p. 105
16:30	Are there trade-offs to reproduction and survival as a result of migratory decision-making in a partial migrant, the red kite (<i>Milvus milvus</i>)? <i>Stephanie Witzak, Patrick Scherler, Martin Gruebler</i> OS-29, p. 106
16:45	Genetics of long-distance migration <i>Staffan Bensch, Max Lundberg, Kristaps Sokolovskis</i> OS-30, p. 106

Oral Session: Dispersal and Population structure

15:30 - 17:00	<i>Nightjar</i> <i>Matthieu Paquet</i>
15:30	Why we should care about habitat differences in movements: using spatially explicit integrated population models to assess habitat source-sink status <i>Matthieu Paquet, Debora Arlt, Jonas Knape, Matthew Low, Pär Forslund, Tomas Pärt</i> OS-1, p. 89
15:45	Individual characteristics and environmental factors associated with natal dispersal in fragmented habitats <i>Hugo Robles, Carlos Ciudad, Zeno Porro, Julien Fattebert, Gilberto Pasinelli, Matthias Tschumi, Marta Vila, Martin Gruebler</i> OS-2, p. 89
16:00	The role of dispersal in adaptation to climate change: an experimental approach <i>Koosje Lamers, Marion Nicolaus, Raymond Klaassen, Jan-Åke Nilsson, Christiaan Both</i> OS-3, p. 90
16:15	Delayed dispersal and sociality in an Afrotropical facultative cooperative breeder <i>Laurence Cousseau, Dries Van de Loock, Carl Vangestel, Luc Lens</i> OS-4, p. 90
16:30	Natal dispersal displacement patterns in resident bird species: an interspecific comparison <i>Martin U. Gruebler, Hugo Robles, Bettina Almasi</i> OS-5, p. 91
16:45	Habitat imprinting in common buzzards (<i>Buteo buteo</i>): factors explaining nest-site selection, dispersal and age of first reproduction <i>Meinolf Ottensmann, Nayden Chakarov, Tony Rinaud, Jamie Winternitz, Oliver Krüger</i> OS-6, p. 91

Poster Session (odd numbers)

17:00 - 19:00 | *Authors of posters with odd numbers (PP-1, PP-3, ...) are present at their posters.*

The evidence of torpor in a tropical passerine, the scarlet-backed flowerpecker (*Dicaeum cruentatum*)

Andrey Bushuev, Ekaterina Zubkova, Anvar Kerimov

PP-3, p. 178

Bacteria killing capacity in birds: cross species variation, phylogenetic signal and relation to oxidative physiology

Janka Péntzes, Péter L. Pap, Csongor I. Vágási, Gábor Á. Czirájk, Orsolya Vincze

PP-5, p. 178

Insulin-like growth factor 1 affects the expression of plumage traits in a passerine species

Katharina Mahr, Orsolya Vincze, Zsófia Tóth, Herbert Hoi, Ádám Lendvai

PP-7, p. 179

Diet influence on black stork (*Ciconia nigra*) breeding in captivity (on the example of Kyiv Zoo)

Oleksandr Panchuk, Vitalii Liaskivskyi

PP-9, p. 179

Age-related patterns of yolk androgen deposition consistent with adaptive brood reduction in spotless starlings

Jaime Muriel, Lorenzo Pérez-Rodríguez, Diego Gil

PP-11, p. 180

Insulin-like growth factor-1 levels increase in response to food restriction in a passerine

Zsófia Tóth, Gyula Ölveczki, Levente Őri, Ádám Zoltán Lendvai

PP-13, p. 180

Short-term effects of immune challenges on physiological health and telomere attrition

Ye Xiong, Michael Tobler, Arne Hegemann, Dennis Hasselquist

PP-15, p. 181

Diversity of nest predators of ground-nesting passerines in the abandoned fields

Stanislav Samsonov, Dmitry Shitikov, Tatiana Makarova

PP-19, p. 181

Reproductive parameters of the critically endangered yellow-breasted bunting *Emberiza aureola*

Vyacheslav Chernyshov, Ivan Frolov

PP-21, p. 182

Age-related differences in reproductive success in a mute swan population - selection hypothesis confirmed

Radostaw Włodarczyk, Piotr Minias

PP-23, p. 182

Shaky balance between temporal patterns of breeding pied flycatchers and their prey in Moscow region

Ivankina Elena, Tatyana Ilyina, Andrey Bushuev, Anvar Kerimov

PP-25, p. 183

Siberian blue robin (*Larvivora cyane*) as a model species for studying winter ecology of Palaearctic migrants in South-east Asia

Mikhail Markovets, Igor Palko

PP-27, p. 183

Long-term abundance and reproduction trends of black stork *Ciconia nigra* in Sobibór Forest, eastern Poland

Tomasz Chodkiewicz, Bartłomiej Woźniak, Grzegorz Neubauer

PP-29, p. 184

Nest survival of three sympatric *Phylloscopus* warblers in the Swiss Jura

Zephyr Züst, Shannon Lüpold, Gilberto Pasinelli

PP-31, p. 184

Weather conditions at stopover sites affect survival of reed warblers

Lucyna Hałupka, Kaja Wierucka, Hanna Sztwiertnia, Ewelina Klimczuk

PP-33, p. 184

The degree of phenotypic traits asymmetry of the house sparrow *Passer domesticus* populations

Beata Dulisz, Jacek J. Nowakowski

PP-35, p. 185

Food of nuthatch *Sitta europaea* young in a primeval forest: effects of varying food supply and age of nestlings

Tomasz Wesołowski, Patryk Rowiński, Grzegorz Neubauer

PP-37, p. 185

Monitoring owl populations in a natural mountainous forest in the Austrian Alps (Duerrenstein Wilderness Area, IUCN Category I, UNESCO World Heritage Site)

Thomas Hochebner, Ingrid Kohl, Claudia Schuetz, Gerhard Rotheneder

PP-39, p. 186

Seasonal variation of avian malaria across Europe in house sparrows

Samantha Mellinger, Júlio Manuel Neto, Lucyna Hałupka, Alfonso Marzal, Pavel Zehindjiev, Helena Westerdahl

PP-41, p. 186

Food availability limits avian reproduction in the city: an experimental study on great tits (*Parus major*)

Gábor Seress, Krisztina Sándor, Karl L. Evans, András Liker

PP-43, p. 187

Metabarcoding-based diet profiling in insectivorous bird barn swallow and connection of individual-based data on diet and gut microbiota

Lucie Schmiedová, Jakub Kreisinger, Oldřich Tomášek, Tomáš Albrecht

PP-45, p. 187

Local adaptation of incubation rhythms to ambient temperatures

David Diez-Méndez, Emilio Barba, Juan José Sanz

PP-47, p. 188

Effects of urbanization on feather number of great tit (*Parus major*) nestlings

Krisztina Sándor, András Liker, Csenge Sinkovics, Áron Péter, Gábor Seress

PP-49, p. 188

Micro-scale architecture of the blue tit feathers

Katarzyna Janas, Anna Łatkiewicz, Olga Woźnicka, Mariusz Cichoń, Szymon Drobniak

PP-51, p. 189

Hindlimb morphology and the foraging ecology of the extinct Haast's eagle (Accipitriformes: *Hieraaetus moorei*)

Andrei Zinoviev

PP-53, p. 189

Investigating differentiation in closely related European nightjar populations using an integrative approach

Céline Kowalczyk, Ruben Evens, Nyambayar Batbayar, Natalie Beenaerts, Batmunkh Davaasuren, Frederik Hendrickx, Joachim Mergeay, Luc Lens, Tom Artois
PP-55, p. 190

Ordering of song and responses to playback of conspecific song: a study of three sympatric species of *Seicercus (Phylloscopus) burkii* complex

Yulia Kolesnikova, Alexey Opaev
PP-57, p. 190

Blue tits change when they build their nest in response to environmental temperature

Sophie C. Edwards, Alice Bernard, Inès Heeren, Susan D. Healy
PP-59, p. 191

Protective nesting association between red-backed shrike and barred warbler: the importance of the anti-predatory behaviour

Marcin Polak
PP-61, p. 191

Eggshell colour pattern as female fingerprints in black-headed gulls

Katja Rahn, Angela Schmitz Ornés
PP-63, p. 192

Innovative foraging behaviours and success on problem-solving tasks: urban vs. forest performance in Barcelona (Spain)

Eva Serrano-Davies, José G. Carrillo, Lluïsa Arroyo, Helena Navalpotro, Joan Carles Senar
PP-65, p. 192

Movement and parental care characteristics during the nesting season of the little swift (*Apus affinis*)

Itai Bloch, David Troupin, Nir Sapir
PP-67, p. 193

Does shared paternal care affect the growth of brood parasite nestlings? A study on cuckoos in polygynous great reed warblers

Milica Požgayová, Petr Procházka, Marcel Honza
PP-69, p. 193

Geolocators reveal variation and sex-specific differences in the migratory strategy of a long-distance migrant

Fraser Bell, Stuart Bearhop, Malcolm Burgess
PP-71, p. 194

PAMLR: a package for analysing pressure, activity, magnetic and light data in R

Kiran Dhanjal-Adams, Felix Liechti
PP-73, p. 194

Right-side neck-resting preference of the barnacle goose *Branta leucopsis*: the evidence for lateralization of vigilance?

Elmira Zaynagutdinova, Denis Galkin, Elena Galkina, Karina Karenina, Andrey Giljov
PP-75, p. 194

Home range patterns of dispersing juvenile golden eagles (*Aquila chrysaetos*)

Julia Hatzl, Martin Gruebler, Matthias Tschumi, Kamran Safi, David Jenny
PP-77, p. 195

Bird anti-mosquito defensive behaviour in relation to avian malaria

Martin Marinov, Dimitar Dimitrov, Aneliya Bobeva, Karina Ivanova, Strahil Peev, Mihaela Ilieva
PP-79, p. 195

Role of waterbirds in phosphorus cycle in the Curonian lagoon

Julius Morkūnas, Rasa Morkūnė, Jolita Petkuvienė, Marco Bartoli, Modestas Bružas, Mindaugas Dagys

PP-81, p. 196

Nest location, incubation behaviour and personality in the Kentish plover *Charadrius alexandrinus*

Kwanye Zira Bitrus, Zolta Barta, Afonso Rocha, Andras Kosztolanyi

PP-83, p. 196

The use of large non-excavated holes by tawny owls and other forest vertebrates in oak forest

Yehor Yatsiuk

PP-85, p. 197

Evolution of the Satchinez Marshland avifauna in the past two decades and a half (1990-2018)

Birău Alexandru Cătălin, Stănescu Dan

PP-87, p. 197

Great spotted woodpecker indicates bat diversity in naturally disturbed pine forest

Dorota Kotowska

PP-89, p. 198

Species co-occurrence patterns in a Mediterranean urban bird community

Olga Tzortzakaki, Sarah Faulwetter, Popi Georgopoulou, Sinos Giokas

PP-91, p. 198

The effect of urbanization on bird functional traits

Tamás Lakatos, Dávid Korányi, Péter Batáry

PP-93, p. 199

Anthropogenic material in bird nests

Zuzanna Jagiello, Dylewski Łukasz, Jose Aguirre, Marcin Tobółka

PP-95, p. 199

Political borders disrupt associations between land cover and resource availability

Matthias Tschumi, Patrick Scherler, Julien Fattebert, Beat Naef-Daenzer, Martin U. Grüebler

PP-97, p. 200

Present habitat suitability of the historical breeding area of the European roller in Hungary

Orsolya Kiss, Béla Tokody, Károly Nagy, Zsolt Végvári

PP-99, p. 200

Integrating nesting habitat restoration with at-sea individual-based biomonitoring of the endangered seabird *Pterodroma cahow* endemic to Bermuda

Ilaria Marengo, Jeremy Madeiros, Mónica Silva, Paulo Catry, José Pedro Granadeiro, Ilaria Marengo, Jean-Pierre Rouja

PP-101, p. 201

Sex and spatial variation in metal content of kentish plover (*Charadrius alexandrinus*) feathers along the coast of the Iberian Peninsula

María Vidal, Ofelia Gaitán, Óscar García, Jesús Domínguez

PP-103, p. 201

Taxonomic revision of the genus *Gracula* in the island of Sumatra and the southwest located islands

Tereza Švejcarová, Dominic Ng, Tomáš Ouhel, Frank Erwin Rheindt

PP-107, p. 202

“Ornithopolis”: Outreach activities and educational program to promote citizen awareness and engagement in scientific research for urban bird diversity

Popi Georgopoulou, Olga Tzortzakaki, Sarah Faulwetter, Sinos Giokas

PP-109, p. 202

Evaluating the created wetlands for waterbird diversity and reproductive success

Ineta Kačergytė, Tomas Pärt, Debora Arlt, Åke Berg, Michał Żmihorski

PP-111, p. 203

The effectiveness of the use nest boxes on buildings in urban avifauna protection after building modernization

Beata Dulisz, Anna Maria Stawicka

PP-115, p. 203

The Sarolga: Genetic evidence for the hybridization of brolga and Australian sarus crane

Timothy Nevard, Martin Haase, George Archibald, Ian Leiper, Stephen Garnett

PP-119, p. 204

Forest management along riverbanks –which structures for bird conservation?

Jean-Nicolas Pradervand, Alain Jacot, Florian Zellweger

PP-121, p. 204

Owl conservation and education in South Africa –Successes of 20 years Owlproject.org & EcoSolutions.co.za

Jonathan Haw, Ingrid Kohl

PP-123, p. 205

Reproductive success of European turtle doves (*Streptopelia turtur*) in Spain in relation to nest site characteristics

Beatriz Arroyo, Lara Moreno, Francesc Sarda, Gerard Bota

PP-125, p. 205

Behavioural responses to human disturbance in an alpine bird

Enrico Caprio, Cristina Vallino, Fabrizio Genco, Dan Chamberlain, Claudia Palestrini, Angela Roggero, Massimo Bocca, Antonio Rolando

PP-127, p. 206

Number and distribution avian dangerous species on the territory of Omsk Airport in current period

Sergej Soloviev, Irina Shvidko, Oleg Solovye

PP-129, p. 206

Linking breeding ecology and migration: light-level geolocation and monitoring of an Alpine population of Northern wheatear *Oenanthe oenanthe*

Martha Maria Sander, Susanne Jähnig, Riccardo Alba, Domenico Rosselli, Christoph Meier, Dan Chamberlain

PP-131, p. 207

Habitat selection by the European serin in heterogeneous Mediterranean habitats. Does the edge matter?

Aina Taberner, Adrià Viñals, Carmen Vives-Ferrandis, Andreu Gascó, José Antonio Gil Delgado

PP-133, p. 207

Is the ‘great speciator’genus *Zosterops* also great in climatic niche evolution?

Jan Engler, Juliano Cabral, Luc Lens

PP-135, p. 208

Romanian Breeding Bird Atlas –methodology and results

Ciprian Fântână, István Kovács, Zoltán Benkő, Emanuel Baltag, Gábor Bóné, Szilárd Daróczi, Cristian Domşa, Zoltán Szabó, Judit Veres-Szászka
PP-137, p. 208

Comparative life history traits of temperate and tropical wrens

Necmiye Şahin Arslan, Thomas E. Martin
PP-139, p. 209

Within-individual integration of plastic physiological and behavioral responses

Kasja Malkoc, Stefania Casagrande, Michaela Hau
PP-141, p. 209

Remarkably low malaria prevalence in a wetland specialist passerine

Eszter Szöllősi, Zsófia Tóth, Katharina Mahr, Herbert Hoi, Ádám Lendvai
PP-143, p. 209

Density dynamics in flocks of foraging dunlin (*Calidris alpina*)

Ivana Novcic
PP-149, p. 210

Unnoticed sexual domorphism in Western Bonelli's warblers *Phylloscopus bonelli* and its potential applications.

Ángel Sallent, Oscar Gordo, Gustavo A. Ballesteros Pelegrín
PP-151, p. 210

Flexibility in time schedules of pied flycatchers wintering in Ivory Coast: the role of age, year and local ecological conditions in West-Africa for spring migration and breeding schedules

Janne Ouwehand, Wender Bil, Christiaan Both
PP-153, p. 211

Differences in stopover duration of two warbler species at a refuelling site in the Russian Far East

László Bozó, Tibor Csörgő, Wieland Heim
PP-155, p. 211

Flight behaviour across the Sahara Desert in migratory songbirds

Sissel Sjöberg, Lykke Pedersen, Thomas Alerstam, Kasper Thorup, Anders P. Tøttrup, Arne Andersson, Johan Bäckman
PP-157, p. 212

Light level geolocation to reveal new migration route of Central European common terns

Jelena Kralj, Luka Jurinović, Szandra Szandra Sütő, Péter Szinai, Miloš Martinović, Bálint Preiszner
PP-159, p. 212

Migration, African non-breeding grounds and migratory connectivity in pied flycatchers from central European breeding sites

Peter Adamik, Martins Briedis, Steffen Hahn, Stanislav Bures
PP-161, p. 213

Migration ecology of the Indo-European flyway: a case study on common rosefinch

Simeon Lisovski, Silke Bauer, Markus P. Ahola, Thomas Albrecht, Jaroslav Cepak, Thord Fransson, Steffen Hahn, Sven Jakobsson, Tuomo Jaakkonen, Petr Klvana, Cecilia Kullberg, Toni Laaksonen, Benjamin Metzger, Pavel Munclinger, Roland Neumann, Markus Piha, Peter Shurulinkov, Robert Stach, Kare Ström, William Velmala, Martins Briedis
PP-163, p. 213

Estimation of permanent environmental effects for timing in pied flycatcher*Xuelai Wang, Christiaan Both, Marion Nicolaus**PP-165, p. 214***More than migration –year-round movement patterns of birds in the airspace***Baptiste Schmid, Xu Shi, Philippe Tschanz, Felix Liechti**PP-167, p. 214***Strange results of the parasitological study on population of the wood pigeon, *Columba palumbus*, migrating through central Italy***Przemyslaw Busse, Izabella Rząd, Enrico Cavina**PP-169, p. 215***Stopover territoriality in the subalpine warbler during a trans-Saharan crossing***Armando Alberto Aispuro**PP-171, p. 215***EOU fledglings meeting***19:00 - 20:30 | White Stork*



6. Wednesday, 28th August, 2019

6.1 Plenary

09:00 - 10:00 | Plenary Hall | Arne Hegemann

09:00 | **Moving together: social decision making in avian migration**
Stuart Bearhop, Simon Evans
P-3, p. 48

Coffee Break

10:00 - 10:30 | University Building

6.2 Parallel symposia II

Symposium: Immune function as a mediator of trade-offs

10:30 - 12:05 | Corncrake | Arne Hegemann and Kevin Matson

10:35 | **Immune response, oxidative damage, and triglyceride levels exhibit different dose-dependent relationships with intensity of immune challenge**
Michael Butler, Ellen Armour, Justin Hines
S8-1, p. 57

11:00 | **Effect of maternal immunization on nestling immunity and energetics**
Gary Burness, Deanna Moher
S8-2, p. 58

11:15 | **Immunological variation in a long-lived seabird: what can we learn from a longitudinal study?**
Coraline Bichet, Kevin Matson, Oscar Vedder, Sandra Bouwhuis
S8-3, p. 58

11:30 | **Environment explains seasonal differences in baseline innate immune function better than annual cycle stages in a year-round breeding tropical songbird**
Chima Nwaogu, Will Cresswell, Maaike Versteegh, Irene Tieleman
S8-4, p. 59

11:45	Importance of local immune response in eco-immunology: a study in house sparrows (<i>Passer domesticus</i>) <i>Gábor Árpád Czirájk, Melissah Rowe</i> S8-5, p. 59
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Symposium: The effects of weather on birds

10:30 - 12:05	<i>Collared Dove</i> <i>Mark Mainwaring and Andreas Nord</i>
10:35	Rain and drought effects on demography of temperate and tropical songbirds <i>Thomas Martin</i> S9-1, p. 70
11:00	The impact of flooding on the behaviour and ecology of riverine birds <i>Stuart Sharp</i> S9-2, p. 70
11:15	Blown by the wind –weather effects on nocturnal bird migration in Europe and the US <i>Cecilia Nilsson</i> S9-3, p. 71
11:30	Climate change and perishable food stores of an avian predator <i>Giulia Masoero, Julien Terraube, Toni Laaksonen, Chiara Morosinotto, Erkki Korpimäki</i> S9-4, p. 71
11:45	Influence of heat stress and junk food on foraging behaviour and body condition in an urban passerine <i>Miqkayla Stofberg, Arjun Amar, Petra Sumasgutner, Susan Cunningham</i> S9-5, p. 72

Symposium: Urban ornithology: threats and opportunities

10:30 - 12:00	<i>White Stork</i> <i>Juan Diego Ibáñez-Álamo and Arjun Amar</i>
10:35	Bird diversity under urbanization constrains <i>Peter Batary</i> S10-1, p. 72
11:00	Is there a link between socio-economic status and bird diversity in cities? A meta-analysis of the Luxury Effect <i>Dan Chamberlain, Chevonne Reynolds, Arjun Amar, Dominic Henry, Enrico Caprio, Péter Batàry</i> S10-2, p. 73
11:15	Consequences of artificial light at night exposure for mounting an immune response in wild great tit nestlings <i>Ann-Kathrin Ziegler, Arne Hegemann, Hannah Watson, Virginie Canoine, Caroline Isaksson</i> S10-3, p. 73
11:30	Bird song increase humanwell-being and reduce stress: a way forward for urban bird conservation? <i>Marcus Hedblom</i> S10-4, p. 74
11:45	Data gathering in cities: methodological approaches that bring together professional ornithologists and citizen scientists <i>James S. Reynolds, Jennifer Smith</i> S10-5, p. 74

Symposium: Living at high elevations – adaptations and current challenges

10:30 - 12:05	<i>Wryneck</i> <i>Fränzi Korner-Nievergelt and Sabine Hille</i>
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10:35	Life histories in birds at high elevations <i>Sabine Hille</i> S7-1, p. 62
11:00	Climatic and environmental limits for the biology and ecology of a high-elevation mountain bird <i>Davide Scridel, Mattia Brambilla, Christian Schano, Fränzi Korner-Nievergelt, Paolo Pedrini</i> S7-2, p. 63
11:15	Distinct between-year variance in the hatching date of snowfinches and its relation to snow cover fraction <i>Christian Schano, Tobias Jonas, Fränzi Korner-Nievergelt</i> S7-3, p. 63
11:30	The importance of seasonal environmental factors in the foraging habitat selection of Alpine ring ouzels <i>Arnaud Barras, Sophie Marti, Veronika Braunisch, Raphaël Arlettaz</i> S7-4, p. 64
11:45	Group dynamics in an alpine nomadic species <i>Maria del Mar Delgado, Chiara Bettega, Mattia Brambilla, Miguel de Gabriel Hernando, Antonio España, Angel Fernandez-Gonzalez, Angel Fernández-Martín, Juan Antonio Gil, Sergio Hernández-Gómez, Paolo Laiolo, Jose Ramon Obeso, Claire Pernollet, Jaime Resano, Isabel Roa-Álvarez, Davide Scridel, Eliseo Strinella, Ignasi Toranzo, Fränzi Korn</i> S7-5, p. 64

Symposium: Number and distribution of birds of Northern Eurasia

10:30 - 12:05	<i>Nightjar</i> <i>Sergej A. Soloviev</i>
10:35	Number and distribution of birds in Siberian and in Romanian forest-steppe and steppe in winter <i>Sergej Soloviev</i> S6-1, p. 65
11:00	Lesser white-fronted geese nesting in association with peregrine falcon in southern Yamal, Russia <i>Olga Pokrovskaya, Alexander Sokolov, Vasiliy Sokolov, Natalya Sokolova, Dorothee Ehrich</i> S6-2, p. 65
11:15	Spatially referenced database on avifauna of the Nenets Autonomous Okrug (Russian European Arctic) <i>Petr Glazov, Olga Pokrovskaya, Julia Loshchagina</i> S6-3, p. 66
11:30	Estimation of the migration pattern of passerines within SE European flyway <i>Przemysław Busse</i> S6-4, p. 67
11:45	The spatial distribution of the great tit (<i>Parus major</i>) in the urban and suburban areas in the breeding season <i>Ivan Frolov</i> S6-5, p. 67

Lunch

12:05 - 13:30 |

6.3 Plenary

13:30 - 14:30 | Plenary Hall | Judy Shamoun-Baranes

13:30	Global bird navigation: challenges and possibilities <u>Susanne Akesson</u> P-4, p. 48
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Poster Pitches

14:30 - 15:00	Plenary Hall	Arne Hegemann
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Coffee Break

15:00 - 15:30	University Building
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6.4 Parallel oral sessions II

Oral Session: Urban Birds

15:30 - 17:00	<i>Collared Dove</i> <i>Davide Dominoni</i>
15:30	Phenology in the city: effects of urbanisation on the selection on timing of avian reproduction <i>Davide Dominoni</i> OS-49, p. 135
15:45	Are urban birds stressed? A study of an urban exploiter, the house sparrow (<i>Passer domesticus</i>) <i>Erika Beaugeard, François Brischoux, Pierre-Yves Henry, Charline Parenteau, Colette Trouvé, Frédéric Angelier</i> OS-50, p. 135
16:00	Investigating the ecology of an opportunistic predator living in urban ecosystems: the yellow-legged gull in Barcelona <i>Joan Navarro, Raiül Aymí, Maria Carmona, Adrián Méndez, David Nos, Jordi Figuerola, Tomás Montalvo</i> OS-51, p. 136
16:15	Development of urban behavioural type is associated with time since urbanization in a reed-nesting waterbird <i>Jan Jedlikowski, Radosław Włodarczyk, Piotr Minias</i> OS-52, p. 137
16:30	Breeding in the city: are nest-boxes really worse than natural cavities? <i>Joanna Sudyka, Irene Di Lecce, Marta Szulkin</i> OS-53, p. 137
16:45	The long-term impacts of garden bird feeding on British bird communities <i>Kate E. Plummer, Kate Risely, Mike P. Toms, Gavin M. Siriwardena</i> OS-54, p. 138

Oral Session: Migration Routes

15:30 - 17:00	White Stork	Judy Shamoun-Baranes
15:30	Route selection and time-energy trade-off in relation to wind conditions in migrating white storks (<i>Ciconia ciconia</i>) crossing a waterbody <i>Paolo Becciu, Shay Rotics, Nir Horvitz, Michael Kaatz, Florian Jeltsch, Martin Wikelski, Wolfgang Fiedler, Ran Nathan, Nir Sapir</i> OS-55, p. 107	
15:45	Impossible to soar over temperate seas? The osprey exception <i>Flavio Monti, Guillaume Peron, David Grémillet, Andrea Sforzi, Olivier Duriez</i> OS-56, p. 108	

- 16:00 | **The hitchhiker's guide to the migration of Eurasian wigeons: a dynamic migration network from ring recoveries, IBAs, and tracking data**
Mariëlle van Toor, Arzel Céline, Fred Cottaar, Mindaugas Dagys, Wolfgang Fiedler, Anders Hedenström, Sergey Kharitonov, Erik Kleyheeg, Thijs Kuiken, Gerard Muskens, Ulf Ottosson, Kamran Safi, Saulius Švažas, Henk van der Jeugd, Martin Wikelski, Ramunas Žydelis, Susanne Åkesson, Jonas Waldenström
 OS-57, p. 108
- 16:15 | **Towards monitoring, understanding and forecasting Global Biomass flows of Aerial Migrations (GloBAM)**
Judy Shamoun-Baranes, Jason Chapman, Peter Desmet, Andrew Farnsworth, Jarmo Koistinen, Silke Bauer
 OS-58, p. 109
- 16:30 | **Combining citizen science and tracking data to unravel the migration routes of Eastern Palearctic songbirds**
Wieland Heim, Yury Gerasimov, Ramona Heim, Pavel Ktitorov, Kiyooki Ozaki, Ilya Panov, Martha Maria Sander, Sissel Sjöberg, Sergei Smirenski, Alexander Thomas, Ivan Tyunov, Mikkel Willemoes, Anders Tøttrup, Kasper Thorup, Kamp Johannes
 OS-59, p. 109
- 16:45 | **Geographic differentiation in migration routes leads to strong migratory connectivity in the lesser kestrel (*Falco naumanni*)**
Diego Rubolini, Salvatore Bondì, Ana Bermejo, Mathieu Bourgeois, Mathias Bouzin, Javier Bustamante, Javier de la Puente, Angelos Evangelidis, Annagrazia Frassanito, Egidio Fulco, Giuseppe Giglio, Gradimir Gradev, Matteo Griggio, Lina Lopez-Ricarte, Panagiotis Kordopatis, Simeon Marin, Juan Martinez, Rosario Mascara, Ugo Mellone, Stefania Pellegrino, Philippe Pilard, Stefano Podofillini, Marta Romero, Marco Gustin, Nicolas Saulnier, Lorenzo Serra, Athanassios Sfougaris, Vicente Urios, Matteo Visceglia, Konstantinos Vlachopoulos, Laura Zanca, Jacopo G. Cecere, Maurizio Sarà
 OS-60, p. 110

Oral Session: Climate Change

- 15:30 - 17:00 | *Corncrake* | *Malcolm Burgess*
- 15:30 | **Global warming over the last 200 years caused a more extensive feather moult that changed bird appearance**
Nir Sapir, Yoni Vortman, Yosef Kiat
 OS-43, p. 82
- 15:45 | **Climate-driven convergent evolution of plumage colour in a cosmopolitan bird**
Andrea Romano, Robin Séchaud, Alexandre H. Hirzel, Alexandre Roulin
 OS-44, p. 83
- 16:00 | **Long-term analysis of climate change effects on distribution and population trends of the lesser kestrel (*Falco naumanni*)**
Michelangelo Morganti, Nunzio Grattini, Flavio Ferlini, Damiano Preatoni, Roberto Ambrosini, Nikos Tsiopelas, Panagiotis Kordopatis, Jacopo Giuseppe Cecere, Maurizio Sarà, Diego Rubolini
 OS-45, p. 83
- 16:15 | **Tritrophic phenological match-mismatch in space and time**
Malcolm Burgess, Smith Ken, Karl Evans, Dave Leech, James Pearce-Higgins, Claire Branston, Kevin Briggs, John Clark, Chris de Feu, Kate Lewthwaite, Ruedi Nager, Ben Sheldon, Jeremy Smith, Robin Whytock, Stephen Willis, Albert Phillimore
 OS-46, p. 84

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| 16:30 | Laying date correlates with local tree composition but not budburst in great and blue tits
<u>Erik Matthysen, Frank Adriaensen</u>
OS-47, p. 84 |
| 16:45 | Climate change may affect fatal competition between two bird species
<u>Jelmer Samplonius, Christiaan Both</u>
OS-48, p. 85 |

Oral Session: Physiology

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|---------------|---|
| 15:30 - 17:00 | Nightjar Arseny Tsvey |
| 15:30 | Does corticosterone linked to the departure decision or to the metabolic response to temperature?
<u>Arseny Tsvey, Julia Loshchagina, Sergey Naidenko</u>
OS-31, p. 117 |
| 15:45 | Corticosterone levels correlate in wild-grown and lab-grown feathers in greenfinches (<i>Carduelis chloris</i>) and are related to tail damage and survival
<u>Mari-Ann Lind, Richard Meitern, Peeter Hõrak</u>
OS-32, p. 117 |
| 16:00 | Easy life or healthy life? That's the question... for the house sparrows
<u>Amparo Herrera-Dueñas</u>
OS-33, p. 118 |
| 16:15 | Repeatable measures of oxidative balance affect survival but not reproduction in a long-distance migrant
<u>Thomas Bodey, Ian Cleasby, Jonathan Blount, Graham McElwaine, Freydis Vigfusdottir, Stuart Bearhop</u>
OS-34, p. 118 |
| 16:30 | The role of prolactin as a mediator of the host response to parasitic eggs: an experimental study with the common blackbird (<i>Turdus merula</i>)
<u>Francisco Ruiz-Raya, Manuel Soler, Juan Diego Ibáñez-Álamo</u>
OS-35, p. 119 |
| 16:45 | Colony size can affect nestling immune function in common tern <i>Sterna hirundo</i>
<u>Radosław Włodarczyk, Piotr Minias, Kamila Gach, Tomasz Janiszewski</u>
OS-36, p. 119 |

Oral Session: Evolution

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| 15:30 - 17:00 | Wryneck Barbara Class |
| 15:30 | Heritability of an extended phenotype: is nest site selection a heritable trait in a temperate passerine?
<u>Caitlin Higgott, Karl Evans, Ben Hatchwell</u>
OS-37, p. 95 |
| 15:45 | Tail color signals performance in blue tit nestlings
<u>Barbara Class, Edward Kluen, Jon Brommer</u>
OS-38, p. 95 |
| 16:00 | Morphological characterization of flight feather shafts in four bird species with different flight styles
<u>Gergely Osváth, Orsolya Vincze, Dragomir-Cosmin David, László Jácint Nagy, Ádám Z. Lendvai, Péter L. Pap</u>
OS-39, p. 95 |

16:15	<p>The insight in daylight effect on eggshell spotting patterns and coloration in cavity nesting birds <u>Paweł Podkowa, Katarzyna Malinowska, Adrian Surmacki</u> OS-40, p. 96</p>
16:30	<p>Phenotypic and genotypic traits of hybridization between Syrian and great spotted woodpeckers <u>Łukasz Kajtoch, Tomasz Figarski, Jerzy Michalczyk, Artur Gurgul</u> OS-41, p. 96</p>
16:45	<p>The ecological character displacement within the breeding area questions reinforcement in <i>Ficedula</i> flycatchers <u>Vladimir Grinkov, Igor Palko, Helmut Sternberg</u> OS-42, p. 97</p>

Poster Session (even numbers)

17:00 - 19:00	<p><i>Authors of posters with even numbers (PP-2, PP-4, ...) are present at their posters.</i></p>
	<p>Body condition of males and females during breeding in a species with female-only desertion: a case of whiskered tern <i>Chlidonias hybrida</i> <u>Mateusz Ledwoń, Grzegorz Neubauer, Agata Żmuda, Adam Flis</u> PP-2, p. 139</p>
	<p>Interspecific variation in natural antibodies and complement activity in a community of tropical birds <u>Elena Arriero</u> PP-4, p. 140</p>
	<p>Ambient temperature and rainfall impact the offspring PHA-response and body mass via parental reproductive investment <u>Emilia Grzędzicka</u> PP-6, p. 140</p>
	<p>Metabolic rate and night-time body temperature in a small passerine <u>Fredrik Andreasson, Andreas Nord, Jan-Åke Nilsson</u> PP-8, p. 140</p>
	<p>Parasite load of proliferate chewing lice species <i>Myrsidea claytoni</i> relates to the blood index of black-and-red broadbill <i>Cymbirhynchus macrorhynchos</i>. <u>Ekaterina Zubkova, Andrey Bushuev, Anvar Kerimov, Oleg Tolstenkov</u> PP-10, p. 141</p>
	<p>Assessing physiological stress and behavior in a passerine in the Southern Hemisphere: influence of season and experimental protocol. <u>Rodrigo Vasquez, Victor Gutierrez, Yanina Poblete, John Wingfield</u> PP-12, p. 142</p>
	<p>Influence of avian malaria and other haemosporidian parasites (Apicomplexa, Haemosporida) on leucocyte profile of rosy starlings (<i>Pastor roseus</i>) <u>Dimitar Dimitrov, Martin Marinov, Aneliya Bobeva, Mihaela Ilieva, Kiril Bedev, Teodor Atanasov, Pavel Zehindjiev</u> PP-14, p. 142</p>
	<p>Habitat selection of the white-winged snowfinch <i>Montifringilla nivalis nivalis</i> at multiple temporal and spatial scales <u>Chiara Bettega, Angel Fernández-González, José Ramón Obeso, Maria del Mar Delgado</u> PP-18, p. 143</p>

Methods of measuring the synanthropization degree on the example of the magpie *Pica pica* (L.)

Agnieszka Wojciechowska, Zbigniew Wojciechowski

PP-20, p. 143

European robin (*Erithacus rubecula*) and caterpillars - is there an effect of food supply on the breeding phenology?

Katarzyna Kanclerska, Oliwia Karpińska, Patryk Rowiński

PP-22, p. 143

Long-term changes in laying dates in the common coot *Aythya ferina* and the tufted duck *A. fuligula* linked to weather conditions and climate oscillations in the south of western Siberia, Russia

Marina Selivanova, Anatoly Mikhantsev

PP-24, p. 144

The impact of environmental factors on variability of common buzzard *Buteo buteo* population parameters in area with high share of marshlands –40 years study period from Sobibór Forest, eastern Poland

Barłomiej Woźniak, Tomasz Chodkiewicz, Patrycja Woźniak

PP-26, p. 144

Differences regarding habitat preferences of the Eurasian coot (*Fulica atra*, Linnaeus 1758) in the breeding and non-breeding season in local conditions of Câmpenești (Cluj, Transylvania)

Valentin Adrian Kiss, Liviu Răzvan Pripon

PP-28, p. 145

Breeding success and dispersal in yellow wagtail (*Motacilla flava*)

Tatiana Makarova, Irina Malykh, Dmitry Shitikov

PP-30, p. 146

Low first-year apparent survival of passerines in abandoned fields

Victoria Grudinskaya, Tatiana Makarova, Stanislav Samsonov, Alexander Grabovsky, Dmitry Shitikov

PP-32, p. 146

Effects of urbanization on nestling diet and reproductive success in great tits

András Liker, Csenge Sinkovics, Ivett Pipoly, Ernő Vincze, Karl L. Evans, Gábor Seress

PP-36, p. 146

Effect of experimentally manipulated rearing conditions on natal dispersal in blue tit (*Cyanistes caeruleus*)

Julia Barczyk, Szymon Drobnik

PP-38, p. 147

The effect of climate and habitat on the breeding phenology of blue tits (*Cyanistes caeruleus*) in the UK.

Claire Branston, Ally Phillimore, Mark Whittingham, Dave Leech, Stephen Willis

PP-42, p. 147

Predation of the European robin *Erithacus rubecula* nests in the primeval forest (Białowieża National Park, Poland)

Oliwia Karpińska, Katarzyna Kanclerska, Grzegorz Neubauer, Patryk Rowiński

PP-44, p. 148

Melanin-based plumage ornamentation as a signal of individual quality in the black-headed gull

Amelia Chyb, Piotr Minias, Piotr Indykiewicz, Jacek J. Nowakowski, Mateusz Ledwoń, Jarosław Kowalski, Jacek Betleja, Beata Dulisz, Tomasz Janiszewski

PP-46, p. 148

Birds mortality as a result of collision with acoustic screens during the breeding and non-breeding period in urban and suburban area

Paweł Knozowski, Beata Dulisz, Jacek J. Nowakowski

PP-48, p. 149

Age-specific differences in parasitaemia and the influence of haemosporidian infections on survival of sedge warblers *Acrocephalus schoenobaenus*

Wojciech Bielański, Aleksandra Biedrzycka, Tadeusz Zajac, Adam Ćmiel, Wojciech Solarz

PP-50, p. 149

Reproductive success related to uropygial gland volume varies with abundance of conspecifics in barn swallows *Hirundo rustica*

Alfonso Marzal, Sergio Magallanes, Cosme López-Calderón, Javier Balbontín, Anders P. Møller, Florentino de Lope

PP-52, p. 150

Telomere dynamics in relation to brood parasitism in magpies

Marta Precioso, Juan Gabriel Martínez, Mercedes Molina-Morales, Deborah A. Dawson, Terry Burke

PP-54, p. 150

The effect of brood sex ratio on offspring growth

Balázs Rosivall, Fanni Sarkadi, Eszter Szöllősi, Renáta Kopena, Eszter Szász, János Török

PP-56, p. 151

Personality traits and their evaluation in the pied flycatcher in natural environment

Tatyana Ilyina, Elena Ivankina, Andrey Bushuev, Konstantin Rogovin, Anvar Kerimov

PP-58, p. 151

Impact of rail and road noise on woodland birds

Jarosław Wiącek

PP-60, p. 152

Ethology and breeding biology of marsh harrier (*Circus aeruginosus*) in Lublin Region, Poland

Michał Zembrzycki

PP-62, p. 152

Sexual differential investment and influence of disturbances on reproductive success of common cranes (*Grus grus*)

Isabel Barwisch, Wolfgang Mewes, Angela Schmitz Ornés

PP-64, p. 153

Influence of disturbances on the incubation temperature of Eurasian cranes (*Grus grus*) in different habitats

Angela Schmitz Ornés, Isabel Barwisch, Wolfgang Mewes

PP-66, p. 153

Colony is not a unit: foraging behaviour of Mediterranean gulls breeding in different neighbourhoods of the same colony

Simone Pirrello, Simona Imperio, Gabriele Meneghini, Riccardo Nardelli, Matteo Griggio, Jacopo G. Cecere, Lorenzo Serra

PP-68, p. 154

Sex-specific incubation behaviour in uniparental penduline tit

Beata Czyż, Aleksandra Wasińska, Alicja Kwinecka, Klaudia Wala

PP-70, p. 154

Extended phenotype as a signal in interspecific information use

Reetta Hämäläinen, Panu Välimäki, Jukka Forsman

PP-72, p. 155

Sex-differences in feeding rate to nestlings in southern grey shrikes in agricultural areas

Maria Angeles Rojo Rodriguez, Maria Angeles Hernandez, Patricia Casanueva

PP-74, p. 155

Moth and towering song flight serve different function in the black-headed bunting

Sanja Barišić, Davor Ćiković, Vesna Tutiš, Jelena Kralj, Herbert Hoi

PP-76, p. 156

Melanism influences the use of social information in a polymorphic owl

M. Deseada Parejo, Jesús Miguel Avilés

PP-78, p. 156

Birds conceal their eggs as an antipredatory strategy when they detect predator chemical signals

Irene Saavedra, Luisa Amo

PP-80, p. 156

Carry-over effects of developmental conditions on lifetime risk of parasitism and productivity in a cuckoo host

Juan Gabriel Martinez, Marta Precioso, Mercedes Molina-Morales, Jesus Avilés

PP-82, p. 157

Sex roles evolution in shorebirds –cooperation opportunity within ÉLVONAL project

Vojtěch Kubelka, Fanni Takács, Tamás Székely

PP-84, p. 157

Do uninvited pygmy falcons give sociable weavers sleep-deprived nights?

Diana Bolopo, Anthony Lowney, Robert Thomson

PP-88, p. 158

Distribution of avian communities in a moderately urbanized city

Erika Beaugeard, François Brischoux, Elyn Sénac, Frédéric Angelier

PP-90, p. 158

On wings and hooves – impact of grazing by large herbivores on birds in an alluvial environment

Lilla Lovász, Valentin Amrhein

PP-92, p. 159

Changes in waterbird community structure and functional diversity in shallow lakes: The role of water level and submerged macrophytes

Ibrahim Kaan Ozgencil, Meryem Beklioglu, Korhan Ozkan, Cagatay Tavsanoglu, Niccolò Fattorini

PP-94, p. 159

The effects of agri-environment schemes on farmland birds – a quantitative meta-analysis

Julia Staggenborg, Nils Anthes

PP-98, p. 160

Effects of forest management on bird assemblages in the mature oak-beech woods of the Carpathians: undervalued sites for rare species

Peter Lešo, Rudolf Kropil, Łukasz Kajtoch

PP-100, p. 160

Assuring the long-term viability of Conservation-Reliant Species: the case of the lesser kestrel *Falco naumanni* and the European roller *Coracias garrullus* in Southern Portugal

João Gameiro, Aldina Franco, Jorge Palmeirim, Inês Catry

PP-102, p. 161

High number of tourists decreases the spatial distribution of hazel grouse (*Tetrastes bonasia*) and predation on artificial nests in a high-mountain habitat (Tatra National Park)

Robert Gwiazda, Marcin Matysek, Filip Zięba

PP-104, p. 162

Ecological and ethological determinants of Syrian woodpecker occurrence in urban habitats

Tomasz Figarski, Łukasz Kajtoch

PP-106, p. 162

Habitat requirements of woodcocks (*Scolopax rusticola*) in the Swiss Jura mountains

Benjamin Homberger, Pierre Mollet, Martin Gruebler

PP-108, p. 163

Variation in home range size of the white-backed woodpecker

Antonia Ettwein, Michael Lanz, Gilberto Pasinelli

PP-110, p. 163

Habitat use of flying subadult white-tailed eagles (*Haliaeetus albicilla*): implications for land use and wind power plant planning

Hannu Tikkanen, Fabio Balotari-Chiebao, Toni Laaksonen, Veli-Matti Pakanen, Seppo Rytkönen

PP-112, p. 163

Where behavioural studies and conservation meet: synchronizing artificial ponds management with the black stork's (*Ciconia nigra*) fall passage foraging patterns

Ciobotă Mihaela, Murariu Dumitru

PP-114, p. 164

International actions to conserve the European turtle-dove *Streptopelia turtur* –implementing the Species Action Plan

Carles Carboneras

PP-120, p. 164

Long-term telemetry study of reintroduced ural owls *Strix uralensis* in the Duerrenstein Wilderness Area, Austria (IUCN Category I, UNESCO World Heritage Site)

Ingrid Kohl, Christoph Leditznig, Franz Aigner

PP-122, p. 165

Wetland management: the impact of reed height on migratory birds

Szu-Ju Wu, Chia-Chien Li, Szu-Kuang Wu, Chen-Chien Chin, Wei-Ta Fang

PP-124, p. 165

Socioeconomic impact and effects on biodiversity of the yellow-legged gull population in a Natural Park of SE Spain

Gustavo A. Ballesteros Pelegrín, Ángel Sallent, Julio F. Fernández Ramos

PP-126, p. 166

Climate change and vagrant birds on Svalbard

Natalia Lebedeva

PP-128, p. 166

Number and abundance birds on the territory of Omsk Airport

Sergej Soloviev, Irina Shvidko, Sergey Soloviev

PP-130, p. 167

Project Owl: long-term monitoring of a nocturnal species of national conservation concern

Hugh Hanmer, Dario Massimino, Claire Boothby

PP-132, p. 167

Changes in modern status and numbers of Eurasian collared dove *Streptopelia decaocto* (Frivaldszky, 1838) on the North of Ukraine

Igor Davydenko, Valentyn Serebryakov, Vitalii Kazannyk, Ianenko Vadym

PP-134, p. 168

Nuclear genetic analysis reveals shallow population structure in the European golden eagle (*Aquila chrysaetos*)

Carina Nebel, Anita Gamauf, Elisabeth Haring, Gernot Segelbacher, Ülo Väli, Alexandre Villers, Frank E Zachos

PP-136, p. 168

The breeding bird atlas of Bucharest (Romania): Preliminary result

Danut Dragan

PP-138, p. 169

Contrasting heterozygosity-fitness correlations across life in a long-lived seabird

Coraline Bichet, Oscar Vedder, Hedwig Sauer-Gürth, Peter Becker, Michael Wink, Sandra Bouwhuis

PP-140, p. 169

DNA methylation is associated with environmental variation: a case study of urban and rural birds

Hannah Watson, Daniel Powell, Pablo Salmón, Arne Jacobs, Caroline Isaksson

PP-142, p. 170

Effectiveness of scaring off the insects and variation of tail-color in slate-throated whitestart *Myioborus miniatus* (Swinson, 1827) –the effect of adapting to the environmental conditions?

Jacek J. Nowakowski, Beata Dulisz, Beata Orłowska, Marta Borowiec

PP-144, p. 170

Spatio-temporal diversification of the pale sand martin complex

Qindong Tang, Gerald Heckel, Yang Liu, Manuel Schweizer

PP-146, p. 171

Assessing the potential of Sentinel-2 imagery to monitor habitat dynamics of endangered grassland waders

Adrian Regos, María Vidal, Miguel Lorenzo, Jesús Domínguez

PP-148, p. 171

Taking the measure – Quantifying observer knowledge to improve detection parameters in niche-models

Judit Veres-Szászka, Cristian Domşa, Ciprian Fântână, István Kovács, Zoltán D. Szabó, Zoltán Benkő

PP-150, p. 172

Common quail seasonal migrations and global climate changes

Valentin Serebryakov, Vadym Yanenko, Vitalii Kazannyk, Igor Davydenko

PP-152, p. 172

Spatial organization of the bird in steppe zonobiom of Northern Eurasia (Western Siberia and Northern Kazakhstan)

Sergej Soloviev, Irina Shvidko, Oleg Solovyev

PP-154, p. 173

Sex-specific migratory strategies in a long-lived seabird?

Nathalie Kürten, Heiko Schmaljohann, Oscar Vedder, Jacob González-Solís, Sandra Bouwhuis

PP-156, p. 173

Tracking long-distance migration of the black-headed bunting *Emberiza melanocephala* along the Indo-European flyway

Davor Ćiković, Sanja Barišić, Steffen Hahn, Vesna Tutiš, Jelena Kralj, Martins Briedis
PP-158, p. 174

Understanding individual differences in migratory behaviour: the first southward and northward migrations of juvenile black-tailed godwits

Mo Verhoeven, Jelle Loonstra, Christiaan Both, Theunis Piersma
PP-160, p. 174

Towards understanding isotopic niches throughout the distribution ranges and annual cycles of migratory birds

Vojtěch Brlík, Petr Procházka
PP-162, p. 175

The role of wind in Cyprus wheatear migration

Robert Patchett, Will Cresswell
PP-164, p. 175

Investigating peregrine falcon (*Falco peregrinus*) migratory connectivity in the Americas using mark-recapture data from Peru

Oscar Beingolea, Nico Arcilla
PP-166, p. 176

Early autumn water birds gatherings in southern part of the Kyiv reservoir

Vitalii Kazannyk, Valentyn Serebryakov, Igor Davydenko
PP-168, p. 176

Evolution of migratory behavior in birds –a biogeographical perspective

Bela Arora, Kasper Thorup
PP-170, p. 177

Mapping habitat use by turtle doves throughout their full migratory cycle

Alison Beresford, Susana Requena, Graeme Buchanan, Hervé Lormée, John Mallord, Chris Orsman, Juliet Vickery
PP-172, p. 177

Round Table: Bird Conservation Innovation: from grassroots to governments

19:00 - 20:30 | *White Stork*

Round Table: Urban Bird Consortium (URBICON): a new collaborative initiative to study urban birds

19:00 - 20:30 | *Corncrake*



7. Thursday, 29th August, 2019

7.1 Excursion

08:00 - 18:00 |

Conference dinner

19:30 - 22:00 | *Euphoria Music Hall*



8. Friday, 30th August, 2019

8.1 Plenary

09:00 - 10:00 | Plenary Hall | Jan Engler

09:00 | **Mechanisms influencing spatial and temporal variation in hummingbird-plant interactions**
Catherine Graham, Ben Weinstein, Anusha Shankar, Donald Powers
P-5, p. 49

Coffee Break

10:00 - 10:30 | University Building

8.2 Parallel oral sessions III

Oral Session: Conservation

10:30 - 12:00 | Collared Dove | Alain Jacot

10:30 | **Large- versus small-scale agriculture: habitat preferences of the endangered ortolan bunting (*Emberiza hortulana*) and local bird communities in the cereal-dominated Ethiopian Highlands**
Alain Jacot, Gabriel Marcacci, Jérémy Gremion, Philippe Christe, Raphaël Arlettaz
OS-79, p. 85

10:45 | **Does a Swiss population of kestrels profit from breeding in nest boxes?**
Rémi Fay, Stephanie Michler, Jacques Laesser, Michael Schaub
OS-80, p. 86

11:00 | **Linking grassland intensification to Orthoptera abundance and habitat requirements of the endangered insectivorous Scops owl (*Otus scops*)**
Noëlle Klein, Coralie Theux, Raphaël Arlettaz, Antoine Guisan, Jean-Nicolas Pradervand, Alain Jacot
OS-81, p. 86

11:15	The importance of environmental favourability and habitat in the decline of the European turtle-dove in Spain <i>Lara Moreno-Zarate, Alba Estrada, Will Peach, Beatriz Arroyo</i> OS-82, p. 87
11:30	Benefits and costs of restoring native woodland for breeding songbirds in temperate uplands <i>David Douglas, Jonathan Groom, Davide Scridel</i> OS-83, p. 87
11:45	Effects of habitat on nesting success in an Alpine forest-shrub ecotone <i>Susanne Jähnig, Martha Maria Sander, Domenico Rosselli, Antonio Rolando, Dan Chamberlain</i> OS-84, p. 88

Oral Session: Population Ecology

10:30 - 12:00	<i>Corncrake</i> <i>Aneta Arct</i>
10:30	Fluctuating climatic conditions can alter response to brood size manipulation: a long term study of blue tits <i>Aneta Arct, Anna Dubiec, Szymon M. Drobniak, Lars Gustafson, Mariusz Cichon</i> OS-73, p. 123
10:45	Winter food supplementation as a driver of subsequent breeding performance <i>Juli Broggi, Jan Ake Nilsson, Hannah Watson, Johan Nilsson</i> OS-74, p. 123
11:15	Population dynamics of intermittent breeding in the common eider (<i>Somateria mollissima</i>) <i>Alex Nicol-Harper, Tom Ezard, Patrick Doncaster, Geoff Hilton, Kevin Wood</i> OS-75, p. 124
11:30	The role of laying and hatching order in early-life growth and telomere dynamics in a wild passerine species <i>Tiia Kärkkäinen, Pauliina Teerikorpi, Wiebke Schuett, Antoine Stier, Toni Laaksonen</i> OS-76, p. 124
11:45	Automated delineation of the number of bird territories using digital mapping and spatial statistics in freely available GIS technology <i>Piotr Skórka, Dorota Kotowska, Kazimierz Walasz</i> OS-77, p. 125
11:00	Reproductive success in the barn owl is linked to partner compatibility in glucocorticoid levels <i>Bettina Almasi, Paul Béziers, Lukas Jenni, Alexandre Roulin</i> OS-78, p. 125

Oral Session: Parasites and Disease

10:30 - 12:00	<i>Wryneck</i> <i>Tamer Albayrak</i>
10:30	Factors affecting mosquito attraction to birds: implications to avian malaria transmission <i>Josué Martínez-de la Puente, Rafael Gutiérrez-López, Alazne Díez-Fernández, Jiayue Yan, Laura Gangoso, Ramón Soriguer, Jordi Figuerola</i> OS-67, p. 114
10:45	Parrots in peril –investigating beak and feather disease virus in wild Australian psittacines <i>Johanne M Martens, Helena S Stokes, Mathew L Berg, Ken Walder, Michael Magrath, Andy TD Bennett</i> OS-68, p. 114

11:00	No bird is an island: population structure of vector-transmitted blood parasites in raptors <i>Nayden Chakarov, Guillermo Blanco, Annegret Stubbe, Michael Stubbe, Oliver Krüger</i> OS-69, p. 115
11:15	Mix haemosporidian infection occur more than expected <i>Tamer Albayrak</i> OS-70, p. 115
11:30	Short-term consequences of malaria infection in common buzzard (<i>Buteo buteo</i>) <i>Tony Rinaud, Nayden Chakarov</i> OS-71, p. 116
11:45	Ecoimmunology in a seabird species: the link between immunology and foraging in the Gentoo penguin <i>Roger Colominas-Ciuró, Petra Quillfeldt, Juan F. Masello</i> OS-72, p. 116

Oral Session: Timing of Migration

10:30 - 12:00	<i>White Stork</i> <i>Les Underhill</i>
10:30	Effects of large-scale climate indices on the timing of spring migration of willow warblers <i>Phylloscopus trochilus</i> <i>Les Underhill, Magda Remisiewicz</i> OS-85, p. 132
10:45	Spatio-temporal patterns of day-to-day bird migration over the North Sea: the role of wind <i>Maja Bradarić, Ruben Fijn, Willem Bouten, Judy Shamoun-Baranes</i> OS-86, p. 132
11:00	The sleep dilemma of nocturnal migrants <i>Andrea Ferretti, Niels Rattenborg, Massimiliano Cardinale, Leonida Fusani</i> OS-87, p. 133
11:15	Modelling decisions: modelling the influence of stopover site quality on decision making process of migratory warblers <i>Adi Domwe, Eyal Shochat, Ofer Ovadia</i> OS-88, p. 133
11:30	Interrupted breeding in a songbird migrant triggers the type of nocturnality similar to migratory restlessness <i>Andrey Mukhin</i> OS-89, p. 134
11:45	Seasonal dynamics of the Afro-Palearctic migratory flyways <i>Martins Briedis, Silke Bauer, Steffen Hahn</i> OS-90, p. 134

Oral Session: Evolution and Biogeography

10:30 - 12:00	<i>Nightjar</i> <i>Petra Sumasgutner</i>
10:30	The maintenance of colour polymorphism - parental morph combination provide a fitness advantage in the black sparrowhawk <i>Petra Sumasgutner, Carina Nebel, Gareth Tate, Arjun Amar</i> OS-61, p. 98
10:45	A potential role for ecologically mediated sexual selection in the divergence of Tropical Pacific honeyeaters (<i>Myzomela</i>) <i>Henri Thomassen, Thomas Smith</i> OS-62, p. 98

11:00	Biogeographic history of tits and chickadees (Paridae) <i>Dieter Thomas Tietze, Ulf S. Johansson</i> OS-63, p. 99
11:15	Environmental selection is a main driver of divergence in house sparrows (<i>Passer domesticus</i>) in Romania and Bulgaria <i>Julia C. Geue, Csongor I. Vágási, Péter L. Pap, Henri A. Thomassen</i> OS-64, p. 99
11:30	Liver fatty acid composition as a life history-associated adaptation in birds <i>Anandan Sampath Kumar, F. Guillaume Blanchet, Ondřej Kauzál, Tomáš Albrecht, Oldřich Tomášek</i> OS-65, p. 100
11:45	Drivers for the differentiation of call types of red crossbill (<i>Loxia curvirostra</i>) in Europe <i>Ralph Martin, Julien Rochefort, Roger Mundry, Gernot Segelbacher</i> OS-66, p. 100

Lunch

12:00 - 13:30 |

8.3 Plenary

13:30 - 14:30 | Plenary Hall | Erik Matthysen

13:30	Roles for females in the evolution of birdsong: unsung heroines <i>László Garamszegi</i> P-6, p. 49
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Coffee Break

14:30 - 15:00 | University Building

8.4 Parallel oral sessions IV**Oral Session: Physiology of Migration**

15:00 - 16:30 | White Stork | Steffen Hahn

15:00	After the marathon: how do migration strategy, condition, and parasite infection affect aerobic performance? <i>Steffen Hahn, Silke Bauer, Fernando Spina, William B Buttemer</i> OS-115, p. 120
	„Who is the fattest?”–Comparative analysis of fat mass of migratory songbirds during stopover using quantitative magnetic resonance <i>Natalie A. Kelsey, Jochen Dierschke, Thomas Klinner, Franz Bairlein</i> OS-116, p. 120
	Corticosterone and migratory refueling in a short-distance migrant <i>Erithacus rubecula</i> <i>Julia Loshchagina, Arseny Tsvey, Sergey Naidenko</i> OS-117, p. 121
	Changes of the transcriptome in the intestines of a migratory bird <i>Roberto Carlos Frias Soler, Lilian Villarín Pildain, Michael Wink, Franz Bairlein</i> OS-118, p. 121

Stress coping capacity during migration in an Old World warbler

Nikolaus Huber, Virginie Canoine, Jessica Cornils, Ivan Maggini, Massimiliano Cardinale, Thomas Ruf, Leonida Fusani

OS-119, p. 122

Is there an annual cycle of the leukocyte profile in migrant birds? The chiffchaff case

Irina Demina, Arseny Tsvey, Olga Babushkina, Julia Bojarinova

OS-120, p. 122

Oral Session: Foraging and Diet

15:00 - 16:30 | *Nightjar* | *Camilla Ekblad*

Diet of white-tailed eagles depends on landscape characteristics in a northern inland environment

Camilla Ekblad, Seppo Sulkava, Hannu Tikkanen, Toni Laaksonen

OS-91, p. 101

Environmental drivers of foraging patterns in an opportunistic feeder relying on human-mediated food sources: the lesser black-backed gull *Larus fuscus*

Alejandro Sotillo, Jan Baert, Wendt Müller, Eric Stienen, Luc Lens

OS-92, p. 101

Adélie penguins do not take advantage of close polynyas for their incubation trip foraging activity: evidence from a multi-colony analysis

Candice Michelot, Akiko Kato, Thierry Raclot, Kozue Shiomi, Pauline Goulet, Paco Bustamante, Gaël Guillou, Yan Ropert-Coudert

OS-93, p. 102

A swallow's landscape of fear: trade-off between foraging and predation avoidance

Alex Grendelmeier, Julien Fattebert, Beat Naef-Daenzer, Martin Grüebler

OS-94, p. 102

Do habitat characteristics predict innovativeness and dietary preferences?

Eva Serrano-Davies, Bernice Sepers, Nina Bircher, Kees van Oers

OS-95, p. 103

Foraging tactic of a colonial raptor differs among individuals and varies according to weather conditions

Jacopo Cecere, Delphine Menard, Simona Imperio, Stefano Podofillini, Federico De Pascalis, Carlo Catoni, Matteo Griggio, Diego Rubolini

OS-96, p. 103

Oral Session: Species Interactions

15:00 - 16:30 | *Wryneck* | *Robert Thomson*

Bird nests as a resource to others: the case of sociable weaver nests in the Kalahari

Robert Thomson, Kervin Prayag, Carla du Toit, Michael Cramer, Anthony Lowney

OS-97, p. 130

Diversity and structure of feather mite communities on seabirds from the north-east Atlantic and Mediterranean Sea

Laura Mihaela Stefan, Wolf Isbert, Elena Gómez-Díaz, Karen D. McCoy, Jacob González-Solís

OS-98, p. 131

Host alarm calls attract the unwanted attention of the brood parasitic common cuckoo

Attila Marton, Attila Fülöp, Csaba Moskát, Katalin Ozogány, Miklós Bán

OS-99, p. 131

16:00	Reaction speed of an avian prey to a simulated hawk attack in relation to hawk phenotype and visual conditions <i>Carina Nebel, Petra Sumasgutner, Adrien Paul Pajot, Arjun Amar</i> OS-100, p. 129
16:15	Selective concept learning between two competing wild bird species <i>Jukka Forsman, Jere Tolvanen, Sami Kivelä, Olli Loukola</i> OS-101, p. 129
15:15	Birds as ecosystem engineers: nests and their inhabitants <i>Marta Maziarz, Grzegorz Hebda, Richard K. Broughton, Luca Casacci, István Mádk, Magdalena Witek</i> OS-102, p. 130

Oral Session: Social Interactions

15:00 - 16:30	<i>Collared Dove</i> <i>Maris Strazds</i>
15:30	Sexual conflict over parental care in the rock sparrow: parents do not respond in the same way <i>Alejandro Cantarero, Mireia Plaza, Juan Moreno, Matteo Griggio</i> OS-109, p. 126
16:00	Can we assay birds' exploration behaviour in the field? Validating a portable open field test <i>Edward Klun, Katja Rönkä, Johanna Mappes, Rose Thorogood</i> OS-110, p. 126
16:15	Love the neighbour, or not? Does high breeding bird density reduce nest predation? <i>Magali Frauendorf, Bruno J. Ens, Andrew M. Allen, Henk-Jan van der Kolk, Eelke Jongejans, Hans de Kroon, Jenny Cremer, Chris A. M. van Turnhout, Martijn van de Pol</i> OS-111, p. 127
15:00	Diverse social groups are less stressful <i>Attila Fülöp, Csongor I. Vágási, Gergely Osváth, Péter L. Pap, Zoltán Benkő, Janka Péntzes, Ádám Z. Lendvai, Zoltán Barta</i> OS-112, p. 127
15:15	Feather corticosterone is related to social network centrality in a free-ranging great tit population <i>Daan Dekeukeleire, Lionel Hertzog, Johan Aerts, Diederik Strubbe, Luc Lens</i> OS-113, p. 128
15:45	New data on partner choice and nest ownership in black stork (<i>Ciconia nigra</i>) <i>Māris Strazds, František Pojer, Urmas Sellis, Ülo Väli</i> OS-114, p. 128

Oral Session: Navigation

15:00 - 16:30	<i>Corncrake</i> <i>Letizia Campioni</i>
	An ontogenetic perspective on migratory strategy of a long-lived pelagic seabird: timings and destinations change progressively during maturation <i>Letizia Campioni, Maria Peixe Dias, José Pedro Granadeiro, Paulo Catry</i> OS-103, p. 111
	Evidence for true magnetic navigation in a long-distance migratory songbird <i>Florian Packmor, Dmitry Kishkinev, Nikita Chernetsov, Richard Holland</i> OS-104, p. 111

No evidence for compass calibration in European songbird migrants during both migratory seasons

Alexander Pakhomov, Anna Anashina, Nikita Chernetsov

OS-105, p. 112

Developmental flexibility and the effect of non-inherited factors on the first south and northward migration of translocated juvenile black-tailed godwits

A.H. Jelle Loonstra, Mo. A. Verhoeven, Christiaan Both, Theunis Piersma

OS-106, p. 112

The role of olfaction in orientation and homing behaviour of great tits (*Parus major*)

Katharina Mahr, Linda Nowack, Felix Knauer, Herbert Hoi

OS-107, p. 113

Migration routes of willow warblers (*Phylloscopus trochilus*): Evolution and navigation mechanisms

Kristaps Sokolovskis, Susanne Åkesson, Mikkel Willemoes, Max Lundberg, Staffan Besnch

OS-108, p. 113

Leg stretcher

16:30 - 16:45 |

EOU General Assembly

16:45 - 17:45 | Plenary Hall | Jan-Åke Nilsson

Closing ceremony

18:00 - 18:30 | Plenary Hall



Abstracts

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9. Plenaries

	MONDAY, 26TH AUGUST, 2019	PLENARY HALL	P-0
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Bird conservation efforts in Romania

Dan Hulea¹, Tamás Papp²

¹Romanian Ornithological Society, Bucharest, Romania; ²Milvus Group Association, Târgu Mureș, Romania

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09:00	TUESDAY, 27TH AUGUST, 2019	PLENARY HALL	P-1
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The small pelagics: ecology of prions and storm-petrels

Petra Quillfeldt¹

¹Justus Liebig University, Giessen, Germany

Two thirds of our planet are covered by sea, and albatrosses and petrels (Aves, Procellariiformes) are, par excellence, the seabirds of the open ocean. The smaller petrels are ideal monitors of ocean productivity as they feed mainly on zooplankton, which responds rapidly to changing environmental conditions. We used a range of methods to study the foraging ecology, population genetics and year-round distribution of small petrel species. We aim to understand how populations diverge ecologically and genetically and thus enhance our understanding of the mechanisms of local adaptation and speciation.

13:30	TUESDAY, 27TH AUGUST, 2019	PLENARY HALL	P-2
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Towards the understanding of the drivers of long-term population trends in European birds

Jiří Reif^{1,2}

¹*Institute for Environmental Studies, Faculty of Science, Charles University, Prague, Czech Republic;*

²*Department of Zoology and Laboratory of Ornithology, Faculty of Science, Palacky University, Olomouc, Czech Republic*

Birds are excellent indicators of changes in natural and human-modified ecosystems, but the mechanisms of the major impacts on bird populations are still insufficiently known. We first mapped bird population trends across Europe to quantify the geographic gradients in contributions of the key factors reflected by species' traits. They uncovered strong and complex spatial patterns in the impacts of climate change and environmental legislation and weaker patterns in the impacts of the land use. Then we focused on investigating the mechanisms by which means the drivers influence bird populations. In the case of climate change, we tested the contribution of temperature and rainfall to population change at different latitudes showing that the temperature is generally more important than rainfall, but the latitudinal trends are unclear. We showed that the effect of temperature is most likely mediated by changes in phenology, when more flexible species may benefit from the climate change, while species not adjusting their annual cycle decline. To facilitate our understanding of the demographic mechanisms involved, we developed a modelling framework showing that both breeding (acting via productivity) and non-breeding (acting via survival and carry-over effects) environmental conditions are important with a stronger support for the former ones, although the comparison is difficult due to methodological inconsistencies. In respect to the land use change, we found that the forestry supports bird populations in some regions, whereas the agricultural intensification has detrimental effects on farmland birds even in the Eastern Europe and the conservation effort cannot reverse the negative trends.

09:00	WEDNESDAY, 28TH AUGUST, 2019	PLENARY HALL	P-3
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Moving together: social decision making in avian migration

Stuart Bearhop¹, Simon Evans¹

¹*Centre for Ecology & Conservation, University of Exeter, Penryn, United Kingdom*

It is well recognised that many (if not all) birds migrate in groups, with mass movements of individuals from a range of taxa capturing the imagination of humans for millennia. However, much of our current thinking focuses very much on individual decision making despite the fact there are a number of reasons why individuals should pay attention to conspecifics during preparation for, and the initiation of, migratory flights. The benefits of which can include: energetic savings associated with moving groups; gaining information from other individuals about routes, staging, breeding and wintering sites; and benefits associated with maintain long term social bonds (either as associates or relatives). As such, our current understanding of individual optima and the consequences of individual variation in migratory behaviour is likely to be incomplete or possibly incorrect in some instances. I will discuss the potential importance of the social environment for migratory decision making, why we need a framework that includes the social environment and the analytical approaches and tools at our disposal.

13:30	WEDNESDAY, 28TH AUGUST, 2019	PLENARY HALL	P-4
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Global bird navigation: challenges and possibilities

Susanne Akesson¹

¹*Lund University, Lund, Sweden*

Each year billions of birds migrate between sites where they are born and novel or known wintering locations. Some of these migrations are performed across substantial distances and in regions where navigation is challenging. Young birds performing their first solo-migration rely on an endogenous migration program encoding time, distance and direction of migration to reach their non-breeding sites of residency. To select an inherited migration direction during migration they may rely on information from three different biological compasses, based on the sun, stars and the geomagnetic field. Navigation can be performed by a combination of cues including landmarks, odours and magnetic information. Birds may cover several thousands of kilometers on one seasonal migration path, but still the compass mechanism used during migration flights is not yet fully revealed. How birds explore the geomagnetic field for compass orientation and navigation during long migrations, and how they may use magnetic information to detect their position in space will be discussed in this talk. Special focus will be to highlight the challenges and possibilities of using alternative cues for long-distance navigation.

09:00	FRIDAY, 30TH AUGUST, 2019	PLENARY HALL	P-5
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Mechanisms influencing spatial and temporal variation in hummingbird-plant interactions

Catherine Graham¹, Ben Weinstein², Anusha Shankar³, Donald Powers⁴

¹*Swiss Federal Research Institute (WSL), Birmensdorf, Switzerland;* ²*University of Florida, Gainesville, USA;* ³*Stony Brook University, Stony Brook, USA;* ⁴*George Fox University, Newberg, USA*

The impacts of climate and land-use change will increasingly affect biological diversity, species interactions, and ecosystem services. Network ecology aims to quantify interactions of species, usually in a given local assemblage, but rarely addresses how these interactions change across time and space. I present hummingbird-plant interaction data from an elevation gradient ranging from 700 to 3300 meters in the Ecuadorian Andes and over 6 years of data collection. I evaluate the potential underlying abiotic and biotic causes of this variation in an attempt to build a predictive model of species interactions, necessary if we are going to mitigate human-induced environmental changes. I also begin to explore how hummingbird energy budget and heat dissipation models can be used to better understand factors influencing hummingbird abundance and foraging behavior. I suggest that while field-based physiology on hummingbirds is still in a nascent stage it has the potential to inform the ecology of hummingbird-plant interactions.


13:30	FRIDAY, 30TH AUGUST, 2019	PLENARY HALL	P-6
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Roles for females in the evolution of birdsong: unsung heroines

László Gáramszegi¹

¹*Institute of Ecology and Botany MTA Centre for Ecological Research, Vácrátót, Hungary*

Males do the singing and females do the listening. This has been the established concept for the study of bird song, in which sex-specific roles typically involve the advertisement of male quality on one hand, and female choice based on song content on the other. However, alternative roles may also apply and can mediate the function and evolution of song. Accordingly, I will demonstrate how female quality (either absolute or relative) can shape the song output of a male, and how sharpened competition for males can reinforce advertisement songs in females.



10. Symposia

Symposium: Birds and plant volatile organic compounds

10:35	TUESDAY, 27TH AUGUST, 2019	NIGHTJAR	S1-1
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What do we know about birds' use of plant volatile cues in tritrophic interactions?

Katerina Sam^{1,2}

¹*Biology Centre CAS, Entomology Institute, Ceske Budejovice, Czech Republic;* ²*University of South Bohemia, Faculty of Science, Ceske Budejovice, Czech Republic*

The first study showing that birds can smell herbivore-induced plant volatiles was published ten years ago. Since then, only 12 studies have been published, showing contradictory results. My review will evaluate the role of birds in relation to the crying for help hypothesis and their use of olfactory cues. Based on methodologies used in previous studies, I will herein provide a summary of experimental approaches and describe the advantages and disadvantages of experiments conducted in nature versus in aviaries. Moreover, I will recommend experimental methodologies which lead to a deeper knowledge of the topic, including reflection on the induction of plant defences and adaptations of birds. Finally, I will propose some interesting questions for future research to direct further studies towards a thorough and accurate description of birds' roles in tritrophic interactions.

11:00	TUESDAY, 27TH AUGUST, 2019	NIGHTJAR	S1-2
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Attraction of birds to tropical *Ficus* and *Macaranga* trees treated with methyl jasmonate or its inhibitor

Elina Mäntylä¹, Bonny Koane², Heveakore Maraia², Katerina Sam^{1,3}, Simon Segar^{1,4}, Martin Volf^{1,5}, Alexander Weinhold⁵, Vojtech Novotny^{1,3}

¹*Biology Centre of the Czech Academy of Sciences, Ceske Budejovice, Czech Republic;* ²*The New Guinea Binatang Research Center, Madang, Papua New Guinea;* ³*University of South Bohemia, Ceske Budejovice, Czech Republic;* ⁴*Harper Adams University, Shropshire, United Kingdom;* ⁵*German Centre for Integrative*

Biodiversity Research, Leipzig, Germany

The attraction of birds to herbivore-damaged trees has been shown to happen in colder climates but we wanted to study if that is also happening in tropics and with trees with strong constitutive chemical defence. Maybe these trees do not need to use induced defence, such as emission of volatile organic compounds (VOCs) to attract predators. To study this we used 8 *Ficus* and 3 *Macaranga* species growing in tropical lowland rainforest in Papua New Guinea. We had three different treatments: spraying with methyl jasmonate (MeJA) to simulate herbivory and increase VOC emission, applying diethyldithiocarbamic acid (DIECA) which is an inhibitor of MeJA to decrease VOC emission, or untreated controls. On all trees we put artificial plasticine caterpillars to measure attraction of predators to VOCs. We also collected with polydimethylsiloxane (PDMS) tubes VOCs from the trees. The total predation rate of the plasticine caterpillars differed between tree species, 12.8 – 33.6 %. As expected ants were the most common predators, but birds were also rather numerous with predation rate of 0.7 % – 9.4 %. As we expected, in tree species with lower constitutive defence, the MeJA treatment attracted most predators. One of these tree species was *Ficus wassa*, and it had a significant positive correlation between the total predation rate and the emission of six VOCs. *Ficus wassa* had also the highest predation rate by birds. So, it is possible that birds could smell the VOCs and be attracted to the trees emitting these informative compounds.

11:15	TUESDAY, 27TH AUGUST, 2019	NIGHTJAR	S1-3
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Olfactory detection of caterpillar infestation in oak trees by an insectivorous songbird

Jessica Graham¹, Francesco Bonadonna¹, Samuel Caro¹

¹*Centre d'Ecologie Fonctionnelle et Evolutive, Montpellier, France*

Plants often use chemical cues to protect themselves from herbivores. In the case of herbivorous insects, volatile alarm signals released into the air attract carnivorous arthropods that significantly reduce the damages inflicted on the plant. Birds are also capable of detecting these alarm signals, however, less information is known about the plant volatiles birds are using. As caterpillars are the primary food source required for insectivorous birds to successfully raise their offspring, their ability to locate caterpillar prey using olfaction would be advantageous. Blue tits naturally inhabit oak dominated forests, therefore we asked if this insectivorous songbird is capable of detecting infestation of oak trees by smell only. Trees were infested with two common species of caterpillar that represent a major part of their natural diet in temperate zones: winter moths and green oak tortrix. In addition, we aimed to uncover which compounds the birds may be detecting in infested trees and whether emissions differ between caterpillar species. By understanding how birds use these compounds, and which compounds they specifically use, we may be able to develop new and useful management strategies for agricultural pests.

11:30	TUESDAY, 27TH AUGUST, 2019	NIGHTJAR	S1-4
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Are wild insectivorous birds attracted to methyl-jasmonate-treated Pyrenean oak trees?

Irene Saavedra¹, Luisa Amo¹

¹*Museo Nacional de Ciencias Naturales (CSIC), Madrid, Spain*

Plants emit herbivore-induced plant volatiles (HIPVs) when they are attacked by herbivorous arthropods to attract natural enemies of the herbivores, including insectivorous birds. The production of HIPVs is partly mediated by the jasmonic acid signaling pathway. Therefore, spraying of methyl jasmonate (MeJa) solution on plants can induce the emission of volatiles similar to the HIPVs induced by herbivory. We performed two field

experiments to test whether insectivorous adult birds are attracted to Pyrenean oak trees (*Quercus pyrenaica*) treated with MeJa solutions. We estimated the avian attraction to MeJA-treated trees and control untreated trees using used artificial larvae to measure bird predation rate. There were no differences in the predation rates of plasticine larvae between control and MeJa treatments, suggesting that insectivorous birds were not attracted to trees treated with MeJa. Despite previous evidence suggesting that insectivorous birds are attracted to HIPVs, our results do not show that insectivorous adult birds were attracted to trees treated with MeJa. Further studies are needed to disentangle whether the differences in the emission of volatiles between herbivore-infested trees and MeJa-treated trees can explain this lack of attraction to MeJa-treated Pyrenean oak trees.

11:45	TUESDAY, 27TH AUGUST, 2019	NIGHTJAR	S1-5
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Are farmland birds attracted to herbivore-induced plant volatiles?

Diana Rubene¹, Velemir Ninkovic², Matthew Low², Malin Leidefors³, Sönke Eggers²

¹Department of Crop Production Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden;

²Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden; ³Swedish University of Agricultural Sciences, Uppsala, Sweden

Birds affect ecosystem functioning as top predators and their foraging strategies influence trophic plant-insect networks. In agroecosystems, birds may shift the balance between pests and beneficial insects. Insectivorous birds can use herbivore induced plant volatiles (HIPVs) to locate herbivore-damaged trees, but this behavior has not been studied in agroecosystems. We investigated attraction of ground-foraging birds to HIPVs in two field experiments – inside cereal crop fields and in semi-natural margin habitats. In crop fields, experimental plots were treated with HIPV (Methyl Salicylate) and we recorded bird activity by estimating dropping density and directly observing behavior of skylarks (*Alauda arvensis*). We found no correlation between bird activity and HIPV, abundance of aphids or predatory arthropods. In the second experiment, we offered birds a series of foraging choice experiments where HIPVs were presented together with or separately from insect prey. Birds showed a preference for HIPVs when combined with prey, irrespective if the prey were visible or hidden. However, if the alternatives included visible prey only in competition with HIPV-only, the preference for HIPV was lost. Birds from different dietary guilds were attracted to HIPVs, suggesting that the ability of birds to use plant cues is probably a general trait. Our results show that olfactory cues can play a role in birds' foraging choices, but the effects are dependent on the type of the habitat and the bird species. Lack of response to HIPVs inside crop fields may question the pest control potential of birds on farmland, at least in certain crop types.

Symposium: Forest bird ecology and conservation: research advances and future directions

10:35	TUESDAY, 27TH AUGUST, 2019	WHITE STORK	S5-1
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Forest bird ecology and conservation: recent advances and future directions

Nico Arcilla¹, Michael Manton², Maris Strazds³, Per Angelstam⁴

¹Crane Trust, Wood River, USA; ²Aleksandras Stulginkis University, Kaunas, Lithuania; ³University of Latvia, Riga, Latvia; ⁴Swedish University of Agricultural Sciences, Uppsala, Sweden

Can we reconcile competing economic and biodiversity conservation objectives? We review evidence-based approaches to forest management using bird population trends as measurable indicators. Despite efforts to encourage sustainable forest management, destruction and degradation of high conservation value forests continue around the world and effective interventions are urgently needed to conserve forest biodiversity. What

lessons can we draw from recent research on forest bird ecology and responses to forest management? Here, we review research on birds as indicators of forest ecosystem integrity in high value forests and large intact forest landscapes. We will showcase advances in our understanding of forest bird ecology and evaluate forest conservation strategies, including the Swedish University for Agricultural Science's research on reconciling competing economic and biodiversity conservation objectives in forestry, and Norway's International Climate and Forest Initiative, which has invested billions of dollars in stopping tropical deforestation over the past 10 years. We also present a preliminary comparison of forestry impacts on birds in Eurasia and North America using evidence-based knowledge about how forest birds with different life history traits respond to different forest management conditions, using case studies in the Baltic Sea Region and Quebec, Canada. We contribute this work in an effort to inform international policy and governance that support the world's natural forests in their critical roles in maintaining birds and other biodiversity, which are increasingly threatened by logging and associated deforestation and degradation.

11:00	TUESDAY, 27TH AUGUST, 2019	WHITE STORK	S5-2
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The effects of forest management on cavity-nesting birds in the Białowieża forest, Poland

Dorota Czeszczewik¹, Wiesław Walankiewicz¹, Tomasz Stański¹

¹*Siedlce University, Siedlce, Poland*

Population characteristics of some species of cavity-nesting birds were studied in the Białowieża Forest (BF). We examined the effects of forest management practices on breeding density of secondary cavity nesting birds. During three breeding seasons (April-June) point counts (Hutto et al. 1986) of birds were carried out within two forest habitats lime-hornbeam (*Tilio-Carpinetum*) and ash-alder (*Fraxino-Alnetum*) of different intensities of forest management practices (protected and managed). We also examined tree cavity abundance in the same stands. Because there were no nest-boxes on our plots, cavity-nesting birds used only natural cavities. We found significant reduction of the abundance of the most numerous species i.e. the Collared Flycatcher *Ficedula albicollis* in managed stands compare to old-growth ones.

11:15	TUESDAY, 27TH AUGUST, 2019	WHITE STORK	S5-3
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Biomarkers of oxidative status as a tool to evaluate tropical birds' response to forest selective logging

Simone Messina¹, Marcel Eens², Hamada Abdelgawad¹, Gerrit Beemster¹, Suzan Benedick³, Suzanne Tomassi⁴, David Edwards⁴, David Costantini⁵

¹*Department of Biology, University of Antwerp, Antwerp, Belgium;* ²*Department of Biology, University of Antwerp, Department of Biology, University of Antwerp, Belgium;* ³*Faculty of Sustainable Agriculture, Universiti Malaysia Sabah, Sandakan, Malaysia;* ⁴*Department of Animal and Plant Sciences, University of Sheffield, Sheffield, United Kingdom;* ⁵*Muséum National d'Histoire Naturelle, Sorbonne Universités, Paris, France*

Physiological biomarkers of stress are promising tools to understand the mechanisms of adaptation of vertebrates to short- and long-term environmental perturbations. An important component of stress physiology, which is likely to impinge on the health of animal populations, is oxidative stress. Oxidative stress is a condition of cellular imbalance between reactive oxygen chemicals' production and antioxidant defences, which may lead to tissues damage, reducing individual fitness. Evidence from literature suggests a possible relation between biomarkers of oxidative stress and demographic trends of bird species. We conducted a study to evaluate the impact of forest degradation due to selective logging on the oxidative status of 15 understory bird species. The

study was conducted in Danum Valley, Malaysian Borneo, where primary and selectively logged forests form a unique contiguous forest. Using mist-netting, we sampled birds in primary forest (control) and selectively logged forest. The population abundance trend of each species was estimated based on available data from 2015 to 2018. Species showing positive, negative and neutral population trends between the two types of forest were included in the study. To our knowledge, this is the first study investigating the relationship between biomarkers of oxidative status and population trends on a broad temporal scale. Results from this study will prove useful in evaluating ongoing silvicultural practices on birds and mitigation of their negative impact.

11:30	TUESDAY, 27TH AUGUST, 2019	WHITE STORK	S5-4
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Do natural cavities limit the population density of pygmy owls in managed boreal forest?

Daniele Baroni¹, Erkki Korpimäki¹, Vesa Selonen¹, Toni Laaksonen^{1,2}

¹Section of Ecology, Department of Biology, University of Turku, Turku, Finland; ²Natural Resources Institute Finland (Luke), Turku, Finland

Natural cavities are a critical resource for non-excavating hole-nesting birds, many of which are declining in northern Europe. In the heavily managed boreal forest in Finland, cavities may be a scarce resource, but their availability to different hole-nesters has been examined in only a few studies. We examined the abundance of suitable cavities in this managed landscape for a forest-dwelling predator, the Eurasian pygmy owl *Glaucidium passerinum*, which requires tree holes both for nesting and food hoarding. The abundance of natural cavities *per se* does not seem to limit the breeding density of this predator, as suggested by a low occupancy rate detected both in natural cavities and in nest-boxes. Moreover, cavities whose characteristics prevent the nest from being reached by predators were clearly preferred, as the owls select cavities with more than 5 cm width of the front wall and clean the cavities to get at least 15 cm of entrance-bottom distance within the cavity. The owls may however be limited by suitable habitat with abundant food supply around the available cavities (or by cavities in suitable habitats). They also need more cavities in the winter than in the summer, as each individual needs up to eight cavities of its own for hoarding food to survive over winter. Even if the cavities *per se* may not be currently limiting the population, effective conservation strategies for this forest specialist should include the maintenance of high-quality habitat that contains suitable cavities, supporting the need for protection of mature and old-growth forests.

11:45	TUESDAY, 27TH AUGUST, 2019	WHITE STORK	S5-5
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Importance of clutch predation risk for local capercaillie populations - a large-scale experiment in the Austrian Alps

Barbara Magdalena Waringer¹, Nina Gallmetzer¹, Felix Meyer¹, Julia Paterno¹, Katharina Neugebauer², Christian H. Schulze¹

¹University of Vienna, Vienna, Austria; ²University of Graz, Graz, Austria

Capercaillie (*Tetrao urogallus*) is declining all over Central Europe. Clutch predation is often discussed as additional threat to declining populations. In 2017 and 2018 a large-scale experiment assessing clutch predation risk in 9 different sampling areas in the Austrian Alps representing unlike capercaillie habitat scenarios was performed. 286 artificial clutches equipped with trail cameras were exposed for the average duration of a capercaillie breeding period and displaced after predation or 26 days. Additionally, vegetational parameters, the distance to the nearest forest road as well as potential predators occurring in the area were recorded. The main predators of the artificial clutches were pine martens *Martes martes*, red fox *Vulpes vulpes*, stone martens *Martes foina* and unidentified species. Predation by corvids (Northern ravens *Corvus corax*) was observed only in one

sampling area. The survival probability and the predation rates differed significantly between the sampling areas varying between 31.6% and 93.3% predated clutches. We found significant correlations between the survival probability of artificial clutches and ranked capercaillie occurrence in the sampling areas. Artificial clutches situated closer to forest roads were predicted to be predated quicker than clutches further away from roads. The main predating species (red fox or pine marten) did not differ in their ability to find covered clutches nor in their efficiency of finding clutches. Our results implicate the importance of visitor and waste management in capercaillie habitats and a cautious planning of new forest roads.

Symposium: From genes to behaviour: what mechanistic studies can tell us about migration

10:35	TUESDAY, 27TH AUGUST, 2019	COLLARED DOVE	S4-1
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Peeking in the black box: what physiology can tell us about bird migration

Cas Eikenaar¹, Zoltán Németh²

¹*Institute of Avian Research, Wilhelmshaven, Germany;* ²*University of Debrecen, Debrecen, Hungary*

The study of avian migration has boomed with the advancement of tracking technology; however, the regulatory mechanisms underpinning migratory behaviour by and large have remained hidden in the black box. This is surprising because (epi)genetic and physiological (e.g. endocrine, immunological and oxidative) processes are key in shaping an organism's phenotype in response to the challenges of migration. Guided by a simple conceptual model, we highlight recent advancements made on the regulatory roles of hormones in relation to the development of the migratory state as well as to the decision making processes employed en route. Furthermore, we discuss the novel idea of how oxidative challenges, arising during flight, could affect migration strategies. With this we hope to facilitate and promote the integrative study of migratory behaviour.

11:00	TUESDAY, 27TH AUGUST, 2019	COLLARED DOVE	S4-2
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From genes to behaviour: a functional genomic approach to study phenotypic flexibility of migratory birds

Valeria Marasco¹, Steve Smith¹, Leonida Fusani^{1,2}

¹*Konrad Lorenz Institute of Ethology, University of Veterinary Medicine Vienna, Vienna, Austria;*

²*Department of Cognitive Biology, University of Vienna, Vienna, Austria*

Phenotypic flexibility enables living organisms to adapt to changing environments over space and time. A remarkable example of such phenomenon is provided by migratory birds, which are capable of rapid and reversible changes in their activity rhythms, metabolism, and physiology. The molecular mechanisms underlying such phenotypic flexibility remain unclear. We have manipulated the photoperiod in a captive population of common quail (*Coturnix coturnix*) in order to simulate the temporal life history dynamics of the migratory phenotype. We compared groups of individuals with distinct migratory statuses as defined by monitoring fattening and nocturnal locomotor activity, and examined the brain transcriptome signature between these two experimental phenotypes. We find that the strongest transcriptome differences are skewed towards over-expression of genes in the birds sampled during the migratory period relative to those sampled during the non-migratory period. Such over-expressed genes appear to be involved in metabolic pathways controlling energy and fat metabolism. Moreover, gene expression differences between the two experimental phenotypes appear to be sex-dependent, with stronger changes in males compared to female birds. Our results reveal

mechanistic insights associated with the expression of the migratory phenotype and open new integrative and functional approaches to study phenotypic flexibility within relevant eco-evolutionary contexts.

11:15	TUESDAY, 27TH AUGUST, 2019	COLLARED DOVE	S4-3
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Understanding the molecular machinery shaping migratory phenotypes in the European blackcap

Miriam Liedvogel¹

¹*MPI Evolutionary Biology, Ploen, Germany*

Understanding the genetic architecture of migratory behaviour is a longstanding goal in avian biology. Blackcaps are ideal for this work as populations within this species exhibit dramatic differences in migratory behaviour and little else. Accordingly, any genetic difference we find between these populations is likely related to migration. There is also a tremendous body of research on the genetic basis of migration in this system. The key objectives of our work are to (i) characterize phenotype, population structure, evolutionary and demographic history of our study species the blackcap, and (ii) identify sequence variants and signalling pathways that are associated with variation of the migratory phenotype in this species. For accurate phenotype characterisation in the wild we use light-level geolocators to track birds on migration. Our current work focuses along the central European migratory divide/hybrid zone where we aim to directly evaluated hypotheses relevant to evolution, ecology and conservation. We interpret this insight within a solid framework of bird migration to ultimately integrate both phenotypic and genomic data to answer important questions in evolutionary ecology and genetics. In my talk I will give an overview on state of the art knowledge of migration genetics in the blackcap, covering insight from classical studies on selection and cross-breeding experiments, via quantitative genetics approaches, to finally introducing novel insight from recent work using a *de novo* assembled genome for the blackcap as reference in a comparative population genomics study with different phenotypes across their breeding range.

11:30	TUESDAY, 27TH AUGUST, 2019	COLLARED DOVE	S4-4
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Immune function and blood parasites as mechanistic regulators of stopover ecology

Arne Hegemann¹

¹*Lund University, Lund, Sweden*

Stopovers play a crucial role for the success of migrating animals and are key to optimal migration theory. Variation in refuelling rates, stopover duration and departure decisions among individuals has been related to several external factors. The physiological mechanisms shaping stopover ecology are, however, less well understood. The immune system is a particularly promising candidate for a physiological mediator because it is fundamentally important for self-maintenance and protects the body against diseases, but simultaneously incurs costs in terms of its production, maintenance and activation. As migrants encounter many pathogens and migration is costly, trade-offs with the immune system are likely. In this talk, I will review literature data and my recent own work showing how innate immune function and infections explain several aspects of stopover ecology in migrating birds. For example, several measures of immune function are correlated with stopover duration. Furthermore, correlational and experimental studies show that infected birds have longer stopovers than uninfected conspecifics. Even aspects of stopover behaviour can be linked to immune function and infection status. Finally, departure times are linked to blood parasite infections, with birds infected with multiple avian malaria strains leaving much later after sunset than uninfected birds, which in turn can have severe consequences for the length of the next flight. To conclude, immune function and infections can affect migration speed and

thus can have significant impact on migration success and induce carry-over effects on other annual-cycle stages. They should therefore be considered as important factors when applying optimal migration theory.

11:45	TUESDAY, 27TH AUGUST, 2019	COLLARED DOVE	S4-5
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Evaporative water loss as a determinant of stopover strategies in spring migrants during desert crossing

Ivan Maggini¹

¹*Austrian Ornithological Centre, Konrad-Lorenz Institute of Ethology, University of Veterinary Medicine Vienna, Wien, Austria*

Afro-European migratory Passerines have to cross the Sahara Desert twice a year. Most of the species do not perform the crossing in just one step, but use stopover sites for resting or refueling. Desert oases attract large numbers of migrants, but behavioural strategies at the stopover site differ among species. Previous studies have put forward the hypothesis that species adapted to arid habitats can afford active stopovers with refueling, while mesophilic species avoid activity and simply rest at the stopover site. We tested the prediction that activity patterns are constrained by evaporative water loss rates. We studied four closely related species on a gradient of breeding and/or wintering habitat aridity: Saharan olivaceous warbler (*Iduna pallida reiseri*), Western olivaceous warbler (*Iduna opaca*), melodious warbler (*Hippolais polyglotta*), and European reed warbler (*Acrocephalus scirpaceus*). The study was conducted during spring migration at an isolated oasis in Morocco which offers vegetation but no surface water. We measured birds in a respirometry chamber and assessed respiratory and cutaneous water loss. After the measurement, the birds were tagged and their activity monitored with an automated radiotelemetry system. Our results showed that cutaneous evaporation is higher, and diurnal activity lower in the species on the mesophilic end of the gradient. This suggests that the composition of skin membranes differs between species with different arid adaptations, facilitating evaporative water loss and constraining their ability to forage during stopovers in the desert.

Symposium: Immune function as a mediator of trade-offs

10:35	WEDNESDAY, 28TH AUGUST, 2019	CORNCRAKE	S8-1
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Immune response, oxidative damage, and triglyceride levels exhibit different dose-dependent relationships with intensity of immune challenge

Michael Butler¹, Ellen Armour^{1,2}, Justin Hines¹

¹*Lafayette College, Easton, USA;* ²*Drexel University, Philadelphia, USA*

Mounting an immune response destroys pathogens, but this response comes at a physiological cost, including the production of oxidative damage or the modification of nutrient metabolism. Many investigations into the effects of immune challenges employ a single high dose, meaning that the consequences of more mild (and common) immune challenges are poorly resolved. We tested how degree of immunological challenge modifies oxidative physiology, markers of the immune response, and lipid metabolism. We injected 5 different doses of lipopolysaccharide (LPS) into northern bobwhite quail (0, 0.001, 0.01, 0.1, or 1 mg LPS / kg body mass) and quantified oxidative damage (d-ROMs), antioxidant capacity (OXY), biliverdin concentration (a putative antioxidant), heme oxygenase levels (the enzyme that produces biliverdin), haptoglobin (an acute phase protein that is part of the immune response), circulating triglyceride and glycerol levels (metrics related to lipid metabolism), and change in body mass over the 19-hr experiment. Only the highest dose of LPS reduced body mass and lowered circulating triglyceride levels, while lower doses had no effect on these metrics, suggesting

minimal metabolic costs of mild immune challenges. However, all doses of LPS induced oxidative damage, with the highest dose generating the most oxidative damage, demonstrating that even mild immune challenges affect oxidative physiology. We also found an inverse relationship between oxidative damage and biliverdin amount in the spleen, which may indicate that biliverdin physiologically acts as an antioxidant. Lastly, oxidative damage was robustly predicted by circulating haptoglobin levels, providing insights into the interplay between immune challenges and oxidative physiology.

11:00	WEDNESDAY, 28TH AUGUST, 2019	CORNCRAKE	S8-2
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Effect of maternal immunization on nestling immunity and energetics

Gary Burness¹, Deanna Moher¹

¹Trent University, Peterborough, Canada

Female birds transfer various compounds to their nestlings via the egg, including maternally-derived antibodies (matAb). MatAbs are thought to provide passive protection to nestlings while their own immune system is maturing and may also allow nestlings to avoid the costs associated with mounting an innate immune response. To test for possible energetic consequences to nestlings of receiving matAb, we injected breeding female tree swallows (*Tachycineta bicolor*) prior to egg laying with either lipopolysaccharide (LPS) or saline (Control). We then injected one half of each female's nestlings with either LPS or saline and measured the nestlings' metabolic rate over the following 4-hours. Despite our expectation, growth rates of all nestlings were reduced following nestling immunization with LPS, indicating that exposure of mothers to LPS pre-laying did not allow nestlings to avoid growth-suppressive effects due to activation of an inflammatory response. However, control-nestlings of LPS-immunized mothers had higher metabolic rates than control-nestlings from control-mothers. We hypothesize this increase in energy expenditure was due to costs of non-specific priming in nestlings from LPS-immunized mothers. Near fledging, nestlings of LPS-immunized mothers also had an enhanced inflammatory response to phytohaemagglutinin and increased fledging success. Whether the patterns we detected were due to matAbs or hormones transferred *in ovo* is not clear; in fact, studies of other species suggest a role for glucocorticoids. Our data suggest that maternal immunization can increase fitness for mothers and offspring, but only if there are sufficient resources to offset the increased energetic needs of nestlings.

11:15	WEDNESDAY, 28TH AUGUST, 2019	CORNCRAKE	S8-3
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Immunological variation in a long-lived seabird: what can we learn from a longitudinal study?

Coraline Bichet¹, Kevin Matson², Oscar Vedder¹, Sandra Bouwhuis¹

¹Institute of Avian Research, Wilhelmshaven, Germany; ²University of Wageningen, Wageningen, Netherlands

Variation in the strength of immune defences, both within and between individuals, likely influences resistance to parasites and pathogens. To understand this variation, ecologists have focussed on the roles of life-history trade-offs and environmental variation, but longitudinal studies that span the lifetimes of animals are exceedingly scarce. Such studies are highly relevant since trait expression is often affected by viability selection and ontogenetic processes, both of which can affect trade-off resolution. We collected and analysed longitudinal individual-based data on immune defences as part of an exceptionally detailed multi-decade study of a long-lived seabird, the common tern (*Sterna hirundo*). Specifically, we measured three innate immune parameters: hemagglutination and hemolysis titres and haptoglobin concentrations. We evaluated how these parameters vary with age by assessing the roles of both within-individual change and selective (dis)appearance.

In addition, we tested whether immune parameters correlated with variation in fitness components in order to highlight potential trade-offs.

11:30	WEDNESDAY, 28TH AUGUST, 2019	CORNCRAKE	S8-4
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Environment explains seasonal differences in baseline innate immune function better than annual cycle stages in a year-round breeding tropical songbird

Chima Nwaogu^{1,2}, Will Cresswell³, Maaïke Versteegh⁴, Irene Tieleman⁴

¹Fitzpatrick Institute, Cape Town, South Africa; ²A. Leventis ornithological Research Institute, Jos, Nigeria;

³University of St Andrews, St. Andrews, United Kingdom; ⁴University of Groningen, Groningen, Netherlands

Seasonal variation in immune function is often attributed to environment or life history trade-offs arising from investments in annual cycle stages (ACS). Yet, decoupling ACS effect from that of seasonal environmental condition is difficult, particularly in natural temperate populations. Here, by exploiting cross-seasonal breeding and moult in the tropical common bulbul *Pycnonotus barbatus* we effectively decouple ACSs from environmental variation and test the main and interactive effects of both factors on baseline innate immune function at population and individual level. We expected immune function to be higher in the wet season due to increased environmental productivity and lower during breeding or moult due to resource constraints. We sampled birds in four annual cycle stage categories: breeding, moult, simultaneous breeding and moulting, or neither. We quantified immune indices (haptoglobin, nitric oxide (NO_x) and ovotransferrin concentrations, and haemagglutination and haemolysis titres) over two annual cycles of wet and dry seasons. Environment (i.e wet or dry season) explained variation in all immune indices, except NO_x; which differed between ACSs but not between seasons. Population patterns were largely consistent within individuals. Interestingly, immune indices were higher in the dry season and for breeding birds; suggesting that aridity does not lower immune challenge and birds may not trade-off immune function during breeding, respectively. Overall, seasonal differences in baseline innate immune function were better explained by environment than ACSs; thus, differences in immune function between ACSs in species with seasonally constrained ACSs may arise from environmental seasonality rather than energetic trade-offs between ACSs and immune function.

11:45	WEDNESDAY, 28TH AUGUST, 2019	CORNCRAKE	S8-5
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Importance of local immune response in eco-immunology: a study in house sparrows (*Passer domesticus*)

Gábor Árpád Cziráj¹, Melissah Rowe^{2,3}

¹Department of Wildlife Diseases, Leibniz Institute for Zoo and Wildlife Research, Berlin, Germany;

²Natural History Museum, University of Oslo, Oslo, Norway; ³Centre for Ecological and Evolutionary Synthesis, Department of Biosciences, University of Oslo, Oslo, Norway

A fundamental principle in life-history theory is that the evolution of traits that increase fitness will be constrained by trade-offs between them. Trade-offs exists because, for a given amount of resources, increased investment into one trait decreases the amount of resources available for investment into alternate traits. Trade-offs between immunity and reproduction provide the foundation for a number of prominent models of sexual selection and several studies now support the idea of a trade-off between general immunity and sperm quality, though the mechanism(s) underlying this relationship remain unclear. We hypothesized that molecules contributing to general innate and adaptive immunity may also be present in ejaculate and that there is a trade-off in terms of allocation of these substances between general and local immunity in the reproductive system. To explore this idea, we assayed total immunoglobulin levels and lysozyme-associated bactericidal

activity of plasma and ejaculate from free-living house sparrow males and tested for evidence of a phenotypic trade-off between these two measures. Additionally, we measured sperm motile performance of individuals and tested for a relationship between immunity and sperm quality. Finally, we also collected preen oil from males and investigated the immune function of this secretion. We discuss the phenotypic correlations observed in the context of trade-offs between reproduction and immunity, and also provide the first evidence of immune-related molecules in the preen oil of birds. These findings enhance our understanding of trade-offs relevant to theories of sexual selection and also emphasize the importance of studying the local immunity in eco-evolutionary context.

Symposium: Invasive birds in Europe: trends, drivers and impacts as a mediator of trade-offs

10:35	TUESDAY, 27TH AUGUST, 2019	CORNCRAKE	S3-1
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Human-habitat associations in the native distributions of alien bird species

Laura Cardador¹, Tim Blackburn¹

¹*University College London, London, United Kingdom*

The role of human tolerance is increasingly being proposed as a key driver of invasion success. Human habitat associations may facilitate transport, making a species more available for introduction, and also facilitate establishment by creating environmental matching between human-altered habitats at the sites of origin and introduction. Nevertheless, the assumption that alien species exhibit associations with human habitats in their native ranges has been largely overlooked. We conduct the first global assessment of the relative importance of human habitat associations in shaping the native distributions of 776 bird species introduced worldwide, in relation to other key important drivers, i.e., climate and land-use. For this, we applied deviance partitioning analysis and species distribution models (SDM) to 776 introduced alien bird species from five continents. Our results support the hypothesis that association with humans may be an important driver of alien bird species distribution in their native ranges, and thus increase the likelihood that these species will end up being introduced. For the subset of established species, we then assess whether accounting for human associations in native ranges can improve accuracy of predictions of invasion risk derived from species distribution models. In general, inclusion of human related variables improved model predictions for established species. However a shift towards occupation of more altered habitats in alien ranges was observed for species not selecting or avoiding this type of habitats in their native ranges.

11:00	TUESDAY, 27TH AUGUST, 2019	CORNCRAKE	S3-2
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Quantifying and categorising the environmental impacts of alien birds

Thomas Evans¹

¹*Free University of Berlin, Berlin, Germany*

Despite the increasing numbers of alien species, and the damage they can cause, we lack comparable data on their impacts to allow us to determine the causes and consequences for different invasions, and the species we should worry about and why. Thus, an urgent challenge for invasion science is to develop measures to quantify and categorise the impacts of alien species. The Environmental Impact Classification for Alien Taxa (EICAT) can be used to categorise alien species by the severity and type of their impacts. It will shortly be adopted by the IUCN, which aims to publish EICAT assessments for all known alien species world-wide by 2020. In this presentation, I will provide an overview of a recent set of studies that applied EICAT to quantify and categorise

the environmental impacts of all alien bird species world-wide. I will show how this work has improved our understanding of the severity and type of impacts generated by different orders of alien birds, and of the factors that influence whether we have impact data for alien bird species, the severity of their impacts, and the spatial distribution of alien bird impacts.

11:15	TUESDAY, 27TH AUGUST, 2019	CORNCRAKE	S3-3
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Population dynamics and decision-making models of the monk parakeet to investigate alternative management scenarios

Juan Senar¹, Tomas Montalvo², Michael Conroy³

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Science-based conservation and management of pest species necessarily needs of the estimation of key population dynamics parameters, modeling and decision making analyses. Monk parakeets *Myiopsitta monachus* are among the bird species responsible for the highest potential economic impact. Here we provide detailed breeding parameters for the population of monk parakeets, in Barcelona, Spain, based on data collected for 651 nests over five breeding seasons. This invasive population has a high reproductive capacity compared to the native range: fledging success (3.3 chicks) was double, the percentage of pairs attempting second broods (56%) three times higher, and 55% of one-year old birds bred compared to almost zero in South America. Survival rate (80%) was however similar to that in South America. We created then a life-cycle model that simulates the growth of the monk parakeet, based on these population dynamics parameters. The model, nicely reflected population growth of the species in Barcelona in the last 25 years. This allowed forecasting the impact of different control methods and efforts on population growth. Results showed that culling was far more effective than reducing reproductive success, provided that it eliminated >30% of the birds per year. However, egg poking or similar methods, exerted on 100% of nests, would need >40 years to eradicate any large (>5,000 birds) population. Optimization analysis, having into account efficiency and costs, revealed shooting as the more effective and economic method. The model allowed to estimate the best control method and the total cost for any population size scenario.

11:30	TUESDAY, 27TH AUGUST, 2019	CORNCRAKE	S3-4
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Niche filling rather than competition: the success of rose-ringed parakeets in Europe

Liviu G. Pârâu¹, Bernadette Gross^{1,2}, Michael Braun¹, Michael Wink¹

¹*Institute of Pharmacy and Molecular Biotechnology, Heidelberg University, Heidelberg, Germany;* ²*Zoological Institute, Department of Ecology and Parasitology, Karlsruhe Institute of Technology, Karlsruhe, Germany*

Alien species represent a significant component of human-driven environmental changes, which can occasionally cause damage to biodiversity, agriculture and economy. In Europe 74 alien bird species have established populations. The rose-ringed parakeet (RRP) *Psittacula krameri* is the most abundant alien parrot. Previous studies have investigated the species' general impact on local ecosystems, but close-to-nothing is known about their diet. Existing data on the plant species and plant parts consumed by RRP in Europe were collated from the following sources: (a) literature search, (b) comments in bird sighting databases and (c) personal observations. We found 107 plant species on which the parrots are known to feed. To a great extent, these are wild trees and shrubs. Additionally, they feed on cultivated fruit trees and exotic garden plants. Most often they consume the green buds, flowers, fruits, seeds and young twigs of the plants. Many of the food items

taken by the parrots contain phytotoxins and poisonous secondary metabolites and are mostly not part of the diet of the native bird species. Our synthesis reveals that RRP have a diverse diet and most often they consume toxic plant parts which are not eaten by native species. Therefore, the success of the RRP as a neozoon comes primarily from niche filling behaviour rather than superiority in competition with native species.

11:45	TUESDAY, 27TH AUGUST, 2019	CORNCRAKE	S3-5
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Sharing the burden – transport of alien bird species from established populations to less successful regions of 19th century New Zealand

Pavel Pipek^{1,2}, Petr Pyšek^{1,2}, Tim M. Blackburn^{3,4}

¹Department of Ecology, Charles University in Prague, Prague, Czech Republic; ²Department of Invasions Ecology, Průhonice, Czech Republic; ³Centre for Biodiversity and Environment Research University College London, London, United Kingdom; ⁴Institute of Zoology, Zoological Society of London, London, United Kingdom

New Zealand is one of the countries most invaded by alien species. Besides mammalian predators, which threaten the native endemic fauna, local acclimatisation societies imported more than a hundred species of birds, forty of which successfully established. While these birds are not thought to have huge impact on native ecosystems, they became a popular model system for assessing the role of propagule pressure in the invasion „lottery”; the societies kept records about the numbers of imported and subsequently released individuals. The credibility of these data has been questioned, though, as different authors report different numbers of individuals released into particular regions of New Zealand. Using historical records combined with extensive study of newspaper articles, we show that for two species, common starlings (*Sturnus vulgaris*) and Eurasian skylarks (*Alauda arvensis*), the principal cause of the discrepancy between researchers is that only some of them included translocated birds - individuals that did not come from populations within the native range, but were recruited from already established populations in other regions of New Zealand. In some parts of New Zealand, e.g. Wellington or Hawke’s Bay, the majority of birds were imported this way. Our results have implications for studies of propagule pressure, but also for studies of population genetics and spread of alien birds.

Symposium: Living at high elevations – adaptations and current challenges

10:35	WEDNESDAY, 28TH AUGUST, 2019	WRYNECK	S7-1
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Life histories in birds at high elevations

Sabine Hille¹

¹University of Natural Resources and Life Sciences, Vienna, Vienna, Austria

High elevations demand from birds adaptations to extreme environmental conditions that even heavily change over the seasons. We would expect evolution of physiological and life history traits to result in individuals that exhibit fitness under these conditions. The Pace-of-Life Syndrome (POLS) is a framework to describe the slow–fast axis of variation in life-history and physiological traits. The POLS corresponds to latitudinal gradients, with tropical birds exhibiting a slow pace of life, with a higher investment in survival over reproduction. In contrast birds at higher latitudes in the cold regions exhibit a fast pace with a higher investment in reproduction over survival. High altitudes resemble in many environmental features the higher latitudes. So, should the birds at high altitudes also demonstrate a fast pace as in high latitudes? Recent studies reveal that birds breeding at high elevations in temperate zones exhibit a combination of traits creating a unique elevational pace of life with a central trade-off similar to a slow pace but physiological trade-offs more similar to a fast pace. We propose

extending the POLS framework to include trait variation of elevational clines to help to investigate complexity in global geographic patterns and to take account of ongoing global change.

11:00	WEDNESDAY, 28TH AUGUST, 2019	WRYNECK	S7-2
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Climatic and environmental limits for the biology and ecology of a high-elevation mountain bird

Davide Scridel^{1,2}, Mattia Brambilla^{1,3}, Christian Schano^{4,5}, Fränzi Korner-Nievergelt⁴, Paolo Pedrini¹

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Mountains are globally important areas for birds. Species inhabiting these regions are poorly studied and considered threatened from climatic alterations. In Italy we found a strong positive correlation between species' historic changes in range size and their thermal index (average temperature at occurrence sites). This pattern confirms that recent warming has favoured birds of warmer climates and disfavoured species of colder/alpine habitats. One of the most threatened birds is the white-winged snowfinch (*Montifringilla nivalis*), a species confined to the highest elevations (>2000m). Here, we aim at describing habitat and seasonal, meteorological and social factors affecting the biology, demography and ecology of this bird to derive measures for mitigation and compensation of impacts. We found evidence that snowfinches rely on climate-sensitive resources to forage for invertebrates during the breeding period and are highly capable of tuning their selection in relation to trophic availability, which, at high elevation, is particularly variable in space and time. However, the selection of these specific microhabitats is influenced by the surrounding landscape, suggesting that climate change will not impact on this species homogeneously. Populations mostly relying on climate-sensitive resources (such as snow patches for rock-dwelling populations) are likely to be more affected than others (grass-dwelling), potentially modulating the direct impact of climate change. For this species, conservation actions rely on identifying the most resilient and resistant population and to apply dedicated habitat management (i.e. grazing) which could buffer some negative impacts of climate change by improving foraging microhabitat suitability during the critical phase of reproduction.

11:15	WEDNESDAY, 28TH AUGUST, 2019	WRYNECK	S7-3
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Distinct between-year variance in the hatching date of snowfinches and its relation to snow cover fraction

Christian Schano^{1,2}, Tobias Jonas³, Fränzi Korner-Nievergelt¹

¹*Swiss Ornithological Institute, Sempach, Switzerland;* ²*Department of Evolutionary Biology and Environmental Studies, University of Zurich, Zurich, Switzerland;* ³*WSL Institute for Snow and Avalanche Research SLF, Davos, Switzerland*

High-elevation bird specialists are well adapted to the harsh and extreme conditions of alpine environments. Timeframes to successfully rear offspring in this environment are specifically short and strongly depend on the weather and snow situation. On one hand, breeding periods are relatively roughly determined by endogenous circannual rhythmicity following reoccurring cycles. More flexible, adaptive timers on the other hand, need to reliably predict habitat quality and food availability prior to ideal conditions to successfully address fluctuations in temporal environmental conditions. White-winged snowfinches, *Montifringilla nivalis*, frequently collect insect larvae at snow patch margins in close proximity to their nesting sites to rear their offspring. By implication, such feeding habitats are threatened by recent climatological change, indicating both warmer temperatures and

increasing frequencies of extreme weather conditions simultaneously. We investigated how the initiation of breeding is related to snow cover in order to understand the strategies of snowfinches to adapt to their changing environment. We therefore analysed a long-term citizen science dataset (1999 – 2018) of random snowfinch observations from the Swiss Alps. We calculated mean annual hatching dates based on breeding codes recorded per observation. By matching date and location of each hatching record with a national-wide daily snow cover fraction product, the timing of hatching could be analysed in terms of the concurrent snow situation. We show that average hatching dates underlie distinct between-year variation, reveal its relation to snow cover and address the consequences for the reproduction of snowfinches in their currently changing, highly unpredictable environment.

11:30	WEDNESDAY, 28TH AUGUST, 2019	WRYNECK	S7-4
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The importance of seasonal environmental factors in the foraging habitat selection of Alpine ring ouzels

Arnaud Barras¹, Sophie Marti¹, Veronika Braunisch^{1,2}, Raphaël Arlettaz^{1,3}

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Birds of mountain ecosystems are predicted to be particularly impacted by climate and land-use changes, yet data on their ecology is often deficient. Field-based studies appear therefore essential to refine our understanding and predictions on how those threats will affect bird populations, and consequently develop clear guidelines for conservation management. Here, we focus on the ring ouzel *Turdus torquatus alpestris*, a poorly investigated and threatened Alpine species typical of the timberline ecotone. Our aim was to identify key ecological requirements during the crucial period of nestling provisioning. For this purpose, we monitored the foraging habitat selection of 28 individuals in 2015 & 2017 using radio-tracking. Foraging birds selected, consistently in space and time, short grass swards (<10 cm) with interspersed patches of accessible and soft soils, at intermediate moisture levels (40-70%). This habitat configuration is widespread in alpine ecosystems during the spring snowmelt, but becomes increasingly scarce over the course of the breeding season, resulting in a very short time window suitable for reproduction. In that respect, our results suggest a high vulnerability of the species under global change: earlier snowmelt, as predicted under most scenarios of climate change, might lead to a temporal mismatch between optimal foraging conditions and the breeding effort, while the abandonment of pasturing activities will additionally diminish the occurrence of short and heterogeneous grass swards. Nevertheless, targeted management strategies (e.g. extensive grazing) could improve habitat suitability to some extent, as already suggested for other timberline bird species.

11:45	WEDNESDAY, 28TH AUGUST, 2019	WRYNECK	S7-5
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Group dynamics in an alpine nomadic species

Maria del Mar Delgado¹, Chiara Bettega¹, Mattia Brambilla^{2,3}, Miguel de Gabriel Hernando⁴, Antonio España⁵, Angel Fernandez-Gonzalez⁶, Angel Fernández-Martín⁵, Juan Antonio Gil^{7,8}, Sergio Hernández-Gómez⁵, Paolo Laiolo¹, Jose Ramon Obeso¹, Claire Pernellet⁹, Jaime Resano¹⁰, Isabel Roa-Álvarez¹¹, Davide Scridel², Eliseo Strinella¹², Ignasi Toranzo⁵, Fränzi Korn⁹

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Quebrantahuesos, Zaragoza, Spain; ⁸*2. Estación Zaragoza-Delicias, Zaragoza, Spain;* ⁹*Swiss Ornithological Institute, Sempach, Switzerland;* ¹⁰*Swiss Ornithological Institute, Bern, Switzerland;* ¹¹*Grupo Iberico de Anillamiento, León, Spain;* ¹²*Department for Biodiversity, State Forestry Agency, L'Aquila, Italy*

Nomadism is characterized by unpredictable movement patterns in space and time, commonly associated with highly fluctuating resources and opportunistic breeding or foraging. To date, nomadism remains a highly complex and little understood ecological response. While some species undertake nomadic movements only when resource availability across the wider landscape is low, others undertake nomadic movements in good conditions and become sedentary when conditions degrade. In both cases, this strategy is thought to confer significant advantages to individuals by facilitating them to gain knowledge about the location of resources and refugia. Unlike other movements like dispersal, all members of a nomadic species may leave an area, and move together from patch to patch. Despite its importance, little is known about group dynamics, i.e. the size of the group and its change through time, of nomadic species. For example, group size might influence social information, which is important in many ecological and evolutionary contexts, such as foraging, mate choice, habitat selection and space use. Depending on the relative costs and benefits of conspecific aggregation, individuals may be attracted to or repulsed from other individuals. In many cases, group dynamic is context-dependent and change over time as a response to e.g. varying environmental conditions. Here, by analysing an extensive (16,187 observations) and long-term (1954-2017) database acquired in four populations, we studied the spatio-temporal patterns of group dynamic of snowfinches (*Montifringilla nivalis nivalis*), as a case example of an alpine species adopting a nomadic strategy to cope with extreme and fluctuating weather conditions in winter

Symposium: Number and distribution of birds of Northern Eurasia

10:35	WEDNESDAY, 28TH AUGUST, 2019	NIGHTJAR	S6-1
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Number and distribution of birds in Siberian and in Romanian forest-steppe and steppe in winter

Sergej Soloviev¹

¹*Dostoevsky Omsk State University, Omsk, Russian Federation*

Winter in Irtysh forest-steppe and steppe the greatest density of bird populations, as opposed to the summer, marked in residential type of population. So, in the meadows, fields and steppes in the list are the dominant species consist in Eurasian goldfinch, Northern bullfinch, snow bunting, black and white-winged larks, snowy owl, jackdaw, black grouse, waxwing and fieldfare. Spatial-typological structure of birds ornithocomplexes Western Siberia. In Romania the steppe region is restricted to the north-east and south-east of the country. During winter the bird species are represented by sedentary ones, but also lot of species form the north of the continent or from Siberia come to wintering in Romania. Some of the birds prefer to winter inside the villages or cities like passerines, especially crows, sparrow and finches or long-eared owl. In the forest dominate the birds like finches, tits, thrushes, woodpeckers, owls and gamebirds. In open areas steppe some are foraging in lawns or other in aquatic basins. From first categories dominant are buntings, finches, sparrows, starlings, crows, great grey shrike and larks. Aquatic species are represented by wildfowl, loons, grebes, grey heron, bittern, great white egret, and gulls. In steppe areas appear also a big number of birds of prey: common buzzard, rough-legged buzzard, hen harrier, white-tailed eagle, goshawk, sparrowhawk, merlin and short-eared owl.

11:00	WEDNESDAY, 28TH AUGUST, 2019	NIGHTJAR	S6-2
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Lesser white-fronted geese nesting in association with peregrine falcon in southern Yamal, Russia

Olga Pokrovskaya¹, Alexander Sokolov¹, Vasilii Sokolov², Natalya Sokolova¹, Dorothee Ehrich³

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The lesser white-fronted goose *Anser erythropus* is a globally threatened species, which has been rapidly declining since the middle of 20th century. The main breeding range is in the subarctic zone of northern Russia and consists of separated breeding grounds from Malozemelskaya tundra (European Russia) to Chukotka. General data about nesting habitats based on observations of broods or pairs with breeding behavior are known from most of the breeding range, but only very few reports of nest sites and associations with other species have been published. Along the Erkuta River in southern Yamal, the first broods were recorded in 1999 and the first nest was found in 2006. In 2006-2014 up to 2 nests per season were found. In 2015-2018, we found 17 nests with a maximum of 7 nests in 2016. Before 2018, all nests were found close to breeding pairs of Peregrine Falcon and only in 2018 we found 2 nests without Peregrines as neighbors, but also close to their former breeding territory. An association of lesser white-fronted goose with peregrine falcon or other predator species (gyrfalcon, rough-legged buzzard and some gull species) has only rarely been observed. Almost every year, we also recorded egg dumping among breeding lesser white-fronted geese. Regular egg dumping suggests a local increase of the breeding population and the presence of young unexperienced pairs together with a limited availability of safe nesting sites close to peregrines. Altogether, our results indicate that the population at Erkuta may be growing.

11:15	WEDNESDAY, 28TH AUGUST, 2019	NIGHTJAR	S6-3
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Spatially referenced database on avifauna of the Nenets Autonomous Okrug (Russian European Arctic)

Petr Glazov¹, Olga Pokrovskaya², Julia Loshchagina¹

¹Institute of geography RAS, Moscow, Russian Federation; ²Arctic research station of Institute of Plant and Animal Ecology RAS, Labytnangy, Russian Federation

Birds are the main component of the Arctic ecosystems. Under implementing of UNDP/GEF/Russian Ministry of Nature project “Mainstreaming Biodiversity Conservation into Russia’s Energy Sector Policies and Operations”, an avifauna database was developed for the Nenets Autonomous Okrug (NAO) located within Russian European Arctic. The database comprises spatially referenced observations of bird species according to the literature data published since 1876 till present time. For this moment, the database contains more than 10000 records from more than 750 literature sources. Avifauna of NAO includes 234 bird species from 18 orders, from which 149 species are nesting. The most diverse groups are Passeriformes (76 species), Charadriiformes (61 species) and Anseriformes (38 species). Seven orders (Podicipediformes, Procellariiformes, Pelecaniformes, Ciconiiformes, Caprimulgiformes, Upupiformes and Apodiformes) are presented by vagrant species only. The most numerous species complex of the avifauna in the region is arctic (often circumpolar) species (29%). This category includes typical tundra- and open-nesting species. 24% of birds are comprised of Siberian species, 14% –European species and 26% are widely distributed species. Avifauna of Bolshezemelskaya tundra, Malozemelskaya tundra and the Pechora Delta is the best studied within the mainland part of NAO. In the last decade, Kolguev, Vaygach and Dolgy Islands were actively studied. Nevertheless, ornithological studies even in these areas are very local due to logistic problems. Based on the database, the territory of NAO was ranked according to the importance of the habitats for birds. The most significant areas are coastal zones and island ecosystems.

11:30	WEDNESDAY, 28TH AUGUST, 2019	NIGHTJAR	S6-4
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Estimation of the migration pattern of passerines within SE European flyway

Przemysław Busse¹

¹*Bird Migration Research Foundation, Przebendowo, Poland*

The migration pattern of passerines could be theoretically estimated using different methods. Number of partial, usually species limited, analyses were published presenting ringing data. A very few continent scale presentations were offered, as for passerines they need an extremely long periods of ringing activity. This is especially true for areas where the recovery rate is very low, as huge area of northeastern and eastern Europe and the Near East/Africa. Similarly, the radar and moon-watching studies are of limited value for drawing migration patterns within wider areas. The radar studies need good coverage by the radar systems, while weather radar distribution density is very unbalanced. Modern logger and satellite tracing is applicable rather for non-passerines and still can help for detail studies of limited numbers of individuals and not for population studies. Since end of XX-th century a very simple tool was introduced for a field studies on preferred headings of individual birds caught for ringing. This is use of flat orientation cages. This method was introduced as a standard within the SEEN (SE European Bird Migration Network) since 1995. The presentation contains preliminary big scale evaluation of the data collected within this project. The database used contains more than 45 000 orientation tests performed at 40 ringing sites. The area covered is from the northern part of western Russia to southern Egypt and from Italy and Poland to Siberia and Armenia. Within this area there are identified eight streams of migration that create a quite complicated pattern of movements.

11:45	WEDNESDAY, 28TH AUGUST, 2019	NIGHTJAR	S6-5
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The spatial distribution of the great tit (*Parus major*) in the urban and suburban areas in the breeding season

Ivan Frolov^{1,2}

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The aim of the research is to define the functional connection between the great tit breeding distribution and geographical factors. Urban areas are the areas with the highest number of great tits in wintering due to abundant food supplies. The level of urbanization was determined by calculating the human population density in each square km. The other factor influencing the great tit distribution is an area of «field-forest lands»topoarchitecture type. Topoarchitecture represents protective properties of the environment that are preferred by great tits during breeding season. The map of «field-forest lands»was created using satellite imagery to determine the distribution of preferred topoarchitecture around the city (Novosibirsk) in the circle of 100 km. To cover vast areas route bird accounts were ranged up to 80 km away from the city in four directions. Bird accounts were conducted in 37 locations including city centre, suburban parks, birch and mixed forests in the breeding season (16 April –15 May) and in the wintering season (January). For each location, minimal length of a route account was 5 km in a half of each month. It was found that great tits tend to shorten the distance of the migration by occupying the nearest available nesting site during spring migration from wintering sites. This leads to the decreasing of bird population density with the increasing of distance from the city (other things being equal). Pearson correlation coefficient between breeding bird density and distance from the city varies from 0.75 to 0.92 in different years.

Symposium: Shifting the focus: avian life-history stages from the perspective of understudied hormonal systems

10:35	TUESDAY, 27TH AUGUST, 2019	WRYNECK	S2-1
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The role of thyroid hormones in coordinating avian life-histories

Suvi Ruuskanen¹, Bin-Yan Hsu¹, Tom Sarraude^{1,2}, Antoine Stier^{1,3}

¹*Department of Biology, University of Turku, Turku, Finland;* ²*University of Groningen, Groningen, Netherlands;* ³*University of Glasgow, Glasgow, United Kingdom*

Thyroid hormones (THs) have often been seen as purely metabolic hormones, and they have gained relatively little attention in eco-evolutionary context in birds. Yet, individuals are exposed to THs starting prenatally, and THs have key pleiotropic functions both in development and coordinating transitions across life-history stages, such as initiation of breeding, moult and migration, often interacting with other hormonal axes. We provide an up-to-date overview on the importance of THs on life-history stages in birds. Furthermore, our recent results using experimental manipulations revealed that prenatal THs can have programming effects, influencing hatching, growth and biological markers of aging, and potentially also on initiation of reproduction and moult. We also show, using a comparative analysis with 34 species, that prenatal THs are associated with life-history strategies across species: altricial-precocial continuum and migratory vs resident species. Thus, THs certainly are key hormones widely affecting individual phenotype and performance, and we call for more research effort in an eco-evolutionary setting.

11:00	TUESDAY, 27TH AUGUST, 2019	WRYNECK	S2-2
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Role of the gut-hormone ghrelin during flight in a long-distance passerine migrant

Sara Lupi^{1,2}, Leonida Fusani^{1,3}, Scott MacDougall-Shackleton², Christopher Guglielmo²

¹*Konrad-Lorenz Institute of Ethology, University of Veterinary Medicine, Vienna, Austria;* ²*Advanced Facility for Avian Research, University of Western Ontario, London, Canada;* ³*Department of Cognitive Biology, University of Vienna, Vienna, Austria*

Every year, billions of birds migrate between breeding territories and favorable wintering grounds. Migration involves alternation between non-stop flights, when birds experience prolonged high-intensity exercise and starvation, and stopover periods, when birds can rest and refuel for the next migratory flight. It is crucial for birds to rapidly adjust behavior and physiology to each phase, a switch that is likely triggered by hormones. Because fat stores are the main source of energy to fuel migratory flights and represent the main predictor of migratory decisions, the study of appetite-regulating hormones has become a priority in migration physiology. Ghrelin is a peptide mainly produced by the stomach of birds, which is involved in the control of stopover behavior. We recently discovered that circulating ghrelin levels positively reflect the extent of fat stores in a wild passerine caught at a spring-stopover site. We also found that ghrelin manipulation reduces food intake and increases migratory disposition, i.e. urge of captive birds to migrate. In the current study, we investigate the effects of endurance flight on circulating ghrelin levels and expression of ghrelin mRNA in the stomach, using the long-distance migrant blackpoll warbler (*Setophaga striata*). Further, we test whether post-exercise food intake is associated with circulating ghrelin upon exercise completion. To meet our objectives, we make use of an hypobaric, climatic wind tunnel to artificially migrate birds for different flight times up to 8 hours. The results of this study offer novel insights into the role of appetite-regulating hormones on avian migratory flight.

11:15	TUESDAY, 27TH AUGUST, 2019	WRYNECK	S2-3
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Prolactin as a mediator of parental investment in birds: an understudied hormonal mechanism

Frédéric Angelier¹, Olivier Chastel¹

¹*Centre d'Etudes Biologiques de Chizé, Villiers en Bois, France*

In birds, phenotypic adjustments to environmental changes are often mediated by central hormonal mechanisms. Because of its central role in mediating the stress response, corticosterone is often considered as one of the main endocrine mechanisms that governs the transitions between life-history stages in birds. For example, elevated corticosterone levels are classically known to trigger the transition from the breeding stage to the non-breeding stage (i.e. breeding desertion). However, this relationship between circulating corticosterone levels and breeding decisions appears more complex than initially thought because elevated corticosterone levels are not consistently associated with a reduction of parental care in birds. In that context, we studied in several bird species the prolactin hormone, which has a great potential to better understand the regulation of parental investment. Firstly, we report strong evidence that prolactin is involved in the expression of parental care, but also that elevated prolactin levels are associated with better breeding success in wild birds. Secondly, we demonstrated that prolactin levels are affected not only by environmental conditions (ex: stress) but also by the internal state of an individual (ex: condition, age). Importantly, we also found that the regulations of circulating corticosterone and prolactin levels are connected in a complex way. Overall, these results suggest that prolactin and corticosterone could act together to mediate the parental responses to environmental constraints. To conclude, we think that prolactin regulation has a strong potential to allow ecologists to better understand how individuals adjust their breeding decisions in response to environmental changes.

11:30	TUESDAY, 27TH AUGUST, 2019	WRYNECK	S2-4
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The role of the insulin-like growth factor 1 in the mediation of life history decisions in birds

Ádám Lendvai¹

¹*University of Debrecen, Debrecen, Hungary*

Hormones are key regulators of life history decisions because they orchestrate coordinated physiological and behavioural responses to changes in the environment. For example, when preparing for reproduction, androgens may induce changes at the cellular, physiological and behavioural levels by affecting spermatogenesis, development of muscles, immunity and secondary sexual traits and regulating sexual and agonistic behaviours. While the role of steroid hormones (sex steroids and corticosteroids) in the regulation of life history decisions have been intensively studied, a phylogenetically more ancient regulatory pathway, insulin-like growth factor signalling has received much less attention in free-living birds. Recent evidence shows that the polypeptide metabolic hormone, the insulin-like growth factor 1 (IGF-1) regulates nestling growth, may play a role in the regulation of stress response, may affect moult and the development of sexually selected plumage ornaments. On the other hand, IGF-1 may also affect oxidative balance and therefore increased IGF-1 levels may lead to oxidative stress and cellular oxidative damage. These results suggest that IGF-1 may play a central role in regulating key life history decisions. However, the aforementioned traits are also known to be affected by the phylogenetically more recent steroid hormones, therefore one outstanding question is to understand how the integration of these different regulatory systems provide adaptive responses to environmental changes in free-living birds.

11:45	TUESDAY, 27TH AUGUST, 2019	WRYNECK	S2-5
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Growing up and old: are early-life IGF-1 levels associated with later-life cellular ageing?

Pablo Salmón¹, Caroline Millet¹, Ádám Lendvai², Colin Selman¹, Pat Monaghan¹

¹University of Glasgow, Glasgow, United Kingdom; ²University of Debrecen, Debrecen, Hungary

Animals might be expected to grow quickly, due to factors such as seasonal changes in resource availability, time-limited parental care or the need to get through a vulnerable life-history stage as fast as possible. However, there is a wealth of evidence for the existence of a lifespan penalty when environmental conditions induce accelerated growth to attain a target size within a short time frame. The insulin-like hormone growth factor 1 (IGF-1) has been proposed as one candidate mechanism shaping life-history traits due to its role during development and its pleiotropic effects throughout the lifespan. Nonetheless, our knowledge of this hormone is mostly based on the mammalian literature. In songbirds, we currently know very little about the role of IGF-1 in postnatal growth, whether there are within-individual changes with age and neither the long-term implications of elevated IGF-1 levels. In order to address that knowledge-gap, we conducted an experimental manipulation in zebra finch nestlings (*Taeniopygia guttata*), modifying their early-life growth dynamics, i.e. reducing or accelerating their growth. In addition, we obtained longitudinal blood samples at different time points from hatching to adulthood for measuring the plasma IGF-1 levels and the red blood cells' telomere length, an established lifespan marker in this species. In this talk I will discuss the implications of IGF-1 levels and its dynamics during development, together with the possible consequences in later-life, i.e. faster ageing; thus, providing empirical evidence about the role of IGF-1 in growth investment and subsequent lifespan.

Symposium: The effects of weather on birds

10:35	WEDNESDAY, 28TH AUGUST, 2019	COLLARED DOVE	S9-1
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Rain and drought effects on demography of temperate and tropical songbirds

Thomas Martin¹

¹USGS University of Montana, Missoula, USA

Drought is expected to increase in frequency and intensity, and can negatively impact survival and reproduction. Rain can affect food resources not only to birds, but also to their predators. Over 25 years of study in a north temperate system, leaner years with less rainfall were associated with increased nest predation rates, presumably due to predators searching more for food. New and Old World tropical songbirds behaviorally reduced reproductive activity during drought, with larger reductions in species that had higher apparent adult survival. Species with large reductions in reproduction exhibited increased rather than decreased apparent survival in the drought, likely due to reduced costs of reproduction. Shorter-lived species maintained reproductive activity and experienced lower survival in drought than non-drought years. These differing behavioral adjustments can minimize the population impacts of drought, except in species that rely on the wettest habitat. Projections of demographic impacts of environmental deterioration need to account for behavioral adjustments relative to longevity. Ultimately, many long-lived species may be more resilient to climate fluctuations than currently thought.

11:00	WEDNESDAY, 28TH AUGUST, 2019	COLLARED DOVE	S9-2
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The impact of flooding on the behaviour and ecology of riverine birds

Stuart Sharp¹

¹Lancaster University, Lancaster, United Kingdom

Rivers are among the most threatened of all ecosystems, with catchments the world over adversely affected by pollution and exploitation. The severe impacts on biodiversity are compounded by climate change, including

rising global temperatures and increasingly frequent severe flooding, and predicting how riparian wildlife populations respond to these changes is an urgent conservation challenge. Here, I investigate how changing patterns of river flow affect the ecology of the dipper (*Cinclus cinclus*). Dippers are important indicators of the health of riverine ecosystems and one of several declining river birds across Europe. The susceptibility of this species to poor water quality is well-known, but the potential role of flooding in driving population decline has received far less attention. Using data from a long-term study population in the UK, I will discuss the impact of flow regime on the population dynamics of these birds. I will then assess the relationship between flow and reproductive success before finally exploring the possible mechanisms, including behavioural responses to flooding. The implications for the conservation of river birds and potential avenues for future research will be considered.

11:15	WEDNESDAY, 28TH AUGUST, 2019	COLLARED DOVE	S9-3
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Blown by the wind –weather effects on nocturnal bird migration in Europe and the US

Cecilia Nilsson^{1,2}

¹*Copenhagen University, Copenhagen, Denmark;* ²*Cornell Lab of Ornithology, Ithaca, USA*

When flying through the airspace birds are highly exposed to weather conditions. They need to deal with the airspace they are moving through being not static, but itself a moving medium, and that wind speed and wind direction will greatly affect their flights. Wind and weather conditions are therefore very important for migratory birds, with large impacts on the speed and energetic cost of migration. I have investigated how nocturnal bird migrants relate to weather conditions in several different ways, from the wind assistance obtained by individual birds to how weather conditions cause pulses of migration activity across entire continents. In the US, we have seen migratory birds hitching a ride on hurricane winds to migrate with groundspeeds of up to 100 km/h. However, in tracking radar studies we have shown that in most cases birds migrate with much less wind assistance, and are often forced to migrate even in strong headwinds. But when good conditions do occur large numbers of birds of course take advantage of it. By using a network of weather radar stations across Europe, we could see how a period of tailwinds caused a massive wave of migration activity to sweep across the continent. Although winds vary a lot locally and between nights, there are also large, consistent seasonal patterns in wind and these wind patterns are predicted to change with climate change. We investigated how the amount of wind assistance migrants in North America obtain would change under predicted climate change scenarios.

11:30	WEDNESDAY, 28TH AUGUST, 2019	COLLARED DOVE	S9-4
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Climate change and perishable food stores of an avian predator

Giulia Masoero¹, Julien Terraube², Toni Laaksonen^{1,3}, Chiara Morosinotto^{1,4}, Erkki Korpimäki¹

¹*Section of Ecology, Department of Biology, University of Turku, Turku, Finland;* ²*Metapopulation Research Centre (MRC), Department of Biosciences, University of Helsinki, Helsinki, Finland;* ³*Natural Resources Institute Finland (Luke), Turku, Finland;* ⁴*Novia University of Applied Sciences, Bioeconomy research team, Ekenäs, Finland*

Changing climate modifies predator-prey interactions and can induce decline or local extinctions of predator species due to variation in availability of main prey. Predators that store food for over-winter survival are predicted to be particularly susceptible to increasing winter temperatures due to the highly perishable nature of their stored food. We studied the influence of late autumn and winter climate and main prey availability on the food storing behaviour of a generalist avian predator, the Eurasian pygmy owl (*Glaucidium passerinum*), in western Finland. We collected a 15-year data-set on 327 pygmy owls and the composition of their food

stores, recorded both during the autumn food hoarding season (two checks, 1-2 months apart) and in early spring. Increasing frequencies of rainy days and frost days in the autumn triggered a decrease in biomass of stored prey. Because there is wide variation in the initiation of food storing, accumulation and consumption of stored prey items as well as in the number of rotten prey items in the food stores, we will test how these aspects of hoarding can be affected by changes in autumn and winter weather. A detailed knowledge of the hoarding behaviour can help us to understand the effects of climate change on the ecology and survival of a wintering predator. Since changes in the condition and usability of the stored prey items may furthermore affect the overall predation pressure on prey species, these results raise concern about the impacts of climate change on boreal food webs.

11:45	WEDNESDAY, 28TH AUGUST, 2019	COLLARED DOVE	S9-5
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Influence of heat stress and junk food on foraging behaviour and body condition in an urban passerine

Miqkayla Stofberg¹, Arjun Amar¹, Petra Sumasgutner¹, Susan Cunningham¹

¹*FitzPatrick Institute of African Ornithology, Cape Town, South Africa*

Climate change and urbanization are the most important human-induced environmental changes currently threatening biodiversity. However, the majority of studies focus on these issues in isolation, which limits our ability to predict how species will respond to climate change in urban environments. During hot conditions, birds may reduce foraging activity to lessen heat gain. However, such behavioural adjustments can result in costly trade-offs, particularly with respect to the ability to maintain daily body mass. These costs may have far-reaching implications for body condition and thus individual fitness. Abundant anthropogenic food availability in urban systems may allow individuals to fulfill their metabolic demands with lower foraging effort, and this may in turn buffer the potential costs of a warming environment on body condition. In this study, we explore the impacts of air temperature on the foraging behaviour and body mass of an urban-exploiting passerine, the red-winged starling, *Onychognathus morio* in Cape Town, South Africa. In our system (university campus), anthropogenic food abundance fluctuates with food being more abundant on workweek days and less abundant on weekends. Using focal observations, we explore (1) whether foraging behaviours differ on hot and cool days and (2) whether this is influenced by heat-dissipation behaviour. We also explore (3) whether this differs in relation to anthropogenic food availability and (4) whether any such interaction has an impact on daily body mass gain.

Symposium: Urban ornithology: threats and opportunities

10:35	WEDNESDAY, 28TH AUGUST, 2019	WHITE STORK	S10-1
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Bird diversity under urbanization constrains

Peter Batary¹

¹*MTA ÖK Landscape and Conservation Ecology, Vacratot, Hungary*

Today more than half of World's human population live in cities resulting in a 3% cover of urbanized areas of terrestrial surfaces. Urbanization is the most extreme form of habitat conversion, which seriously threaten the biodiversity and basic ecosystem functions and services. Several nature conservationists view urbanized areas as a hostile matrix. However, urban green areas can host surprisingly high diversity. This is why we have to understand in more detail, how urbanization affects biodiversity in order to assist this ongoing process more sustainably. In the first part of the presentation I give a short overview about major drivers of biodiversity in urbanized areas, and possible mitigation strategies. Then I present a meta-analysis study, where we investigated the effects of urbanization on bird diversity. We found that urbanization had a negative effect on bird richness,

but a slight positive one on bird abundance. Furthermore, this decrease in species richness was most expressed at the urban-suburban interface, whereas the non-linear analysis showed that abundance peaked in suburban areas. Thus this study emphasized the importance of suburban areas, where most birds occurred with a relatively high richness. Then I present the results of a case study, where we investigated urbanization effects on song bird communities in allotments and parks of mid-size green German city. We found that these green infrastructures effectively buffered urbanization in this mid-size green city, and allotments harboured bit different, but valuable bird fauna compared to parks. In the end I give a summary and highlight future directions.

11:00	WEDNESDAY, 28TH AUGUST, 2019	WHITE STORK	S10-2
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Is there a link between socio-economic status and bird diversity in cities? A meta-analysis of the Luxury Effect

Dan Chamberlain¹, Chevonne Reynolds², Arjun Amar³, Dominic Henry³, Enrico Caprio¹, Péter Batàry⁴

¹*University of Turin, Turin, Italy;* ²*University of the Witwatersrand, Braamfontein, South Africa;* ³*University of Cape Town, Cape Town, South Africa;* ⁴*Hungarian Academy of Sciences, Budapest, Hungary*

The Luxury Effect refers to the positive correlation between urban biodiversity and wealth status within urban areas. It also represents environmental injustice, whereby poorer areas have less access to nature and the benefits it provides. We undertook a systematic review and meta-analysis of studies analysing a link between wealth and biodiversity in cities to assess the degree of support for the Luxury Effect on urban terrestrial diversity. The majority of the 97 studies considered were conducted on birds and plants. There was a geographical bias in that 61% of studies were from North America, and only 15% were from the developing world. Measures of the relationship between wealth and biodiversity from the sample of studies were converted to standardized effects which were then analysed in a random effects meta-analysis. There was a significant overall positive association between wealth status and measures of species diversity. The strength of the Luxury Effect increased significantly with increasing aridity, suggesting that availability of water resources is a key driver. Whilst we find overall evidence for the Luxury Effect, most of the research carried out has been in wealthier countries, yet developing countries are showing the greatest rates of urbanization and maintain high levels of income inequality, thus sustainable development to minimise environmental injustice is of a higher priority. Our results suggest that more equitable provision of water resources across different socioeconomic levels could increase overall urban biodiversity and reduce environmental injustice.

11:15	WEDNESDAY, 28TH AUGUST, 2019	WHITE STORK	S10-3
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Consequences of artificial light at night exposure for mounting an immune response in wild great tit nestlings

Ann-Kathrin Ziegler¹, Arne Hegemann¹, Hannah Watson¹, Virginie Canoine², Caroline Isaksson¹

¹*Lund University, Lund, Sweden;* ²*University of Vienna, Vienna, Austria*

Increasing exposure to artificial light at night (ALAN) in urbanized habitats has been found to affect the physiology and behaviour in wildlife. Especially, impacts during the developmentally critical phase as a nestling could persist throughout life and might have long-lasting effects on survival and fitness. Exposure to ALAN was found to change physiological processes like hormone secretion and immune function, possibly through trade-offs created by differential energetical and/or nutritional allocation. However, experimental evidence of how ALAN affects the capacity to mount an immune response against a pathogen in wild birds is scarce. Here we exposed seven-day old great tits (*Parus major*) nestlings for a week to ALAN and subsequently studied the physiological changes induced by an experimental immune activation. We predict that melatonin levels of

ALAN exposed nestlings will be lower. Since melatonin is also known to be involved in immune function, we expect that ALAN nestlings that received an immune challenge will show a weaker response than challenged control birds. Possible findings of negative impacts of ALAN exposure of developing animals in this experiment would add important information to the cost arising that might come with inhabiting an urbanized area.

11:30	WEDNESDAY, 28TH AUGUST, 2019	WHITE STORK	S10-4
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Bird song increase human well-being and reduce stress: a way forward for urban bird conservation?

Marcus Hedblom¹

¹*Swedish University of Agricultural Sciences, Uppsala, Sweden*

Increasing urbanization continue to reduce natural habitats for birds. Similarly, people seem to be negatively affected by living in cities. Noise is considered the biggest environmental problem for humans in European cities leading to increased stress and cardiovascular diseases. Studies showed that bird songs could contribute to human wellbeing although few studies specified the types of birds singing. In a study conducted in Gothenburg (Sweden) chattering from house sparrow (*Passer domesticus*) increase people's positive perception of urban setting. Interestingly, the positive perception increased even more when adding more species. This indicated that not only type of species singing but also the combination (diversity) of species matters. In another study combining bird song with smell, reduced peoples physical stress faster than visual features. In a third study people self-rated perception of bird song were higher evaluated in more natural areas than parks. Thus, it seems as the present urban planning dominated by visual setting could benefit by providing urban habitats with reduced noise so people can hear birds. Further, these habitats should be of such quality so that they allow a diversity of species allowing for more natural remnants than parks. Nature conservation in cities have to compete with the need of housing and roads. Further studies on people increased health might an additional argument for conserving species in cities.

11:45	WEDNESDAY, 28TH AUGUST, 2019	WHITE STORK	S10-5
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Data gathering in cities: methodological approaches that bring together professional ornithologists and citizen scientists

James S. Reynolds^{1,2}, Jennifer Smith³

¹*University of Birmingham, Birmingham, United Kingdom;* ²*Army Ornithological Society (AOS), Aldershot, United Kingdom;* ³*University of Texas at San Antonio, San Antonio, TX, USA*

The world is urbanising rapidly such that by 2050 66% of the global human population is predicted to live in urban areas. Professional ornithologists are learning rapidly how urbanisation influences the biology of birds occupying urban areas. However, working alone we are limited in what we can study due to the challenges of conducting research in heavily populated areas that include assessments of ecological conditions and restricted access to study areas. Here, we will outline some modern examples of ways in which professional ornithologists and citizen scientists might work together to study urban birds. We will consider how citizen scientists can take an active (and prominent) role in on-the-ground research by collecting data systematically as part of planned research projects whilst also providing valuable opportunistically collected data through online citizen science databases. We will explore advances in biotelemetry that allow citizen scientists to set up and run research studies autonomously to generate high quality data. Lastly, we will discuss the benefits of citizen science far beyond maximising research capacity and efficiency. This will consider how citizen science efforts engage with local

communities by providing educational benefits and fostering a conservation ethos, especially in demographic groups of citizens that historically have had limited access to, and thus engagement with, nature.



11. Oral sessions

Oral Session: Bird communities

15:30	TUESDAY, 27TH AUGUST, 2019	CORNCRAKE	OS-13
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Multi-scale approaches are needed to infer true species-climate relationships: implications for research and conservation

Mattia Brambilla^{1,2,3}, Marco Gustin¹, Luca Ilahiane¹, Michele Cento¹, Davide Scridel^{2,4}, Paolo Pedrini², Claudio Celada¹

¹Lipu/BirdLife Italia, Parma, Italy; ²Muse - Science Museum, Trento, Italy; ³Fondazione Lombardia per l'Ambiente, Seveso (MB), Italy; ⁴University of Pavia, Pavia, Italy

A proper understanding of species response to climate and habitat change is fundamental to plan effective conservation strategies for threatened species. A critical issue for the definition of such responses is the focus on the 'right' scale(s) and on appropriate environmental predictors. We show that considering relevant predictors at biologically meaningful scales is crucial to disentangle the direct impacts of climate change from other environmental factors, as the latter often are spatially correlated with climate traits, and such a co-variation could be particularly confounding in single-scale correlative approaches. We use breeding birds in different environmental systems as study cases to demonstrate, by means of multi-scale approaches (landscape > territory > microhabitat), consistencies and differences in the expected impacts of climate on species occurrence and distribution. Building on such insights, we discuss possible strategies to overcome common pitfalls and to distinguish potential direct effects from indirect ones. We highlight the implications of research at different spatial scales for practical conservation. Information derived from multi-scale studies could allow a robust identification of important drivers of species ecology, and could contribute to different levels of conservation planning, from the design of protected areas, to the definition of broad management strategies at the landscape scale, down to the implementation of fine-scale, microhabitat management. The use of multi-scale approaches could maximize the potential benefits of conservation actions implemented to face the challenges and pressures imposed by climate and environmental change.

15:45	TUESDAY, 27TH AUGUST, 2019	CORNCRAKE	OS-14
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Impact of invasive Caucasian hogweeds on bird assemblages in the agricultural landscape of Poland

Emilia Grzędzicka¹

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The Sosnowsky's hogweed *Heracleum sosnowskyi* and the giant hogweed *Heracleum mantegazzianum* are invasive species that are widespread in Poland. These plants have a large negative impact on wildlife, because dangerous chemicals furanocoumarins with the ability to cross-link DNA are present in the hair of plants covering their leaves and stems. On the other hand, flowers of alien hogweeds are insect pollinated, visited by a wide range of insects, including a number of Hymenoptera, Diptera and Coleoptera, and can be a food base for insectivorous birds. The impact of toxic Caucasian hogweeds on birds has not been studied so far. Those plants are most often a problem on abandoned farmland, which can adversely affect birds of the agricultural landscape. Farmland birds are among the most endangered birds in Europe, suffering the highest rate of population decline. Using birds as an indicator taxon, it was investigated whether *Heracleum* invasion is correlated with changes in ecosystem health of the open areas in south-eastern Poland. Author studied bird diversity near the Caucasian hogweeds at different densities, and with the absence or presence of flowering shoots, for comparison with bird assemblages on no-*Heracleum* control. Bird species diversity, species richness, and abundance were lower at high densities of alien plants with flowering shoots. To better understand the observed changes in bird community composition, birds were segregated into foraging guilds. Results suggest that *Heracleum* impacts the structure of bird communities by decreasing diversity, although it affects some guilds more than others.

16:00	TUESDAY, 27TH AUGUST, 2019	CORNCRAKE	OS-15
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Abundance of titmice is a potential ecological indicator of forest bird abundance in European forests

Mira Kajanus¹, Jukka Forsman², Maximilian Vollstädt¹, Vincent Devictor³, Merja Elo⁴, Aleksa Lehikoinen⁵, Mikko Mönkkönen⁴, James Thorson⁶, Sami Kivelä¹

¹*University of Oulu, Oulu, Finland;* ²*Natural Resources Institute Finland, Oulu, Finland;* ³*Institut des Sciences de l'Evolution de Montpellier, Montpellier, France;* ⁴*University of Jyväskylä, Jyväskylä, Finland;* ⁵*Finnish Museum of Natural History, Helsinki, Finland;* ⁶*National Marine Fisheries Service, NOAA, Seattle, USA*

Particular species are often used as surrogates in estimating abundance of target species group. However, using multiple species as surrogates could be a more effective ecological indicator than merely one surrogate species. Migratory birds often use social information on the abundance of resident birds as a cue for habitat selection, interspecific information use potentially affecting community dynamics. We hypothesize that abundance of resident titmice acts as a general ecological indicator of bird abundance in European forests, because titmice are known to be a source of social information for migratory birds and their abundance is easy to record by observers. Spatio-temporal variation in total bird and titmouse abundance patterns were examined from long-term datasets of breeding forest birds in France and Finland. Variation in observed forest bird abundance (excluding titmice) in relation to titmouse abundance was analyzed with a spatial Gompertz model, where titmouse abundance and squared titmouse abundance were used as covariates. In both countries, forest bird abundance increased with increasing titmouse abundance, the association becoming weaker towards higher titmouse abundance. We then analyzed whether abundances of random species sets could predict forest bird abundance better than titmice. Titmice performed as a better indicator of forest bird abundance than random species sets in ~80% and ~70% of the cases, in France and Finland, respectively. The results suggest that titmice

could act as a potential indicator of forest bird abundance. This supports the recent suggestions that positive species associations could affect community dynamics and biodiversity.

16:15	TUESDAY, 27TH AUGUST, 2019	CORNCRAKE	OS-16
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Effects of *Eucalyptus* plantations on avian species richness and composition in North-West Spain

Sandra Goded¹, Johan Ekroos², Jesús Domínguez¹, José Á. Guitián¹, Henrik G. Smith²

¹University of Santiago de Compostela, Santiago de Compostela, Spain; ²University of Lund, Lund, Sweden

Eucalyptus plantations have been established in many areas of the world due to their fast growth and profitability. In NW Spain, *Eucalyptus* plantations now cover a larger area than native forests. Although *Eucalyptus* plantations have been shown to affect biodiversity, relatively few studies have analysed their effect on avian biodiversity and community composition. We compared bird species richness and abundance between 14 paired patches of native deciduous forest and *Eucalyptus* plantation in a heterogeneous agro-forest region of NW Spain. We also investigated whether *Eucalyptus* plantations contribute to shifts in community composition by analysing species nestedness and turnover. We found that species richness of birds consistently was lower in *Eucalyptus* plantations compared to native forests. Furthermore, the abundances of bird species characteristic of agricultural, forest, scrubland and other habitats, were all much lower in *Eucalyptus* plantations than in native forests. Bird communities were also significantly dissimilar between the two patch types, as they were characterised by species nestedness, with fewer species and much lower numbers of both forest specialist and generalist species in *Eucalyptus* plantations compared to native forests. As a result, *Eucalyptus* plantations cannot replace native forests as they harbour only a subset of the bird species found in native forests. Considering the current rate of increase of *Eucalyptus* plantations and the fragmentation of native forests in NW Spain, a lack of conservation of native forests could result in future loss of biodiversity in general and forest specialist species in particular.

16:30	TUESDAY, 27TH AUGUST, 2019	CORNCRAKE	OS-17
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Species richness, diversity and total density patterns of breeding bird assemblages of primeval and natural forests of the Western Carpathians

Martin Korňan^{1,2}, Ľudovít Kocian³, Karel Pavelka⁴, Rudolf Kropil¹, Jan Pavelka⁵, Peter Lešo¹, Marek Svitok^{6,7}

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Primeval and natural forests represent high conservation value communities. We tested following hypotheses: (1) Due to mid-domain effect, we assumed that species richness and diversity of bird assemblages should have arch relationship with elevation peaking in the mid-elevation zone, (2) The dominance of the most abundant species should significantly increase with elevation, whereas total density should decrease mainly due to climatic constrains. We assessed bird diversity of the Western Carpathian primeval and natural forests using meta-analysis of published and our unpublished data covering all forest vegetation zones (116–1720 m a.s.l.). We summarize data from territory mapping censuses from 33 plots (mean = 3.8 years/plot, SD = 3.1 year/plot). We applied

Monte Carlo individual-based rarefaction approach to estimate species richness and Shannon, Simpson, and Berger-Parker indices values of year samples in two types of matrices (all species and woodpeckers, pigeons and passerines). Bird assemblages were classified into four very broad (deciduous, mixed, coniferous, dwarf pine) and seven finer (lowland and floodplain, oak, oak-beech, beech, mixed, spruce, dwarf pine) categories. Generalized linear and additive mixed effect models were applied to test for differences in diversity among the forest classes. All diversity measures except Berger-Parker index from both types of matrices showed significant decline with elevation without clear mid-domain effect. Berger-Parker index increased with elevation as expected, while total density sharply declined. In broader forest classification, deciduous and mixed forests showed higher diversity than the other types, while in finer classification, oak-beech forest had the highest mean diversity.

16:45	TUESDAY, 27TH AUGUST, 2019	CORNCRAKE	OS-18
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Biotic interactions and temperature gradients contribute to differences in elevational range limits of Bornean mountain birds

Ryan C. Burner^{1,2}, Andy J. Boyce^{3,4}, Thomas E. Martin⁵, Frederick H. Sheldon¹

¹*Museum of Natural Science and Department of Biological Sciences, Louisiana State University, Baton Rouge, USA;* ²*Department of Ecology and Natural Resource Management, Norwegian University of Life Sciences, Ås, Norway;* ³*Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, USA;* ⁴*Conservation Ecology Center, Smithsonian Conservation Biology Institute, National Zoological Park, Front Royal, USA;* ⁵*U.S. Geological Survey, Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, USA*

Ecological determinants of range boundaries have been widely debated and have implications both for ecological theory and predicting the impacts of climate change on species and communities. We surveyed the elevational ranges of forest birds on four mountains in Borneo to test which environmental variables—habitat, temperature, or presence of likely competitors—best predicted differences in elevational ranges among species. On smaller mountains with fewer montane species, lowland species range farther uphill despite elevational compression of habitat zones on these mountains. Ranges extended highest where fewer species of potential montane competitors were present. Differences among mountains in lower range limits of montane species correlated well with temperature. Our results suggest that both competition and physiological constraints play a role in setting range limits, but their relative importance changes with elevation. Competition played a stronger role in limiting the upper elevational distributions of lowland species, whereas temperature was a stronger factor in determining the lower limits of montane species. Thus, models predicting range shifts under climate change scenarios that include only temperature and precipitation, as is currently most common, will be inadequate. Information on the likely changes in species interactions, and their effects, must be included.

Oral Session: Birds and Humans

15:30	TUESDAY, 27TH AUGUST, 2019	COLLARED DOVE	OS-19
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The cultural identity of birds in particular human communities

Liviu Pripon¹, Valentin Kiss²

¹*Faculty of History and Philosophy, Babeş-Bolyai University, Cluj, Romania;* ²*Faculty of Biology and Geology, Babeş-Bolyai University, Cluj, Romania*

In this paper, we want to present the preliminary results of an analysis regarding the cultural identity of bird species according to the correct attachment of the name for pictures of birds. To do so we evaluated two

groups of students, the first being art students (N = 46) and the second being biology students (N = 46) who were asked to fill in the names in a questionnaire with 30 pictures of bird species. We took into account the number of species identified by a person, the rate of identification for each species, the number of other names attached to a species and the extension of the name of one species to other species. Based on these results, we have proposed an Identity index that shows how clear or ambiguous the name of a species is in relation to the form of individuals of this species and therefore shows the degree of identity of a particular species. By virtue of this index, we have found that both lots are very similar, some aspects of the species ambiguity being more pronounced even among biologists who reveal a low Identity index. The conclusion is that birds are an extremely ambiguous group and poorly known even with regard to urban and common species. More than the results of this analysis here we intend to present a method by which we assess a neglected but essential aspect for conservation and protection programs which otherwise work very inefficient.

15:45	TUESDAY, 27TH AUGUST, 2019	COLLARED DOVE	OS-20
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Small-scale but long-term grassland nutrient depletion on military airfields results in source populations of red-listed birds

Karen Krijgsveld¹, Hans van Gasteren¹

¹*Royal Netherlands Air Force, Nature Bureau, Breda, Netherlands*

To prevent collisions between birds and aircraft, Dutch military airfields are being managed in such a way as to deplete the soil of nutrients. On airfields, large birds especially pose a risk to flight safety, because they may collide with and thus cause damage to the aircraft. Reducing food availability is a key factor in reducing the numbers of these large birds. Therefore, a mowing regime aimed at depletion of soil nutrients was initiated on all ten military airfields in the Netherlands in the mid-nineties. With the soil nutrient depletion program having run for 25 years, we evaluated the change in bird species composition over time. Based on long-term bird counts, we analysed whether numbers of larger high-risk birds have indeed decreased and we show how numbers of hazardous species like geese, gulls, lapwings and starlings have developed relative to local trends. Simultaneously, the depletion program resulted in a tremendous diversification of the vegetation. Over time, the airfields turned into flower-rich grasslands with a high biodiversity. We analysed whether this has in turn led to an increase in bird species that benefit from such habitats. In the Netherlands these habitats are scarce nowadays, and thus this concerns many red-listed species such as field lark, stonechat, red-backed shrike and kestrel. The results show how small-scale but long-term soil nutrient depletion can result in source populations of red-listed bird species in a highly urbanised area. It offers a nature-inclusive way to improve not only flight safety but also species diversity on airfields.

16:15	TUESDAY, 27TH AUGUST, 2019	COLLARED DOVE	OS-21
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Bird-window collisions: can UV markings solve the problem or is avian obstacle detection a UV-blind process?

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¹*University of Natural Resources and Applied Life Sciences, Vienna, Austria;* ²*Biological Station Hohenau - Ringelsdorf, Hohenau / March, Austria*

Glass surfaces in avian habitats cause bird collisions. Unintended, ubiquitous and non-selective casualties run into billions worldwide every year. In order to reduce collision risks, supplying glass with optical signals detectable for birds is a commonly accepted measure. Especially UV markings, invisible to humans, are expected to promote public acceptance of marked panes, which may be hard to win for black, coloured, and

semitransparent applications. However, experimental UV tests did not fulfil expectations and are a constant matter of methodological and psychophysiological discussion. We here will present flight tunnel tests of commercially available UV products. The tests were conducted under natural light conditions using daylight-adapted wild birds. UV markings were ineffective in all tests. We discuss these findings in the light of psychophysiological research of the last two decades and differentiate between motion view and a much slower "searching" mode of vision and signal processing. The latter employs retinal tetrachromal colour information that facilitates the search for food and attractive mating partners including UV perception. In contrast, the neurons of the accessory optic system (AOS) and the "descending" pathways to the cerebellum, inducing fast, unconscious reactive movements, are believed to be UV-blind. We suggest that the physiology of vision has to be considered thoroughly to interpret experimental results, and that birds are generally not able to adequately react to UV pane markings.

16:30	TUESDAY, 27TH AUGUST, 2019	COLLARED DOVE	OS-22
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Patterns of satellite tagged hen harrier disappearances suggest widespread illegal killing on British grouse moors

Arjun Amar¹, Megan Murgatroyd¹, Steve Repath², Stephen Murphy³, David Douglas⁴, Richard Saunders³

¹*FitzPatrick Institute, Cape Town, South Africa;* ²*Aberdeen University, Aberdeen, United Kingdom;* ³*Natural England, Norwich, United Kingdom;* ⁴*RSPB, Edinburgh, United Kingdom*

Identifying patterns of wildlife crime is a major conservation challenge. Here, we test if deaths or disappearances of a protected species, the hen harrier, are associated with grouse moors, which are areas managed for the production of red grouse for recreational shooting. Using data from 58 satellite tracked hen harriers, we show high rates of unexpected tag failure and low first-year survival compared to other harrier populations. The likelihood of harriers dying or disappearing increased as their use of grouse moors increased. Similarly, at the landscape scale, satellite fixes from the last week of life were distributed disproportionately on grouse moors in comparison to the overall use of such areas. This pattern was also apparent in protected areas in northern England. We conclude that hen harriers in Britain suffer elevated levels of mortality on grouse moors, which is most likely the result of illegal killing.

16:45	TUESDAY, 27TH AUGUST, 2019	COLLARED DOVE	OS-23
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Eating from the rubbish: good for today, a problem for tomorrow

Javier Pineda-Pampliega¹, Amparo Herrera-Dueñas², Ellis Mulder², José I. Aguirre¹, Ursula Höfle³, Simon Verhulst²

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Humans have altered the ecosystem for centuries, for example, by the creation of new food resources as the rubbish dumps. Their abundance and predictability make it a potentially valuable food source. However, some studies suggest inadequate nutritional composition of food found on rubbish dumps, with an insufficient presence of antioxidants. After their decline during the mid of the 20th century, numbers of white storks have increased due to the use of these rubbish dumps. In our own work with nestlings, this diet does not produce any negative short-term effect on health status, but potential long-term effects remain to be investigated. We propose to assess the effect of antioxidant treatment on the telomere dynamics, as indicative of potential lifespan in avian species. With this purpose, 57 free-living nestlings were divided into control and treated group supplied

with vitamin E and Selenium, using Telomere Restriction Fragment technique to evaluate telomere dynamics. The treatment increased the concentration of tocopherol, and treated nestlings have longer telomeres on average. There is also a positive association between tocopherol concentration and telomere length. This study is among the first to experimentally demonstrate a relationship between oxidative stress and telomere dynamics *in vivo*, indicating a lack of antioxidants in the diet of these nestlings is likely to have negative long-term effects.

16:00	TUESDAY, 27TH AUGUST, 2019	COLLARED DOVE	OS-24
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Variability in foraging patterns of griffon vultures influences the collision risk at wind farms

Juan Manuel Pérez-García^{1,2}, Martina Carrete³, Eneko Arrondo⁴, Ainara Cortés-Avizanda⁵, Manuel de la Riva⁴, José Antonio Sánchez-Zapata², Jose Antonio Donazar⁴

¹University of Lleida, Lleida, Spain; ²University Miguel Hernández, Elche, Spain; ³University Pablo Olavide, Sevilla, Spain; ⁴Estación Biológica de Doñana, Sevilla, Spain; ⁵Instituto Mediterráneo de Estudios Avanzados, Esporles, Spain

Wind farm development represents a new hazard for bird conservation due to the fatalities by collision with the turbines. Large soaring birds, as griffon vultures (*Gyps fulvus*) are heavily affected. To evaluate the movement patterns of griffon vultures and the factors driving collisions in wind turbines, we started a research project involving vulture tracking by means of innovative telemetry devices. The study was carried out in Cádiz, south eastern Spain. The spatial coincidence of a large population of vultures (more than 2,400 breeding pairs) and the strong wind-farm development (more than 1,000 turbines) has determined a very high mortality incidence (1848 individuals between 1996 and 2016). On 22 may 2018, 12 birds were captured and fitted with GPRS-GSM transmitters manufactured by ECOTONE (<http://ecotone-telemetry.com/>, Poland). We compared the home range and trajectory patterns of each individual, estimating the number of dangerous weekly crossings on the turbine lines made at low altitudes. Our results showed that although all the vultures breed in the same area, they showed very marked individual differences in their foraging patterns. Part of the birds made regular long-distance travels whereas others virtually did not abandon the surroundings of the breeding zone. These differences might compromise the individual risk of collision. To investigate the underlying causes that motivate these foraging patterns will help to propose more effective mitigation measures.

Oral Session: Climate Change

15:30	WEDNESDAY, 28TH AUGUST, 2019	CORNCRAKE	OS-43
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Global warming over the last 200 years caused a more extensive feather moult that changed bird appearance

Nir Sapir¹, Yoni Vortman², Yosef Kiat¹

¹University of Haifa, Haifa, Israel; ²Tel-Hai College, Kiryat Shmona, Israel

Bird appearance is largely determined by plumage, influencing, for example, bird attractiveness, social status and camouflage. Juveniles of most passerine species replace their nest-grown plumage (juvenile plumage) during the first months of life, a process that is called post-juvenile feather moult. This process can vary widely in its extent between different individuals and taxa, and is affected by time and food resources availability. Using data from ten natural history collections, we show that the extent of the post-juvenile moult has increased significantly over the last 212 years (1805-2016), a trend that is positively correlated with the temperature of the environment (provided by Global Mean Temperature Anomalies), suggesting that birds replaced more feathers under warmer conditions, and this caused juveniles to appear more similar to adult birds. Moreover, in several species, we

documented a male-female switch in moult extent, with females currently replacing more feathers than males compared to the past. Although physiological and behavioural differences in the response of females and males to environmental conditions have been reported in the past, to our knowledge, this is the first demonstration of a differential response of different phenotypes to climate warming. Our findings regarding the progressive alteration of bird appearance over the past centuries highlight an overlooked link between climate warming and bird life history, with potential consequences for sexual selection in many passerine species. We suggest that sex-specific responses to warming climates should be considered in the future when exploring the effects of climate changes on biological systems.

15:45	WEDNESDAY, 28TH AUGUST, 2019	CORNCRAKE	OS-44
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Climate-driven convergent evolution of plumage colour in a cosmopolitan bird

Andrea Romano¹, Robin Séchaud¹, Alexandre H. Hirzel¹, Alexandre Roulin¹

¹*University of Lausanne, Lausanne, Switzerland*

The investigation of phenotypic diversity across geographical gradients is pivotal to understanding the evolution and adaptive functions of alternative phenotypes. The aim of the present study was to examine whether the polymorphism in ventral plumage colouration observed in the cosmopolitan common barn owl group was determined by climatic factors, such as temperature and rainfall, consistently with Gloger's and Bogert's biogeographical rules. We analysed the variation in heritable melanin-based plumage colour according to annual temperature and rainfall in 9110 barn owls, representing three distinct evolutionary lineages and covering the entire distribution range: the Afro-European (or Western) *Tyto alba*, occurring between Scandinavia and South Africa, the American *T. furcata*, found from Southern Canada to Patagonia, and the Australasian (or Eastern) *T. javanica*, living between Himalaya to Tasmania. Although the geographical distribution of colour morphs is heterogeneous among the lineages, in all of them plumage colour becomes darker at increasing annual rainfall, indicating a convergent selection of darker morphs in humid habitats possibly to improve camouflage against the dark environment and/or to repel water more efficiently. Moreover, in *T. alba* and *T. furcata*, melanisation increases at decreasing temperature, suggesting its possible role in thermoregulation. These findings provide evidence of repeated evolution of similar body colouration patterns at a worldwide scale compatible with the main biogeographical rules, while emphasizing the possible role of melanin-based traits in animal adaptation to climate change.

16:00	WEDNESDAY, 28TH AUGUST, 2019	CORNCRAKE	OS-45
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Long-term analysis of climate change effects on distribution and population trends of the lesser kestrel (*Falco naumanni*)

Michelangelo Morganti¹, Nunzio Grattini², Flavio Ferlini³, Damiano Preatoni⁴, Roberto Ambrosini¹, Nikos Tsiopelas⁵, Panagiotis Kordopatis⁵, Jacopo Giuseppe Cecere⁶, Maurizio Sarà⁷, Diego Rubolini¹

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Determining the main drivers of population fluctuations over wide spatial and temporal scales is a key ecological issue, with broad conservation implications. The lesser kestrel (*Falco naumanni*) was a widespread raptor in Europe until the second half of the 20th century, but then suffered a population collapse. We collated historical bibliography aiming at quantifying this trend and mapping the associated range contraction,

documenting the loss of ca. 90% of the population in the 1960-1990. We then focused on recent (2003-2014) local population trends of two neighbouring (<100 km apart) populations inhabiting the lowlands and the highlands of Sicily (Italy). We found that different drivers determined contrasting long-term population trends at a small spatial scale. Hence, climatic and environmental changes would play different roles in shaping the trends of populations occupying different portions of the climatic niche of the species. Finally, we explored the potential future threats that climate change will pose for the lesser kestrel by the means of climate envelope models. We found that the reduction in spring rainfall amount predicted for Mediterranean coastal areas will threaten the long-term persistence of the current core populations of the species, while temperature rise will favour a northward range expansion. These findings suggest that promoting conservation interventions in small peripheral populations (e.g. northern Italy and Greece), i.e. those that are settled at the northern margin of the current distribution range, should be pivotal to fostering the resilience of this conservation-priority and migratory species to the ongoing climate change.

16:15	WEDNESDAY, 28TH AUGUST, 2019	CORNCRAKE	OS-46
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Tritrophic phenological match-mismatch in space and time

Malcolm Burgess^{1,2}, Smith Ken³, Karl Evans⁴, Dave Leech⁵, James Pearce-Higgins⁵, Claire Branston⁶, Kevin Briggs⁷, John Clark⁸, Chris de Feu⁹, Kate Lewthwaite¹⁰, Ruedi Nager¹¹, Ben Sheldon¹², Jeremy Smith¹³, Robin Whytock¹⁴, Stephen Willis⁶, Albert Phillimore¹⁵

¹RSPB Centre for Conservation Science, Sandy, United Kingdom; ²University of Exeter, Exeter, United Kingdom; ³15 Roman Fields, Chichester, United Kingdom; ⁴University of Sheffield, Sheffield, United Kingdom; ⁵British Trust for Ornithology, Thetford, United Kingdom; ⁶Durham University, Durham, United Kingdom; ⁷1 Washington Drive, Warton, United Kingdom; ⁸15 Kirby Close, Southwell, United Kingdom; ⁹66 High Street, Beckingham, United Kingdom; ¹⁰Woodland Trust, Grantham, United Kingdom; ¹¹University of Glasgow, Glasgow, United Kingdom; ¹²University of Oxford, Oxford, United Kingdom; ¹³Cardiff University, Cardiff, United Kingdom; ¹⁴University of Stirling, Stirling, United Kingdom; ¹⁵University of Edinburgh, Edinburgh, United Kingdom

Increasing temperatures associated with climate change may generate phenological mismatches that disrupt previously synchronous trophic interactions. Most work on mismatch has been from single sites and focuses on temporal trends, whereas spatial variation in the degree of trophic synchrony has largely been neglected. We quantify latitudinal trends in phenological mismatch, using phenological data collected by citizen scientists on the oak–caterpillar–bird system from across the UK. Increasing latitude delays phenology of all species, but more so for oak, resulting in a shorter interval between leaf emergence and peak caterpillar biomass at northern locations. Asynchrony found between peak caterpillar biomass and peak nestling demand of blue tits, great tits and pied flycatchers increases in earlier (warm) springs. There is no evidence of spatial variation in the timing of peak nestling demand relative to peak caterpillar biomass for any species. Phenological mismatch alone is thus unlikely to explain spatial variation in population trends. Given projections of continued spring warming, we predict that temperate forest birds will become increasingly mismatched with peak caterpillar timing. Latitudinal invariance in the direction of mismatch limits opportunities for spatial buffering from the effects of mismatch on population size, but generates spatially consistent directional selection on timing which could facilitate rapid evolutionary change.

16:30	WEDNESDAY, 28TH AUGUST, 2019	CORNCRAKE	OS-47
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Laying date correlates with local tree composition but not budburst in great and blue tits

Erik Matthysen¹, Frank Adriaensen¹

¹University of Antwerp, Wilrijk, Belgium

Many studies have shown how insectivores time their egg-laying to match the nestling food demand peak, which in turn correlates with tree phenology. This adaptive timing has been shown repeatedly to occur at the temporal scale between years, but much less so at the spatial scale. Here we combine data from a 40-year nestbox study on great tits *Parus major* and blue tits *Cyanistes caeruleus* with a full survey of individual trees plot to analyze drivers of territory-level variation in laying date. We identified size, species and budburst timing of more than 1500 trees in a 12-hectare plot, and correlated these with nest data in 118 nestboxes. Additional data on a subset of trees showed that relative budburst date was repeatable between years. After correcting for species identity and age, first-egg dates showed no correlation at all with mean budburst of nearby trees. One explanation may be the high variance in budburst within territories, since timing of individual trees was not spatially autocorrelated. However, first-egg dates were significantly related to local tree composition, being consistently later in nestboxes surrounded by many beech trees. Individual-level data showed that this was a plastic response in both species, with individual females changing their relative timing as they moved between territories with more or fewer beech trees.

16:45	WEDNESDAY, 28TH AUGUST, 2019	CORNCRAKE	OS-48
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Climate change may affect fatal competition between two bird species

Jelmer Samplonius^{1,2}, Christiaan Both¹

¹University of Groningen, Groningen, Netherlands; ²University of Edinburgh, Edinburgh, United Kingdom

Climate warming has altered phenologies of many taxa, but the extent differs vastly between and within trophic levels. Differential adjustment to climate warming within trophic levels may affect coexistence of competing species, because relative phenologies alter facilitative and competitive outcomes, but evidence for this is scant. Here, we report on two mechanisms through which climate change may affect fatal interactions between two sympatric passerines, the resident great tit *Parus major* and the migratory pied flycatcher *Ficedula hypoleuca*, competing for nest sites. Spring temperature more strongly affected breeding phenology of tits than flycatchers, and tits killed more flycatchers when flycatcher arrival coincided with peak laying in the tits. Ongoing climate change may diminish this fatal competition if great tit and flycatcher phenologies diverge. However, great tit density increased after warm winters, and flycatcher mortality was elevated when tit densities were higher. Consequently, flycatcher males in synchronous and high-tit-density years suffered mortality by great tits of up to 8.9%. Interestingly, we found no population consequences of fatal competition, suggesting that mortality predominantly happened among surplus males. Indeed, late-arriving males are less likely to find a partner, and here we show that such late arrivers are more likely to die from competition with great tits. We conclude that our breeding population is buffered against detrimental effects of competition. Nevertheless, we expect that if buffers are diminished, population consequences of interspecific competition may become apparent, especially after warm winters that are benign to resident species.

Oral Session: Conservation

10:30	FRIDAY, 30TH AUGUST, 2019	COLLARED DOVE	OS-79
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Large- versus small-scale agriculture: habitat preferences of the endangered ortolan bunting (*Emberiza hortulana*) and local bird communities in the cereal-dominated Ethiopian Highlands

Alain Jacot^{1,2}, Gabriel Marcacci^{1,2}, Jérémy Gremion³, Philippe Christe³, Raphaël Arlettaz^{1,2}

¹Swiss Ornithological Institute, Sempach, Switzerland; ²University of Bern, Bern, Switzerland; ³University of Lausanne, Lausanne, Switzerland

While European countries are facing an inexorable decline of their farmland biodiversity, agricultural landscapes in Africa are still dominated by small-scale subsistence farming harbouring high biodiversity. However, as most African countries are confronted to an unprecedented population and economic growth, efforts to intensify food production are widespread, with potentially negative effects on biodiversity. Among European farmland species, the ortolan bunting (*Emberiza hortulana*), is dramatically declining across its breeding range where 90% of the world population is wintering in the Ethiopian Highlands. Here, we conducted a study (transects & telemetry) in a highly contrasted agricultural landscape comprising two distinct farming systems: large-scale farming relying on modern machinery and technology versus small-scale traditional farming. Our aim was to disentangle the effects of the operating farming system and the extent of semi-natural habitats on habitat preferences of the endangered ortolan bunting and by the overall local bird community. Our results demonstrate the relevance of traditionally managed, cereal-dominated fields that are interspersed with natural habitats on a land-scape scale, while patches of bare ground seemed essential on a foraging scale for the ortolan bunting. For avian communities, natural structures had strong positive effects and large-scale farming had overall negative effects, while some typical open-farmland species benefitted from wide-open landscapes. Our findings suggest that both farming systems could coexist as long as semi-natural habitats are preserved and agricultural management is maintained at its current practices. We emphasize the need integrating socio-economic aspects to better predict future impacts of agricultural intensification processes on Palearctic migrants and African biodiversity.

10:45	FRIDAY, 30TH AUGUST, 2019	COLLARED DOVE	OS-80
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Does a Swiss population of kestrels profit from breeding in nest boxes?

Rémi Fay¹, Stephanie Michler¹, Jacques Laesser¹, Michael Schaub¹

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The common kestrel *Falco tinnunculus*, is listed as near threatened on the red list of endangered species in Switzerland. Kestrel populations are expected to be limited locally by nest-site availability. Since 2002, a population monitoring and species recovery program for the kestrel is running in the Swiss plateau, coordinated by the Swiss Ornithological Institute. Within this program groups of volunteers manage nest boxes, control their occupation, band juveniles and in some projects also adults. We assessed the source status of the kestrel population by analyzing the data from the program in an integrated population model. For this we estimated juvenile and adult survival, reproduction, immigration and emigration by jointly analyzing capture-recapture, dead recovery, breeding monitoring and population survey data. We also investigated the role of nest boxes on kestrel demography and realized population growth rates. The results indicate that the kestrel population breeding in nest boxes has acted as a source during 15 years of the study. Values from a literature review suggest that fecundity is considerably reduced if kestrels breed in open nests compared to nest boxes. Using these effect sizes in our integrated population model shows that without nest boxes the population might not have operated as a source. Together, these findings suggest that fecundity is an important driver for the dynamics of this population and that nest boxes have contributed to its raise.

11:00	FRIDAY, 30TH AUGUST, 2019	COLLARED DOVE	OS-81
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Linking grassland intensification to Orthoptera abundance and habitat requirements of the endangered insectivorous Scops owl (*Otus scops*)

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A growing food demand and advanced agricultural techniques increasingly impact natural ecosystems, threatening insect populations with cascading effects on insectivores. This study investigated Orthoptera abundance in territories of the endangered and least studied European Scops owl (*Otus scops*) and assessed their habitat preferences by comparing presence and abandoned/random territories. The study was conducted in the swiss Canton Valais, where all territories were mapped and a random subsample of meadows within these territories was sampled for floral diversity and Orthoptera abundance. First, vegetation surveys of plant indicator species were used to generate a land-use intensity proxy and Orthoptera abundance was recorded across the season. The results show a hump-shaped relation of grassland intensification against Orthoptera abundance, with low values in intensified and steppe-like grasslands and a peak in semi-extensive grasslands. Second, a multi-scale approach was used to assess the habitat requirements of the Scops owl. We generated a set of multi-scale predictors, classified each of them at their best spatial scales using multi-model inference, and used the most important predictors to build Ensembles of Small Models (ESMs) which were then utilized to build a high-resolution habitat suitability map. Scops owls were shown not to be limited by extensive but semi-intensive grasslands, to avoid forest, and to prefer the presence of smaller structures like wooded hems. These results are essential to understand the impacts of land-use on the food-chain, provide further information about the ecology of the poorly known Scops owl and act as an important basis for evidence-based conservation planning.

11:15	FRIDAY, 30TH AUGUST, 2019	COLLARED DOVE	OS-82
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The importance of environmental favourability and habitat in the decline of the European turtle-dove in Spain

Lara Moreno-Zarate¹, Alba Estrada¹, Will Peach², Beatriz Arroyo¹

¹Instituto de Investigación en Recursos Cinegéticos (IREC), Ciudad Real, Spain; ²RSPB Centre for Conservation Science, Sandy, United Kingdom

In north-west Europe the European turtle-dove is considered a farmland bird and has suffered large population declines probably as a consequence of agricultural intensification. However, our understanding of drivers of population change elsewhere in Europe is poor especially from the numerically important breeding populations in southern Europe. We used breeding atlas data to model environmental favourability (distribution) of turtle doves across Spain, and extensive monitoring data to identify land use correlates of spatial variation in temporal abundance trends between 1996 and 2016. Our study indicates that the large Spanish turtle dove population has undergone a 40% decline since 1996. Breeding turtle doves preferred areas of low and intermediate altitude, with low spring rainfall and a higher cover of complex cultivations and transitional woodland scrub. Areas dominated by coniferous forest were avoided. Land use was more important in explaining distribution than climate or topography. Trends in abundance were more positive in localities dominated by broad-leaved forest, and more negative in localities dominated by coniferous forest, transitional woodland shrub or mixed forest. The strongest land use correlates of spatial variation in turtle dove abundance trends mainly involved forested rather than farmland habitats, which could have important implications for conservation and management.

11:30	FRIDAY, 30TH AUGUST, 2019	COLLARED DOVE	OS-83
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Benefits and costs of restoring native woodland for breeding songbirds in temperate uplands

David Douglas¹, Jonathan Groom², Davide Scridel^{3,4}

¹RSPB Centre for Conservation Science, Edinburgh, United Kingdom; ²Staffordshire Wildlife Trust, Stafford, United Kingdom; ³Università degli Studi di Pavia, Pavia, Italy; ⁴MUSE-Museo delle Scienze di Trento, Trento, Italy

Numerous countries are implementing reforestation policies which may provide biodiversity conservation benefits, but the ecological impacts must be understood when woodland replaces long-established open habitats supporting characteristic wildlife. This includes the UK where large-scale reforestation is replacing open moorland supporting important breeding bird communities. We compared breeding bird species richness and abundance in upland native woodland in Scotland created 8-24 years previously and open ground (moorland) and predicted future abundance changes in moorland and woodland indicator bird species resulting from woodland creation. Bird species richness at point counts increased with increasing woodland cover, woodland age and an index of increasing tree height and declined with increasing altitude. Differing abundances of bird species of conservation concern between woodland and moorland were related to their associations with vegetation correlates, especially woodland extent or tree species composition. The planned creation of 2120km² of new woodland in Scotland between 2017 and 2032 is predicted to markedly reduce meadow pipit *Anthus pratensis* (a moorland indicator and keystone species in upland food webs) abundance and increase willow warbler *Phylloscopus trochilus* (indicator of young woodland) abundance. Native reforestation of open ground could offer net gains in bird species richness whilst having profound negative impacts on some open-ground birds including keystone species in upland food webs. Where the retention of important open-ground species is desired, the spatial delivery of landscape-scale reforestation must account for both woodland and open-ground wildlife.

11:45	FRIDAY, 30TH AUGUST, 2019	COLLARED DOVE	OS-84
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Effects of habitat on nesting success in an Alpine forest-shrub ecotone

Susanne Jähnig¹, Martha Maria Sander¹, Domenico Rosselli², Antonio Rolando¹, Dan Chamberlain¹

¹Department of Life Sciences and Systems Biology, University of Turin, Turin, Italy; ²Ente di Gestione delle Aree Protette delle Alpi Cozie, Salbertrand, Italy

Bird species have shifted their distribution along latitudinal and elevational gradients due to the impacts of climate change. In mountains, it is expected that increasing temperatures will lead to an upward shift in the distribution of many bird species. However, distributional shifts have been shown to be heterogeneous among and within bird species suggesting that underpinning demographic mechanisms might be influenced by factors other than climate change *per se*, including habitat change. The aim of this study was to investigate the reproductive performance of four bird species in the Alps in order to identify causes of nest failure and how these are influenced by habitat characteristics in the nest surroundings. Nest success ranged from 55% (lesser whitethroat and linnet) to 33% (dunnock), with an intermediate success of 49% for northern wheatear. Predation (all species), abandonment (linnet) and brood parasitism (dunnock) were the main causes of nest failure. Predation and parasitism were generally positively associated with canopy cover and total shrub cover. These results indicate that future forest and shrub expansion might severely impact the reproductive success of these species, not only by limiting the availability of suitable breeding habitat, but also by restricting their functional habitat due to increased predation pressure in the proximity of the forest. It might be beneficial for ecotone species to breed further away from the forest edge, but breeding at higher elevations might be constrained by climatic factors as treelines continue to shift upslope.

Oral Session: Dispersal and Population structure

15:30	TUESDAY, 27TH AUGUST, 2019	NIGHTJAR	OS-1
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Why we should care about habitat differences in movements: using spatially explicit integrated population models to assess habitat source-sink status

Matthieu Paquet¹, Debora Arlt¹, Jonas Knape¹, Matthew Low¹, Pär Forslund¹, Tomas Pärt¹

¹SLU, Uppsala, Sweden

Assessing the source-sink status and dynamics of populations is of major importance for understanding population dynamics and to inform decisions concerning the management of natural populations and species. However, in-depth assessment of the source or sink status of habitats or populations has been proven difficult because it would require the clear distinction between survival and permanent emigration. This is of particular importance since habitat characteristics can affect both survival and movement decisions or distances. Therefore, ignoring habitat-specific movements may be either conceal or amplify habitat differences in contributions to the growth rate of a population (hereafter productivity). We aimed to better assess the source-sink status and temporal variation of two contrasting habitats using 24 years of habitat-specific local movements and demographic data of a farmland passerine, the northern wheatear (*Oenanthe oenanthe*). To do so, we combined multi-event Integrated Population models with spatial capture recapture models. This let us better estimate apparent survival of fledglings and adult breeders in the two contrasting habitats by taking into account estimated habitat-specific emigration both within and to outside the study population. Our results highlight that taking into account habitat-specific local movements have important consequences on habitat source-sink status and habitat differences in productivity.

15:45	TUESDAY, 27TH AUGUST, 2019	NIGHTJAR	OS-2
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Individual characteristics and environmental factors associated with natal dispersal in fragmented habitats

Hugo Robles^{1,2}, Carlos Ciudad³, Zeno Porro⁴, Julien Fattebert¹, Gilberto Pasinelli¹, Matthias Tschumi¹, Marta Vila⁵, Martin Grüebler¹

¹Swiss Ornithological Institute, Sempach, Switzerland; ²University of Antwerp, Antwerp, Belgium; ³University of León, León, Spain; ⁴University of Pavia, Pavia, Italy; ⁵University of A Coruña, A Coruña, Spain

Natal dispersal critically influences (meta)population dynamics. However, the underlying mechanisms of dispersal are poorly understood due to the difficulty of tracking the movements of individuals at different behavioural stages. By assessing the influence of several individual characteristics and environmental factors on the movements of radio-tracked juvenile middle spotted woodpeckers during departure and transfer stages in fragmented habitats, we revealed multiple associations that may drive dispersal. Birds from smaller habitat patches delayed departure, moved faster at transfer and ended up farther away from their natal nests than birds from larger patches, suggesting that, while habitat loss/fragmentation may inhibit departure, fast/long-distance dispersal can be a behavioural mechanism to overcome fragmentation. In addition, individuals from high quality territories delayed departure, suggesting that dispersal may help escaping degraded habitats. Larger individuals initiated dispersal earlier than smaller birds, which supports the size-dependent emigration hypothesis under fragmented scenarios. Moreover, we found positive density-dependent age at departure (i.e., delayed departure at higher densities) for birds in patches surrounded by hard edges but not in patches with softer edges, which may indicate a strong effect of competition mediated by landscape structure on dispersal timing. However, birds from areas with high population density moved slower and ended up at shorter distances during transfer, which may support the conspecific attraction hypothesis when searching for a new home. Finally, females from

better connected patches, but not from more isolated patches, moved faster and farther than males, showing that fragmentation may mask the sex-biased dispersal frequently observed in vertebrates.

16:00	TUESDAY, 27TH AUGUST, 2019	NIGHTJAR	OS-3
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The role of dispersal in adaptation to climate change: an experimental approach

Koosje Lamers¹, Marion Nicolaus¹, Raymond Klaassen¹, Jan-Åke Nilsson², Christiaan Both¹

¹Conservation Ecology, GELIFES, University of Groningen, Groningen, Netherlands; ²Evolutionary Ecology, Lund University, Lund, Sweden

Climate change advances spring onset, and shifts the optimal timing of breeding. In a changing world, dispersal could accelerate adaptation if migrating individuals that arrive late at a breeding site continue migration northward to areas with later spring phenology. Whether prolonged migration can aid adaptation to climate change depends on (1) whether these dispersers contribute their genes to these northern populations and (2) whether the timing of migration and breeding has a genetic component rather than being determined by rearing environment. Through translocation of female pied flycatchers (*Ficedula hypoleuca*) from the Netherlands to Sweden, we “experimentally dispersed” birds to determine whether southern immigrants have advanced timing and if long-distance dispersal affects reproductive success. Moreover, through egg translocations to Sweden, we created a common garden set-up of wild birds with various origins (natural Swedish, “hybrid”, and Dutch) that we monitor to determine whether genetic or ontogenetic effects determine the timing of the annual cycle. We show that translocated Dutch females breed earlier than Swedish control females. Moreover, our common garden experiment suggests that between-population variation in timing of the annual cycle is based on genetic differences. Dutch recruits in Sweden adhered to Dutch timing and bred earlier than their Swedish counterparts. Our preliminary work reveals potential for long-distance dispersal to accelerate adaptation to climate change through spreading genes for early timing from early to late populations.

16:15	TUESDAY, 27TH AUGUST, 2019	NIGHTJAR	OS-4
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Delayed dispersal and sociality in an Afrotropical facultative cooperative breeder

Laurence Cousseau¹, Dries Van de Loock^{1,2,3}, Carl Vangestel⁴, Luc Lens¹

¹Ghent University, Ghent, Belgium; ²University of Antwerp, Antwerp, Belgium; ³National Museums of Kenya, Nairobi, Kenya; ⁴Royal Belgian Institute of Natural Sciences, Brussels, Belgium

Cooperative breeding species are often characterized by a non-random spatial distribution of individuals, where close relatives are spatially clustered. Such local kin structure may facilitate kin selection, promoting indirect fitness benefits arising from cooperation. However, kin selection alone does not explain the evolution of sociality. While already existing theories on group formation mainly focus on delayed dispersal, the recently proposed “dual benefits” uses the conflict theory to generate predictions on group sizes, delayed dispersal and genetic composition of social group. We investigated what factors affect sociality and dispersal patterns in the facultative cooperative breeding placid greenbul (*Phyllastrephus placidus*), in the severely fragmented cloud forests of the Taita Hills (Kenya). Preliminary results show that 64% of pairs breed in groups with one up to five subordinates. Among groups, on average 75% of subordinates were related to the breeding female. More specifically, 73% of all groups had only related subordinates, 22% only unrelated, and 5% had a combination of both. The proportion of related subordinates increased with the age of the breeding females. Since the number of related subordinates, but not group sizes, also increases with female age, this suggests that younger females compensate the lack of retained offspring by recruiting unrelated subordinates. In addition, up to 90% of the offspring delayed dispersal until the first subsequent breeding season whereas almost all were dispersed in their

fourth year after fledging. However, birds disperse on average sooner in smaller forest patches, likely because less breeding opportunities are available.

16:30	TUESDAY, 27TH AUGUST, 2019	NIGHTJAR	OS-5
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Natal dispersal displacement patterns in resident bird species: an interspecific comparison

Martin U. Grüebler¹, Hugo Robles^{1,2}, Bettina Almasi¹

¹Swiss Ornithological Institute, Sempach, Switzerland; ²University of Antwerp, Antwerp, Belgium

Natal dispersal is a fundamental process that links demography to space. Dispersal is a three-stage process: two stationary stages (departure and settlement) separated by an exploratory transience phase. Even though transience is the key stage of dispersal displacement, processes shaping the movements in the long-lasting time period between leaving the natal range and occupying a first breeding range are highly neglected. Even worse, comparable interspecific research on the patterns of natal dispersal based on movement trajectories during transience remains limited. Here, we present natal dispersal displacements of three short-lived resident bird species, the little owl (*Athene noctua*), the barn owl (*Tyto alba*) and the middle-spotted woodpecker (*Dendrocoptes medius*) recorded by tracking studies including large parts of the transience phase. The three species showed striking similarities in the natal dispersal patterns: departure from the natal range was strongly synchronized in a narrow window of age within species and the first displacement period after permanent emigration was of very short duration with fast movements and included large proportions of the final dispersal distances. Exact timing, duration and distance of this first displacement were modulated by intrinsic and environmental factors. Displacement characteristics after the first transience period showed high variability, suggesting high context dependence. These results suggest that long-distance dispersal movements in the transience stage are costly and kept to a minimum. We further hypothesise that the first short period of transience is ontogenetically and hormonally driven followed by a much longer environmentally driven period of habitat and mate selection.

16:45	TUESDAY, 27TH AUGUST, 2019	NIGHTJAR	OS-6
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Habitat imprinting in common buzzards (*Buteo buteo*): factors explaining nest-site selection, dispersal and age of first reproduction

Meinolf Ottensmann¹, Nayden Chakarov¹, Tony Rinaud¹, Jamie Winternitz¹, Oliver Krüger¹

¹Bielefeld University, Bielefeld, Germany

Choosing a suitable habitat for breeding is a prerequisite for reproductive success and hence, strongly determines an individual's fitness. This is especially true for long-lived, territorial animals such as raptors, that once settled, show strong site-fidelity and often use the same nest throughout the entire reproductive life-span. For several raptor species, it has been shown that micro- and macrohabitat characteristics of the nest site can have strong fitness consequences and consequently, selection should favour mechanisms which allow individuals to claim territories matching their phenotype. Given the longevity of parents, it is nearly impossible for recruiting offspring in raptors to obtain the nest and the territory they were raised in, proposing that habitat imprinting as a form of ecological inheritance could lead offspring to choose nesting sites that are similar to the parental territory. Evidence for this is hard to obtain and this process is rarely investigated in the wild. Here, we make use of a long-term study on a population of individually marked common buzzards inhabiting a heterogeneous landscape in Germany. We compiled a dataset comprising more than one hundred individuals that were marked with wingtags as nestlings, allowing us to follow when and where they recruited within as well as outside the study area. We hypothesise that offspring select nest sites similar to their parents, irrespective of dispersal

distance. Furthermore, we predict that individuals raised in top territories are more likely to start reproducing at a younger age than conspecifics that were raised under less favourable conditions.

Oral Session: Energy and Metabolism

16:15	TUESDAY, 27TH AUGUST, 2019	WRYNECK	OS-10
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Ecological determinants of blood oxygen-carrying capacity in birds

Piotr Minias¹

¹*University of Lodz, Lodz, Poland*

The amount of oxygen supplied to the tissues per unit time plays a key role in oxidative metabolism of vertebrates and blood oxygen-carrying capacity is recognized as one of its major components. In wild birds, blood oxygen-carrying capacity is most commonly measured with the total blood haemoglobin concentration (Hb) and haematocrit (Hct), which is the volume percentage of red blood cells in blood. The aim of this study was to use phylogenetically-informed comparative analysis to test whether Hb and Hct correlate with basic life-history, ecological, and biogeographical traits of birds. For this purpose, I collected nearly one thousand published estimates of Hb and Hct from 300 wild avian species. The results indicate that blood oxygen-carrying capacity was primarily determined by species distribution and morphological constraints, while I found little support for the effect of life history components on both Hb and Hct. The results offer novel insights into the evolution of blood oxygen-carrying capacity in birds, as well as they provide a general, phylogenetically-robust support for some long-standing hypotheses in avian ecophysiology.

16:30	TUESDAY, 27TH AUGUST, 2019	WRYNECK	OS-11
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Winter food supply and body temperature regulation in a small bird

Hannah Watson¹, Jan-Åke Nilsson¹, Juli Broggi², Johan Nilsson¹

¹*Lund University, Lund, Sweden;* ²*Estación Biológica de Doñana, Sevilla, Spain*

The combination of short days and long cold nights in winter in temperate regions presents a major challenge for small diurnal birds. Energy constraints will impact how resources are allocated between competing energetic demands for e.g. thermoregulation, foraging, and the immune system. Small passerines regularly reduce their body temperature markedly and enter rest-phase hypothermia to conserve energy reserves during the long winter nights. However, a reduction in body temperature will likely also carry costs, for example a slower reaction to a predation attack. Furthermore, if the immune system is challenged, a fever response - integral to the acute phase response to an invading pathogen - may be at odds with energy-saving hypothermia. Food supply is likely to be a key driver determining thermoregulatory responses of wintering birds, but studies – especially in the wild – are limited. We manipulated food availability in the wild for great tits *Parus major*, over several consecutive winters, in southern Sweden. Using subcutaneous temperature-sensitive PIT-tags, we have been studying how the predictability of food supply affects nocturnal hypothermia, revealing fascinating differences in thermoregulatory responses between males and females. Continuous monitoring of nocturnal body temperature of birds exposed to an immune challenge has also revealed a detailed understanding of the ability to mount a fever response under different levels of resource predictability. These findings shed new light on the trade-offs associated with food acquisition, thermoregulation and immune function in small birds.

16:45	TUESDAY, 27TH AUGUST, 2019	WRYNECK	OS-12
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Measuring power input, power output and energy efficiency in flying birds

Linus Hedh¹, Christopher G. Guglielmo², Christoffer Johansson¹, Jessica Deakin², Christian C. Voigt³, Anders Hedenström¹

¹Lund University, Lund, Sweden; ²University of Western Ontario, London, Canada; ³Leibniz Institute for Zoo and Wildlife Research, Berlin, Germany

Measuring energy expenditure in flight is a key feature towards understanding trade-offs and adaptations of various activities in birds during their life cycles, especially for the extreme endurance flights carried out by some migratory populations. Traditionally, energy expenditure has been estimated by parameterizing theoretical models for mechanical power output and the power input (chemical power) has subsequently been estimated by using an assumed efficiency factor. Alternatively, power input has been measured empirically with various methods. However, it is unknown if input follows the theoretical U-shaped power curve of mechanical power, if efficiency is constant across flight speeds and if these relationships vary with physiological and morphological differences among species. Wake velocity fields measured using Particle Image Velocimetry (PIV) can be used to determine the mechanical power output and new techniques in gas spectrometry can measure ¹³C/¹²C from exhaust air in animals injected with labeled sodium bicarbonate, which can be used for real time tracking of power input. Here we attempt to use and evaluate the combination of these two methods to better understand flight costs in birds across air speeds using wind tunnels.

15:30	TUESDAY, 27TH AUGUST, 2019	WRYNECK	OS-7
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Effects of food availability on the energy budget of wintering great tits

Sachin Anand¹, Hannah Watson¹, Johan Nilsson¹, Jan-Åke Nilsson¹

¹Lund University, Lund, Sweden

Birds living in temperate regions face an energetically demanding period in winter, when food availability becomes reduced and unpredictable. To conserve energy, wintering passerines reduce their metabolic rate (MR) and body temperature (T_b) during the night to enter a state of hypothermia. The effect of food availability on the energy budget of birds is not fully understood. Therefore, we studied the energy budget using wild great tits (*Parus major*) by concurrently measuring MR and T_b during the night in the following two treatments: 1) constant food supplementation thereby providing the birds with predictable food availability and 2) no food supplementation where the birds would experience a natural and unpredictable food availability. Wild great tits were implanted subcutaneously with a temperature-sensitive passive integrated transponder (PIT). A few weeks later, PIT-tagged birds were collected from the field and placed in a climate-controlled chamber at -10°C to mimic a severe winter night. The chamber was connected to a respirometer for MR measurements while T_b was recorded every minute via a PIT tag reader. In total, we measured 25 individuals from predictable and 22 individuals from the unpredictable food treatment. Since the birds in the predictable food treatment can gather enough energy reserves during the day, we predicted that they would maintain their T_b close to their normothermic range and have higher MR compared with the birds experiencing unpredictable food availability, who would lower their MR and enter deeper hypothermia to conserve energy.

15:45	TUESDAY, 27TH AUGUST, 2019	WRYNECK	OS-8
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Insights into the motor of bird cells –seasonal adaptation of mitochondrial respiration in three sympatric species of tits

Andreas Nord^{1,2}, Anna Huxtable², Jennifer Page², Dominic J. McCafferty², Neil Metcalfe², Neal Dawson²

¹Department of Biology, Lund University, Lund, Sweden; ²Institute for Biodiversity, Animal Health and Comparative Medicine, University of Glasgow, Glasgow, United Kingdom

Non-migratory birds in the temperate zone adapt to winter cold by improving insulation and heat-producing capacity. While seasonal adaptation in these regards is relatively well studied at the level of whole organisms and tissues, less attention has been given to exploring seasonal change in the cellular machinery fuelling heat production. To further our proximate understanding of winter adaptation in birds, we studied seasonal changes in mitochondrial respiration and function in intact red blood cells of sympatric coal tits (*Periparus ater*), blue tits (*Cyanistes caeruleus*), and great tits (*Parus major*), between early autumn and later winter in western Scotland. These species show more than twofold interspecific variation in body mass and significant differences in foraging ecology, which could affect the level of energy stress experienced by each species in winter and call for differential seasonal adaptation. We found that all species, but particularly coal and great tits, upregulated mitochondrial respiration rate in winter. However, higher respiration rate was not directed towards increased ATP production but may instead have been a consequence of increased proton leakiness across the mitochondrial membrane in winter, a response shown by all species. Because leak is an exothermic process, it is possible that seasonal adaptation gives preference to improved heat-producing capacity also at the sub-cellular level. This suggests that non-shivering thermogenesis might be more widespread amongst birds than previously appreciated.

16:00	TUESDAY, 27TH AUGUST, 2019	WRYNECK	OS-9
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Keep cool and cool down: indications of torpor in free-ranging common swifts *Apus apus* revealed by flow-through respirometry

Arndt Wellbrock¹, Natalie Kelsey², Gerhard Heldmaier³, Jan Rozman¹, Witte Klaudia¹

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In endotherm vertebrates, heterothermia is a vital mechanism to maintain energy homeostasis, e.g. during unfavourable weather conditions and/or lack of food. Heterothermic endotherms can actively and reversibly downregulate their metabolic rate and core body temperature T_b beyond normothermia, resulting in a physiological state called torpor. Adaptive controlled hypothermia has been found in several avian taxa, like mousebirds, frogmouths, nightjars, hummingbirds and swifts. Laboratory studies in Common Swifts *Apus apus* kept in respirometry chambers showed that both juvenile and adult swifts are able to lower T_b and metabolic rate during resting in order to regulate their energy balance in times of food deprivation and low ambient temperature. In free-ranging swifts, however, there is no proof that they reduce metabolic rate under natural conditions during a cold period at the breeding site when paired swifts usually roost in their nests every night. To study this issue, we used the mobile indirect respirometer 'CaloBox' to measure oxygen consumption, carbon dioxide production and water loss of swifts resting at their nest. In periods with ambient temperature below 20°C and/or with high rain fall, we found that oxygen consumption was reduced gradually by more than 60% during the night and rose directly in a steep increase in the morning. The nest temperature, which was measured as a non-invasive proxy for T_b , followed also the pattern in oxygen consumption (decrease of at least 7°C). We conclude that these observations are clear indications of torpor in free-ranging swifts.

Oral Session: Evolution

15:30	WEDNESDAY, 28TH AUGUST, 2019	WRYNECK	OS-37
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Heritability of an extended phenotype: is nest site selection a heritable trait in a temperate passerine?

Caitlin Higgott¹, Karl Evans¹, Ben Hatchwell¹

¹University of Sheffield, Sheffield, United Kingdom

Nest site selection is closely tied to breeding success, with choosing a poor nest site reducing your chances of successfully reproducing. Given this, it is often assumed to be under high evolutionary selection pressure. However, it has rarely been explicitly tested whether nest site selection has a genetic component, which would be crucial for selection to act. Our study hypothesised that nest site selection, in terms of nest height and vegetation type, will be a repeatable and heritable trait. Using locations of nests collected between 1994 and 2018, our study calculates the repeatability and heritability of nest height and vegetation choice in long-tailed tits (*Aegithalos caudatus*). To do this, we will use a linear mixed model that uses pedigree-derived estimates of relatedness to estimate additive genetic covariance, otherwise known as an animal model. This analysis will utilise both genetic and social pedigree data as this provides extra information about the extent to which nest placement is socially acquired or genetically inherited. This study will show whether nest site selection traits have a heritable component, leading us to a better understanding of how evolutionary selection is able to act upon an extended phenotype.

15:45	WEDNESDAY, 28TH AUGUST, 2019	WRYNECK	OS-38
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Tail color signals performance in blue tit nestlings

Barbara Class¹, Edward Klun², Jon Brommer¹

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Indirect sexual selection arises when reproductive individuals choose their mates based on heritable ornaments that are genetically correlated to fitness. Evidence for genetic associations between ornamental coloration and fitness remain scarce. In this study we investigate the quantitative genetic relationship between different aspects of tail structural coloration (brightness, hue and UV chroma) and performance (cell mediated immunity, body condition and wing length) in blue tit (*Cyanistes caeruleus*) nestlings. In line with previous studies, we find low heritability for structural coloration and moderate heritability for performance measures. Multivariate animal models show positive genetic correlations between the three measures of performance, indicating the presence of genes for overall performance while tail brightness and UV chroma, two genetically independent color measures, are genetically correlated with performance (positively and negatively respectively). Our results suggest that mate choice based on independent aspects of tail coloration can have fitness payoffs in blue tits and provide support for the indirect benefits hypothesis. However, low heritability of tail structural coloration implies that indirect sexual selection on mate choice for this ornament will be a weak evolutionary force.

16:00	WEDNESDAY, 28TH AUGUST, 2019	WRYNECK	OS-39
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Morphological characterization of flight feather shafts in four bird species with different flight styles

Gergely Osváth^{1,2,3}, Orsolya Vincze¹, Dragomir-Cosmin David³, László Jácint Nagy¹, Ádám Z. Lendvai², Péter L. Pap^{1,4}

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The variation in rachis morphology among species and individual flight feathers may reflect adaptations to requirements imposed by aerodynamic forces. Here we describe how the shape of the rachis, expressed by the dorso-ventral/lateral width ratio, changes along the longitudinal and lateral axis of the wing in four bird species with different flight styles: flapping-soaring (white stork), flapping-gliding (common buzzard), continuous flapping (pygmy cormorant) and passerine-type (house sparrow). Overall, in each wing feather, irrespective of species identity, the rachis shape changed from circular to rectangular, from the calamus towards the feather tip. The ratio between the dorso-ventral and lateral width of the calamus was similar along the wing in the four species, while the ratio at the base, middle and tip of the rachis changed in function of feather type and species. In distal primaries of the white stork and common buzzard, rachis width ratio decreased along the feather shaft, indicating greater lateral than dorso-ventral width towards the feather tip, while the inner primaries and secondaries became broader dorso-ventrally. In pygmy cormorants the lateral rachis thickness exceeds the dorso-ventral width at each measurement point except at the calamus. Finally, in house sparrows the rachis was wider dorso-ventrally in each measurement points, except at the distal segment of the two outermost primary feathers. Our results suggest that the resistance of the rachis to in-plane and out-of-plane aerodynamic forces varies along the wing and across species. Furthermore, variation in bending resistance is supported by the altered second moment of area of different rachis segments.

16:15	WEDNESDAY, 28TH AUGUST, 2019	WRYNECK	OS-40
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The insight in daylight effect on eggshell spotting patterns and coloration in cavity nesting birds

Paweł Podkowa¹, Katarzyna Malinowska¹, Adrian Surmacki¹

¹*Adam Mickiewicz University in Poznań, Faculty of Biology, Department of Avian Biology and Ecology, Poznań, Poland*

Light penetrating through eggshell could be beneficial for developing avian embryo. Preliminary studies on poultry showed, that light participate in processes regulating e.g. circadian clock, development of functional lateralization and body growth. The amount of light reaching an embryo depends on illumination in nest habitat and degree of eggshell pigmentation. Comparative studies indicated that species breeding in darker conditions (hole-nesters) develop less maculated eggs comparing to species breeding in abundance of light (open-nesters). Whether similar mechanism exists at a single species level remains unstudied. We investigated this issue using great tit population breeding in nest boxes equipped with plastic windows, which enabled controlling for the amount of light reaching nest boxes. Prior to the breeding season birds could choose between “dark” and “bright” nest boxes. We predicted that females breeding in dark nest boxes lay less pigmented eggs to compensate shortage of illumination. Eggshell pigmentation was assessed by coloration and spotting measured from digital images taken with calibrated SLR camera in a standard conditions. Preliminary analysis didn’t show evidence for effect of nest site light conditions on eggshell spotting and coloration in cavity nesting bird. We discuss potential obtained results in the light of other hypothesis explaining variation of egg coloration.

16:30	WEDNESDAY, 28TH AUGUST, 2019	WRYNECK	OS-41
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Phenotypic and genotypic traits of hybridization between Syrian and great spotted woodpeckers

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²*University of Rzeszów, Department of Agrobiolology and Environmental Protection, Rzeszów, Poland;*

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Syrian and great spotted woodpeckers (*Dendrocopos syriacus* and *D. major*; SW and GW, respectively) are known to hybridize in nature. Based on field studies in Poland it was estimated that only 2.1% of territories were formed by mixed pairs (5.3% if also considering pairs comprising at least one hybrid). These interspecific pairs in 92.8% comprised SW or hybrid females and GW males. In total 3.6% of observed individuals and 6.9% of dead birds were identified as hybrids. The sex ratio of hybrids was equal. 8 phenotypic characters were found to allow for the identification of hybrids. Next, with use of genetic markers (1 mitochondrial, 4 nuclear introns, 6 microsatellite loci, and nearly 2,500 single nucleotide polymorphisms), genotypes of 12 SW, 12 GW, and 2 phenotypic hybrids was determined. The highest number of fixed nucleotide sites were found in the mtDNA. Analyses of microsatellite data distinguished the two species, but all loci showed a large number of common alleles. According to the DNA sequence analyses, 2 out of 18 specimens within the sympatric range in Poland were identified as hybrids, but microsatellites and single nucleotide polymorphisms suggested c. 20% individuals with introgressed DNA. These results suggest that in urban populations of these woodpeckers, part of phenotypic SWs harbor genotypes assigned as these known for GWs. These data suggest that hybridization between SWs and GWs is an underestimated phenomenon with important consequences for any ecological studies on sympatric populations of both species and for the conservation of the rare SW.

16:45	WEDNESDAY, 28TH AUGUST, 2019	WRYNECK	OS-42
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The ecological character displacement within the breeding area questions reinforcement in *Ficedula* flycatchers

Vladimir Grinkov¹, Igor Palko², Helmut Sternberg³

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Reinforcement is the process of enhancing reproductive isolation directly controlled by natural selection to cancel maladaptive hybridization between nascent species living together in sympatry. It is significant to check how often this process occurs in nature and how important it is for speciation. Therefore, we studied the character displacement within the breeding area of the pied flycatcher (*Ficedula hypoleuca*) to address this task, because relationships between the pied flycatcher and the collared flycatcher (*F. albicollis*) had come to be considered one of the examples of reinforcement. Herewith we checked whether there is a relationship between the mean male breeding plumage colour and the remoteness of the pied flycatcher population from the breeding area of the collared flycatcher. To do this, we collected all known literature data about the phenotypic structure of the pied flycatcher populations. We found information for 41 populations. We also analysed zoological collections from 11 museums. We evaluated the phenotypic structure of another 38 metapopulations. To check whether the distance from the nesting area of the collared flycatcher impacted on the phenotypic structure of the pied flycatcher, we used a random forest as spatial predictions framework. We showed that the environmental temperature, and not the distance to sympatry, were proven to better describe the geographic pattern of the mean breeding plumage colour of the pied flycatcher populations. Therefore, we conclude that ecologically distinct adaptations driven by niche differentiation, but not reinforcement, resulted in the morphological differentiation of the Old World flycatchers (ecological character displacement).

Oral Session: Evolution and Biogeography

10:30	FRIDAY, 30TH AUGUST, 2019	NIGHTJAR	OS-61
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The maintenance of colour polymorphism - parental morph combination provide a fitness advantage in the black sparrowhawk

Petra Sumasgutner¹, Carina Nebel¹, Gareth Tate², Arjun Amar¹

¹*FitzPatrick Institute of African Ornithology, Cape Town, South Africa;* ²*Endangered Wildlife Trust, Modderfontein, South Africa*

Animals are darker in warmer and wetter environments, a phenomenon known as Gloger's rule. One species following such a clinal variation is the colour polymorphic black sparrowhawk (*Accipiter melanoleucus*), where dark morph adults are numerically dominant in the winter rainfall region of the Cape Peninsula, South Africa. A proposed explanation of the persistence of colour morphs within the same population however, is that differently coloured individuals may have different ecological strategies. Thus, combined pairings of different morphs may have advantages in the range of ecological niches a pair can exploit ('complementarity hypothesis'). We found support for this hypothesis, with i) the morphs of the black sparrowhawks showing differential provisioning rates to nestlings depending on light conditions; ii) mixed-pairs having higher productivity than like-pairs; and, iii) their offspring showing higher annual survival rates. Additionally, we found evidence for a potential mechanism behind this mixed-morph advantage. We hypothesised that this is due to mixed-pairs being afforded a wider range of ideal environmental (light) conditions for hunting. Indeed, several years of nest camera footage revealed, that mixed-pairs were less variable in the time gaps between feeding events. Thus, their chicks were less likely to experience longer periods of no food supply. This finding was further supported by the expression of stress bars in chicks' tail feathers, with chicks of mixed-morph pairs having less stress bars than chicks of like-pairs. Our overall results suggest that the complementarity hypothesis could play a role in the stability of colour polymorphism in this system.

10:45	FRIDAY, 30TH AUGUST, 2019	NIGHTJAR	OS-62
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A potential role for ecologically mediated sexual selection in the divergence of Tropical Pacific honeyeaters (*Myzomela*)

Henri Thomassen¹, Thomas Smith²

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The relative roles of neutral and selective processes in divergence are of key interest in evolutionary biology. Due to the many large and small islands, the Indopacific area constitutes an ideal natural laboratory to study the different modes of diversification. It is a biotically extremely rich region, and as a result is designated as several distinct biodiversity hotspots. It was suggested that the islands of the Pacific are a likely source of biodiversity, rather than a sink of species that originated on the mainland, as has long been the established hypothesis. We use landscape genetic approaches to study the potential roles of drift, natural selection, and sexual selection to study the divergence among island and mainland species of sexually dimorphic honeyeaters, *Myzomela* sp. Sequence and microsatellite data indicate that these populations either very recently diverged or experience ongoing gene flow. We found that males exhibit distinct differences between islands in plumage coloration and song, but not in other, fitness-related morphological traits. Females did not show divergence in any morphological traits between islands. Environmental heterogeneity explained the observed divergence in song frequency characteristics, whereas oceanic barriers better explained divergence in temporal traits. These results suggest that sexual selection is a potential factor in maintaining and deepening population differentiation,

and that environmental conditions pose selection pressures on some but not all sexual traits. The role of sexual selection in population divergence will be further evaluated using mate choice experiments.

11:00	FRIDAY, 30TH AUGUST, 2019	NIGHTJAR	OS-63
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Biogeographic history of tits and chickadees (Paridae)

Dieter Thomas Tietze¹, Ulf S. Johansson²

¹Natural History Museum Basel, Basel, Switzerland; ²Swedish Museum of Natural History, Stockholm, Sweden

The tits and chickadees (Paridae) are widespread passerine birds, distributed across vast parts of the African, Eurasian and North American continents. We inferred their biogeographic history using methods based on discrete, a priori defined, geographical areas and a method that uses actual species distributions and a relaxed random walk in a Bayesian context. We compared their relative performances and how different area codings influenced the outcome in the discrete analyses. The phylogeny was reconstructed using Bayesian inference and time-calibrated using published substitution rates and a fossil calibration point. The discrete analyses were performed in BioGeoBEARS. For the probabilistic diffusion analysis, the extant distribution of each species was shaped as polygons in Google Earth and analyzed together with the posterior distribution of time-calibrated trees in BEAST. The earliest divergences occurred 10-15 million years ago (Ma) and the probabilistic diffusion analysis and the discrete analysis indicated that the parids originated in the mountains of East Asia (Sino-Himalayas). Between 8 and 5 Ma, parids started to spread from the Sino-Himalayas and became established in North America and Africa before 5 Ma. Some transitions remained obscure and partially highly unlikely given the extant vegetation cover of some areas in between. We are now reconstructing habitat and climate niches in order to discuss the plausibility of the compiled ancestral scenarios.

11:15	FRIDAY, 30TH AUGUST, 2019	NIGHTJAR	OS-64
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Environmental selection is a main driver of divergence in house sparrows (*Passer domesticus*) in Romania and Bulgaria

Julia C. Geue¹, Csongor I. Vágási², Péter L. Pap², Henri A. Thomassen¹

¹University of Tübingen, Tübingen, Germany; ²Babes-Bolyai University, Cluj-Napoca, Romania

Both neutral and adaptive evolutionary processes can cause population divergence, but their relative contributions remain unclear. We investigated the roles of these processes in population divergence in house sparrows (*Passer domesticus*) from Romania and Bulgaria. We asked whether morphological divergence and genetic variation on a population level in this human commensal species, was best explained by environmental variation, geographic distance, or landscape resistance. We used generalized dissimilarity modelling to fit biotic beta diversity to both environmental predictors and geographic distance, and to evaluate the relative importance of natural habitat variables and those related to human habitation in driving divergence. We found that a small set of climate and vegetation variables explained more of the observed divergence than geographic and resistance distances. Our results are consistent with signals of selection on morphological traits and of isolation by adaptation in genetic markers, suggesting that selection by natural environmental conditions shapes population divergence in house sparrows. Finally, because protecting standing intraspecific variation will help maximizing a species' evolutionary potential facing changing environmental conditions, and intraspecific variation in common species may represent that in species of conservation concern, we also mapped intraspecific variation in house sparrows for conservation purposes.

11:30	FRIDAY, 30TH AUGUST, 2019	NIGHTJAR	OS-65
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Liver fatty acid composition as a life history-associated adaptation in birds

Anandan Sampath Kumar^{1,2}, F. Guillaume Blanchet³, Ondřej Kauzál^{1,4}, Tomáš Albrecht^{1,5}, Oldřich Tomášek¹

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Life history theory describes how various combinations of fitness-related traits are optimized to maximize fitness in the face of ecological challenges. As an extension, correlated suites of physiological, biochemical and behavioral adaptations – pace-of-life syndromes – are predicted to emerge resulting from their co-evolution with life-history traits. It has been proposed that membrane fatty acid (FA) composition represents such a life-history-associated adaptation underpinning variation in metabolic rate and resistance to oxidative damage (the membrane pacemaker hypothesis; MPH). Specifically, unsaturated FA are assumed to promote faster metabolic rates due to increased membrane fluidity, but are also more prone to oxidative damage. Hence, higher membrane unsaturation should evolve in species with fast life-histories, promoting their higher growth and reproduction rates, but also shortening their lifespan. Using published data on 106 bird species, we endeavored here to test the predicted links between liver FA composition, basal metabolic rate (BMR) and life-history traits. Our phylogenetically informed analysis suggests that membrane unsaturation correlates positively with BMR and fecundity, keeping in line with the predictions. However, the results showed no correlation between membrane unsaturation and lifespan. This provides mixed support for the MPH, supporting the metabolic-pacemaker role of membrane unsaturation but not its constraining effect on lifespan evolution.

11:45	FRIDAY, 30TH AUGUST, 2019	NIGHTJAR	OS-66
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Drivers for the differentiation of call types of red crossbill (*Loxia curvirostra*) in Europe

Ralph Martin¹, Julien Rochefort², Roger Mundry³, Gernot Segelbacher¹

¹University of Freiburg, Freiburg, Germany; ²private person, Savigny-sur-orge, France; ³Max-Planck-Institute for Evolutionary Anthropology, Leipzig, Germany

The driving forces causing species formation have been in focus of biologists' research for centuries. While many model species are known for allopatric speciation processes, there are still discussions about the frequency of occurrence of sympatric speciation processes. The North American red crossbill (*Loxia curvirostra*) is one of the few species where sympatric speciation processes are suggested for differentiation. In this species, calls with the same function (e.g. flight calls or excitement calls) are clustered in distinct groups, the so-called 'call types'. Each individual utters only calls of a certain call type and individuals mate assortatively with individuals of the same call type. In the Palearctic, individuals of different call types often occur in the same forest, foraging next to each other, and reasons for the differentiation of the call types remain unknown. We investigated the temporal and spatial occurrence of crossbill call types in the northern Palearctic, tested possible causes for the composition of call types at different sites and compared their occurrence with the fructification of conifers. The composition of the call types was mainly influenced by the location and not by the available conifer species. We therefore suggest that call types have developed parapatrically in the northern Palearctic. Additionally, we discuss the possible influence of anthropogenic changes in forest composition. We discuss that at least one call type has likely been 'created' by human forestry. Future changes in the forests of Central Europe thus offer an opportunity to directly experience the evolution of the red crossbill.

Oral Session: Foraging and Diet

15:00	FRIDAY, 30TH AUGUST, 2019	NIGHTJAR	OS-91
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Diet of white-tailed eagles depends on landscape characteristics in a northern inland environment

Camilla Ekblad¹, Seppo Sulkava², Hannu Tikkanen³, Toni Laaksonen^{1,4}

¹University of Turku, Turku, Finland; ²University of Helsinki, Helsinki, Finland; ³University of Oulu, Oulu, Finland; ⁴Natural resources institute Finland, Turku, Finland

Many apex predator populations are recovering, with individuals returning to old and dispersing to entirely new areas. This might have consequences for the prey species and in some cases also for livestock. The number of white-tailed eagles (*Haliaeetus albicilla*, WTE) in Scandinavia has grown rapidly since the 1980's after a previous population crash. The WTEs traditionally occur along the sea coasts, but a considerable population has settled inland in northern Finland, mainly at two big water reservoirs but also in areas scattered by forests, mires and small watersheds. The aim of this study was to find patterns in the prey use of WTEs according to landscape characteristics around the eagles' nests and to gain an understanding of factors shaping the diet of individual eagle pairs in inland environments. Special emphasis was paid on the occurrence of reindeer calves, because reindeer husbandry is a traditional livelihood in the area and concern has been raised that the growing WTE population poses a threat to reindeer calves. The results show that some prey types or species are more abundant in the diet in certain types of landscapes, strengthening the picture of the white-tailed eagle as an opportunist hunter. Reindeer calves became more abundant in the diet along a gradient towards north (within the reindeer herding area), and their occurrence often coincided with the occurrence of certain prey species, but not landscape types.

15:45	FRIDAY, 30TH AUGUST, 2019	NIGHTJAR	OS-92
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Environmental drivers of foraging patterns in an opportunistic feeder relying on human-mediated food sources: the lesser black-backed gull *Larus fuscus*

Alejandro Sotillo^{1,2}, Jan Baert^{1,3}, Wendt Müller³, Eric Stienen⁴, Luc Lens¹

¹Ghent University, Ghent, Belgium; ²Aveiro University, Aveiro, Portugal; ³Antwerp University, Antwerp, Belgium; ⁴Research Institute for Nature and Forest, Brussels, Belgium

Opportunistic species can adapt their behavior to the local resource availability, by either switching between different exploitation alternatives, or modulating their effort in accordance to the actual availability. A number of such species has adapted to the exploitation of anthropogenic food sources. Among them, the lesser black-backed gull *Larus fuscus* population breeding at the Belgian coast relies almost completely on human-mediated foods: fishery discards at sea, soil organisms at agricultural fields, and garbage. Different environmental factors determine the availability of each of these food sources: wind speed at sea, drought at agricultural fields, and human behavior in every habitat. Under the current climate change scenario, extreme weather events, such as storms and drought, are deemed to become increasingly frequent in the following decades. Characterizing current responses of foraging individuals to fluctuations in the relevant environmental factors, as well as the effects of inter-annual variation in these fluctuations, can help us assess the magnitude of the impact of climate change on non-domesticated species associated to humans. These impacts may in turn be mediated by changes in human behavior, such as the European discards ban or reductions in the accessibility to garbage. To this end, we combined 5 years of high-resolution GPS tracking data collected at a breeding colony in the Belgian coast with local environmental data with a daily resolution. Our analyses revealed short term trends in foraging habitat

attendance and habitat-specific time-energy budgets along environmental gradients during the chick rearing phase, but the effect of inter-annual variation remains unclear.

15:30	FRIDAY, 30TH AUGUST, 2019	NIGHTJAR	OS-93
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Adélie penguins do not take advantage of close polynyas for their incubation trip foraging activity: evidence from a multi-colony analysis

Candice Michelot¹, Akiko Kato¹, Thierry Raclot², Kozue Shiomi³, Pauline Goulet⁴, Paco Bustamante⁵, Gaël Guillou⁵, Yan Ropert-Coudert¹

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Sentinel species, like seabirds, are often used to assess the impact of environmental changes in remote ecosystems like Antarctica. However, such an approach often relies on the study of a few well-known populations. Here, we studied the foraging behaviour of incubating Adélie penguins *Pygoscelis adeliae* in two colonies in East Antarctica: the intensively studied colony from Pétrels Island near Dumont d'Urville French station, and that of Cap Bienvenue, 24 km east of Pétrels Island and that has never been studied, using GPS tracking, daily sea-ice data, bathymetry and diet. Comparisons between the 2 sites were first done on females in 2016, and on males in 2017. Despite being close to the colonies, polynyas were not used preferentially by Adélie penguins. Instead, they targeted the continental slope and the sea-ice edge, even when this one was far from the colonies. In addition, there was no difference in diet between the two colonies. In other words, penguins chose areas where food abundance would be more predictable rather than simply the closest open water areas in which the trophic chain has not yet fully developed at such an early stage in the breeding season. Interestingly, the strategies displayed by the penguins from the two colonies were similar. This reinforces the general idea that incubating Adélie penguins use the sea-ice edge at a species level, suggesting a common pattern across colonies, although additional sites are necessary to ascertain this.

15:15	FRIDAY, 30TH AUGUST, 2019	NIGHTJAR	OS-94
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A swallow's landscape of fear: trade-off between foraging and predation avoidance

Alex Grendelmeier¹, Julien Fattebert^{2,3}, Beat Naef-Daenzer¹, Martin Gruebler¹

¹Swiss Ornithological Institute, Sempach, Switzerland; ²Wyoming Cooperative Fish and Wildlife Research Unit, Department of Zoology and Physiology, University of Wyoming, Laramie, USA; ³School of Life Sciences, University of KwaZulu-Natal, Durban, South Africa

Habitat preference during the post-fledging period is a pivotal, but still understudied part of avian life history. How an individual uses its environment is a trade-off between the spatiotemporal distribution of resources and the risk, such as predation, encountered when exploiting them. Predation creates a landscape of fear whereby prey is expected to avoid foraging in food-rich areas of high risk. In the barn swallow (*Hirundo rustica*) daily mortality rate, mainly due to predation increases during the first two weeks after fledging and peaks shortly after independence from the parents. Using telemetry and visual observation data to quantify predation pressure and habitat preference, we described the landscape of fear for juvenile barn swallows during their first three weeks post-fledging. Preliminary results indicate that settlement edges, grasslands, fallows, water bodies and any type of woody habitat including single trees, tree rows and forests appeared to be preferred during foraging, while

arable land was avoided. The preferred habitats were important for foraging but could expose swallow flocks to predation. Indeed, attack rates on barn swallows correlated negatively with distance to standing water bodies and forests, two of the preferred foraging habitats. Furthermore, attack rates peaked around noon and were highest for medium sized flocks of around 70 individuals. The preliminary results suggest that group size may play a role in predation risk mitigation. We hypothesize that swallows react to variability in attack rates with group size and that they exploit good foraging patches with high attack rates in very large flocks.

16:00	FRIDAY, 30TH AUGUST, 2019	NIGHTJAR	OS-95
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Do habitat characteristics predict innovativeness and dietary preferences?

Eva Serrano-Davies¹, Bernice Sepers¹, Nina Bircher¹, Kees van Oers¹

¹*Netherlands Institute for Ecology (NIOO-KNAW), Wageningen, Netherlands*

Innovativeness—where individuals feed on novel food types or adopt new foraging techniques—is likely driven by cognition. Because of the benefits associated with innovative behaviours, it has been argued that innovation may be a mechanism that facilitates alternative foraging strategies among individuals, allowing them to avoid costs associated with intense competition. Also, food preferences are likely influenced by the habitats individuals live in. The ‘adaptive innovation hypothesis’ predicts that innovators may have a higher food intake when novel foraging opportunities arise, and that they should have a more diverse range of foraging tactics. We provided feeders throughout the woods with two different types of food and fitted adult great tits (*Parus major*) roosting in our study area with an RFID tag. In order to test whether the tendency to innovate increases the ingestion of better-quality but difficult-to-handle food items (raw peanuts vs. sunflower seeds) and if these differences are mediated by problem solving performance, birds were captured and tested indoors for a novel foraging task. We found that solver individuals have greater food diversity and foraging intake rate, and habitat quality explained individual differences in problem solving performance. Food preferences were influenced by the habitat, either because of the kinds of foods prevalent in those habitats or because of intrinsic differences in metabolism linked to, for example, stress associated with living in those habitats. Our results illustrate that several factors can determine foraging behaviour and success, including innovativeness, state variables and habitat quality.

16:15	FRIDAY, 30TH AUGUST, 2019	NIGHTJAR	OS-96
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Foraging tactic of a colonial raptor differs among individuals and varies according to weather conditions

Jacopo Cecere¹, Delphine Menard², Simona Imperio¹, Stefano Podofillini², Federico De Pascalis², Carlo Catoni³, Matteo Griggio⁴, Diego Rubolini²

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Individual diversification in foraging behaviours may reduce ecological niche overlap, resulting in a mitigation of intraspecific competition. At the same time, different foraging behaviours may vary in their efficiency and energy expenditure, with different fitness implications. We investigated individual differences in foraging tactics in a colonial raptor species, the lesser kestrel (*Falco naumanni*), and assessed their implication in terms of energy expenditure and fitness. We analyzed 489 foraging trips from breeding individuals equipped with GPS-accelerometer data-loggers using the EMbC method to infer behavioural mode. Cluster analysis of the relative duration of each behavioural mode within a given foraging trip identified two distinct foraging tactics:

widely-foraging and sit-and-wait. Using behavioural reaction norms we investigated differences in individual tendency to adopt a specific foraging tactic across weather condition gradients. Energy expenditure for each foraging trip was estimated using accelerometer-data. Overall, lesser kestrels preferred to pursue widely foraging tactic over sit-and-wait as solar radiation and cross-wind-component intensity increased, with the individual tendency to adopt a specific foraging strategy being consistent across weather condition gradients. Energy expenditure in widely foraging trips was markedly higher than in sit-and-wait trips, but daily brood mass increase of parents that were more prone to adopt the more energy demanding tactic were higher, despite nestling feeding rates did not significantly differed among birds. The fitness benefits for parents adopting the most energy expensive foraging tactic suggest that individual differences in foraging behaviour may play a key role in maintaining life-history trade-offs between reproduction and self-maintenance.

Oral Session: Migration

15:30	TUESDAY, 27TH AUGUST, 2019	WHITE STORK	OS-25
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The importance of connectivity to long-distance migrant population dynamics

Will Cresswell¹, Tom Finch², Robert Patchett¹

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Estimating how much long-distance migrant populations spread out and mix during the non-breeding season (migratory connectivity) is essential for understanding their population declines in the face of global change. High migratory spread is predicted to decrease vulnerability to climate-driven shifts in the location of suitable non-breeding habitat, because individuals are more likely to encounter newly suitable sites, but if habitats are being removed then low migratory spread is favoured. We tested how migratory connectivity was correlated with migrant population trends (using all available migratory landbird tracking data from 50 species, and breeding bird population data from 128 populations and human population change data from 909 individual non-breeding site locations). Most migrant species show high levels of population spread (low connectivity) suggesting that deterministic migration strategies are not generally adaptive; this makes sense in the context of the recent evolution of the systems, and the spatial and temporal unpredictability of non-breeding habitat. Low spread was associated with declining populations in the Neotropic flyway, but the reverse occurred in the Afro-Palearctic flyway. Thus climate change may be more important in Neotropic migrant population declines whereas habitat loss may be more important in the Afro-Palearctic. The link between non-breeding habitat change and migrant population change is weak however. The conservation implications of generally low connectivity are that the loss (or protection) of any non-breeding site will have a diffuse but widespread effect on many breeding populations, and that conservation efforts are best targeted at breeding and staging sites.

15:45	TUESDAY, 27TH AUGUST, 2019	WHITE STORK	OS-26
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Spatial and temporal use by a Palearctic migrant during the non-breeding season in Africa

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Afro-Palearctic migrants spend half of their life cycle south of the Sahara Desert, but little information is known about their life history traits during the non-breeding season. Estimating the degree of an individual's winter territoriality, residency and site fidelity are key to successfully estimating adequate survival rates and

determining how susceptible or resilient a species is to habitat and environmental changes, particularly in the light of recent widespread declines of long-distance migratory birds. During this study we aim to (1) estimate arrival and departure dates, (2) calculate territory size and residency periods, and (3) determine the degree of site fidelity of an Afro-Palearctic migrant bird, the common whitethroat (*Sylvia communis*), during two wintering seasons in Central Nigeria (2017–2019). Individuals were colour-banded with unique combinations and sought out at least once a week until April. Our preliminary results show great individual variation in territory sizes and residency periods. Less than 20% of winter1's individuals returned to the study site the following winter. Only a small proportion of individuals remained throughout the whole wintering seasons however, many established temporary territories in autumn (October–early December) and in spring (February–April) during both seasons. These results suggest a second wintering site elsewhere. The individual variation and the use of more than one site during the non-breeding season highlight the importance of adequate conservation strategies across Africa to increase and protect populations of Afro-Palearctic migrants.

16:00	TUESDAY, 27TH AUGUST, 2019	WHITE STORK	OS-27
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Influence of environment and landscape on population genetic structure between migratory and resident blackcaps in Spain

Tania Garrido-Garduno¹, Guillermo Fandos², Richard A.J. Williams³, Javier Pérez Tris⁴, Miriam Liedvogel¹

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Animal migration is the movement of individuals at different spatial scales as a strategy for coping with seasonal environments. Thus, climate and landscape have a considerable influence on migratory strategy, particularly separating sedentary and migratory populations. In this context it is important to understand what landscape and environmental factors are the key elements shaping the distribution of migratory and sedentary populations. The European blackcap, *Sylvia atricapilla*, is a good model species to study evolutionary history of bird migration because it exhibits the full range of migratory behaviour (residents, short distance, medium distance and long distance). That recent changes in climate will lead to shorter migratory distances between breeding and wintering areas, and in consequence increased residency. Here we focus on identifying specific barriers to dispersal on population genetic diversity between migratory and resident population of blackcap in Spain. Using a landscape genetic approach, and despite little overall genomic divergence between blackcap populations, we identify five clearly separated genetic groups, highlighting an interesting landscape genetic structure in the south of Spain. This structure is due to variation of temperature and precipitation between north and south Spain, land cover and changes in the orography as main drivers of breeding habitat selection by individuals of population.

16:15	TUESDAY, 27TH AUGUST, 2019	WHITE STORK	OS-28
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Wing morphology and migration distance predict pre-migratory fattening of birds: a comparative study

Orsolya Vincze^{1,2}, Csongor I. Vágási^{1,3}, Péter L. Pap^{1,3}, Colin Palmer⁴, Anders Pape Møller⁵

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Debrecen, Debrecen, Hungary; ⁴School of Earth Sciences, University of Bristol, Bristol, United Kingdom; ⁵Ecologie Systématique Evolution, Université Paris-Sud, CNRS, AgroParisTech, Université Paris Saclay, Paris, France

Migratory birds are known to accumulate large amounts of fat, protein and other nutrients prior their migration. Stored reserves often serve the sole source of energy, especially in birds that undertake long non-stop flights, but they impact negatively on flight manoeuvrability, predator avoidance and flight dynamics. Therefore, sub-optimal fat loads have a strong potential to decrease fitness. Fuel accumulation in migratory birds has previously been linked to the length of their migratory journey, nonetheless such association lacks evidence across species. To date our knowledge is limited on what factors, especially other than migration distance, influence the cross-species variation in accumulated fuel loads. Within the framework of this phylogenetic comparative study, we collected maximum fuel load data from 139 European bird species and investigated how migration distance, wing morphology and flight style influenced maximum fuel load across birds. We quantified fuel load based on literature data and validated this measure using condition indices calculated based on migrant birds captured at a bird ringing station. Our results indicate that maximum fuel load strongly increases with the length of migratory journey across species. Additionally, we show that species with high wing aspect ratio accumulate less fuel. Wing loading and flight style have little predictive power for maximum fuel load across birds. Our results indicate that optimal fuel load is influenced by the length of migratory distance and the flight energy-efficiency, as reflected by wing aspect ratio, of the species.

16:30	TUESDAY, 27TH AUGUST, 2019	WHITE STORK	OS-29
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Are there trade-offs to reproduction and survival as a result of migratory decision-making in a partial migrant, the red kite (*Milvus milvus*)?

Stephanie Witczak^{1,2}, Patrick Scherler^{1,2}, Martin Gruebler¹

¹Swiss Ornithological Institute, Sempach, Switzerland; ²University of Zurich, Department of Evolutionary Biology and Environmental Studies, Zurich, Switzerland

The presence of partial migratory behaviour in a population is believed to be associated with a trade-off in demographic parameters in many species. The exact response of these parameters to the decision to remain resident or migrate during winter is still largely undescribed. One hypothesis suggests that the decision to migrate reflects an attempt to increase survival by avoiding adverse conditions on the breeding grounds. However, a further consequence of this decision is potentially decreasing reproductive success due to temporary abandonment of the territory leading to territory loss. Furthermore, a later start of reproduction may result from territory loss and delays during migration. As such, survival should be lower in residents than migrants, while reproductive success should be higher and reproductive start earlier. To investigate these questions, 77 adult Swiss red kites were fitted with GPS transmitters between 2016 and 2018. Residency is an increasingly common strategy in this population, rendering it an interesting study system for examining this question. The GPS data were used to determine migratory status (resident or migrant) and mortality. Field observations were used to determine reproductive success. Neither mortality, nor reproductive phenology or success exhibited a strong difference between migrants and residents. This suggests that costs and benefits associated with the different strategies may act on the longer term. For example, infrequent occurrence of severe winters might generate significant costs for residents, while earlier recruitment into the breeding population, resulting from first claim to territories in spring, could generate significant benefits.

16:45	TUESDAY, 27TH AUGUST, 2019	WHITE STORK	OS-30
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Genetics of long-distance migration

Staffan Bensch¹, Max Lundberg¹, Kristaps Sokolovskis¹

¹Lund University, Lund, Sweden

Understanding the genetic architecture of the migratory program is a research field in its infancy - no gene has so far been conclusively identified as linked to the expression of the migratory phenotype. The willow warbler *Phylloscopus trochilus* has two migratory divides located in central Scandinavia and south of the Baltic Sea. Smaller and greener birds of the subspecies *trochilus* breed in southern Scandinavia and migrate towards SW for wintering in western Africa whereas larger, grayer birds of the subspecies *acredula* breed in northern Scandinavia and Finland and migrate towards SE for wintering in east and south Africa. Absence of differences at neutral loci between the subspecies suggested that the phenotypic trait differences have evolved within the last 10,000 years during the process of postglacial colonization of northern Europe. Population samples of willow warblers around the Baltic demonstrate that several different traits including coloration, size, migratory direction (inferred from stable isotope analyses) and three independent chromosomal blocks, show drastically different cline patterns along the eastern side of the Baltic, supporting that the willow warbler has colonized Scandinavia via two directions from one common glacial refuge population. New data from whole genome sequencing and resequencing demonstrate that finding genes involved in the migratory program is challenging, but the willow warbler system provides promising directions of research that might finally lead to a breakthrough in this field.

Oral Session: Migration Routes

15:30	WEDNESDAY, 28TH AUGUST, 2019	WHITE STORK	OS-55
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Route selection and time-energy trade-off in relation to wind conditions in migrating white storks (*Ciconia ciconia*) crossing a waterbody

Paolo Becciu¹, Shay Rotics^{2,3}, Nir Horvitz², Michael Kaatz⁴, Florian Jeltsch^{5,6}, Martin Wikelski^{7,8}, Wolfgang Fiedler^{7,8}, Ran Nathan², Nir Sapir¹

¹Animal Flight Laboratory, Department of Evolutionary and Environmental Biology, University of Haifa, Haifa, Israel; ²Department of Ecology, Evolution and Behavior, Alexander Silberman Institute of Life Sciences, The Hebrew University of Jerusalem, Jerusalem, Israel; ³Department of Zoology, University of Cambridge, Cambridge, United Kingdom; ⁴Vogelschutzwarte Storchenhof Loburg e.V., Loburg, Germany; ⁵Plant Ecology and Conservation Biology, Institute for Biochemistry and Biology, University of Potsdam, Potsdam, Germany; ⁶Berlin-Brandenburg Institute of Advanced Biodiversity Research (BBIB), Berlin, Germany; ⁷Department of Migration and Immuno-Ecology, Max-Planck-Institute for Ornithology, Radolfzell, Germany; ⁸Department of Biology, University of Konstanz, Konstanz, Germany

Soaring birds encounter a variety of environmental conditions during their migration, and winds in particular could affect route selection over sea or land and affect associated time-energy trade-offs. Large soaring birds tend to avoid crossing seas since usually they cannot soar over water, and switching to flapping flight can be very demanding energetically. Yet, sea-crossing can be substantially shorter than a land detour. We tested the effects of different atmospheric factors (winds, thermal availability and cloud cover), bird position, day of passage, season (spring vs. autumn), and individual characteristics (sex and age) on route selection of 70 migrating White storks (*Ciconia ciconia*) tracked using GPS devices at the Gulf of Iskenderun in southern Turkey. We analyzed 196 tracks altogether, 96 (49%) crossed the bay, and all others undertook a longer detour overland. The main factor affecting the decision to cross the sea was wind direction before crossing the bay. In spring, increasing westward wind component and overall stronger winds promoted sea-crossing, while in autumn southerlies promoted a land detour. Flight across the bay was associated with flapping flight and higher values of Overall Dynamic Body Acceleration (ODBA). Notably, spring migrants crossing the bay were able to extend their travel by 30% in the same day after crossing the bay compared to detouring birds, but no time-energy trade-off was

found during autumn. Our findings propose that atmospheric conditions may strongly affect bird route selection, with different consequences for migration timing, speed and energy expenditure in the two migratory seasons.

15:45	WEDNESDAY, 28TH AUGUST, 2019	WHITE STORK	OS-56
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Impossible to soar over temperate seas? The osprey exception

Flavio Monti¹, Guillaume Peron², David Grémillet³, Andrea Sforzi⁴, Olivier Duriez³

¹University of Siena, Siena, Italy; ²University of Lyon 1, Lyon, France; ³CEFE-CNRS, University of Montpellier, Montpellier, France; ⁴5. Maremma Natural History Museum, Grosseto, Italy

Large raptors on migration generally avoid crossing the sea and prefer making large detours to concentrate at straits and isthmus. The explanation generally given is that there are no thermal ascending currents over temperate seas to practice soaring-gliding flight. The osprey *Pandion haliaetus* is an exception as they are able to cross several hundred km of open sea. These long sea crossings are currently assumed to be powered by constant flapping. However, osprey may also exploit the weak thermal convection currents that form over warm seas, as other seabirds do. We equipped five juvenile ospreys with GPS-Accelerometer-Magnetometer loggers. All birds were able to find and use thermal uplift while crossing the Mediterranean Sea, on average 7.5 times per 100 km, and could reach altitudes of 900 m above the sea surface. Their climb rate was 1.6 times slower than over land, and birds kept flapping most of the time while circling in the thermals, indicating that convections cells were weaker than over land. The frequency of thermal soaring was correlated with the difference between the sea surface and air temperature, indicating that atmospheric convection occurred when surface waters were warmer than the overlaying air. These observations help explain the transoceanic cosmopolitan distribution of osprey, and question the widely held assumption that water bodies represent strict barriers for large raptors.

16:00	WEDNESDAY, 28TH AUGUST, 2019	WHITE STORK	OS-57
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The hitchhiker's guide to the migration of Eurasian wigeons: a dynamic migration network from ring recoveries, IBAs, and tracking data

Mariëlle van Toor¹, Arzel Céline², Fred Cottaar³, Mindaugas Dagys⁴, Wolfgang Fiedler⁵, Anders Hedenström⁶, Sergey Kharitonov⁷, Erik Kleyheeg⁸, Thijs Kuiken⁹, Gerard Muskens¹⁰, Ulf Ottosson¹, Kamran Safi⁵, Saulius Švažas¹¹, Henk van der Jeugd¹², Martin Wikelski⁵, Ramunas Žydelis⁴, Susanne Åkesson⁶, Jonas Waldenström¹

¹Linnaeus University, Kalmar, Sweden; ²University of Turku, Turku, Finland; ³NA, Haarlem, Netherlands; ⁴Ornitela UAB, Vilnius, Lithuania; ⁵Max Planck Institute for Ornithology, Radolfzell, Germany; ⁶Lund University, Lund, Sweden; ⁷Bird Ringing Centre of Russia, Moscow, Russian Federation; ⁸SOVON, Nijmegen, Netherlands; ⁹Erasmus MC, Rotterdam, Netherlands; ¹⁰Wageningen Environmental Research (Alterra), Wageningen, Netherlands; ¹¹Lithuanian Nature Research Centre, Vilnius, Lithuania; ¹²Netherlands Institute of Ecology, Wageningen, Netherlands

Seasonal migrations provide regular and directional dispersal opportunities for less mobile organisms. Thus, common migratory species are potentially powerful agents of directional dispersal processes that substantially affect the ecology and population dynamics of organisms relying on zoochorous dispersal. Consequently, studying phenomena such as the rapid spatial spread of pathogens like avian influenza viruses (AIVs) in the light of animal migrations might enable us to understand the underlying processes, and predict such scenarios in the future. Yet, the impact of entire disperser populations, rather than individuals alone, is not easily understood without quantitative estimates of population flow. Recently, network theory has been proposed as a tool for formalising the spatio-temporal process of migrations on a population level. Here, we constructed such a dynamic

migration network for a long-distance migratory dabbling duck, the Eurasian Wigeon. We combined existing data from ring recoveries and important bird areas (IBAs) with a migration model derived from high-resolution tracking data to parameterise the network. We used the network to study how the migration of entire populations might affect dispersal processes on a landscape perspective, and estimated the potential of wigeons to disperse pathogens such as AIVs during their migrations. We think that dynamic migration networks have a wide range of applications for the study of migration on a population level, and could lead to a better understanding of how the environment affects the seasonal and spatial aspects of migration, and vice-versa.

16:15	WEDNESDAY, 28TH AUGUST, 2019	WHITE STORK	OS-58
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Towards monitoring, understanding and forecasting Global Biomass flows of Aerial Migrations (GloBAM)

Judy Shamoun-Baranes¹, Jason Chapman², Peter Desmet³, Andrew Farnsworth⁴, Jarmo Koistinen⁵, Silke Bauer⁶

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Migratory movements of birds and insects can have substantial impacts on ecosystem functioning and human activities. Yet, environmental conditions that migrants experience are changing rapidly and consequences for migratory populations and the ecosystems they inhabit that are still largely unknown. GloBAM (Global Biomass flows of Aerial Migrations) is an international BiodivERsA research project that aims to (1) improve tools to monitor aerial biomass flow of insects and birds at regional to continental scales, (2) develop an e-science infrastructure to support research, (3) understand external factors that influence biomass flow among different taxa and (4) develop scenarios of future environmental change on migratory systems and ecosystem functioning. Operational weather radar is the primary sensor for this project's large scale sampling of the aerial environment, with additional information on aerial movements to be gathered from dedicated bird and insect radars as well as citizen scientists' observational data. We will apply different modelling techniques to integrate information about bird behaviour and environmental conditions and develop forecast models and scenario testing. We provide a brief overview of ongoing work towards achieving the project's aims and examples of how the tools and knowledge developed during this project can benefit a range of stakeholders in conservation, renewable energy, flight safety, agriculture, and public engagement.

16:30	WEDNESDAY, 28TH AUGUST, 2019	WHITE STORK	OS-59
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Combining citizen science and tracking data to unravel the migration routes of Eastern Palaearctic songbirds

Wieland Heim¹, Yury Gerasimov², Ramona Heim¹, Pavel Kitorov³, Kiyooki Ozaki⁴, Ilya Panov⁵, Martha Maria Sander⁶, Sissel Sjöberg⁷, Sergei Smirenski⁸, Alexander Thomas⁹, Ivan Tyunov¹⁰, Mikkel Willemoes¹¹, Anders Tøttrup⁷, Kasper Thorup⁷, Kamp Johannes¹

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Species-distribution models (SDMs) are widely used to model the spatio-temporal occurrence of birds. Observations from citizen scientists have become a commonly utilized data source for SDMs, but their usefulness for this purpose remains controversial. Here we use eBird observation data and a maximum entropy modelling approach to predict the distribution of eight songbird species that migrate in the East Asian flyway. Separate models were built to predict the main spring and autumn stopover sites, and wintering areas. We then used recoveries from the Russian and Japanese ringing schemes to test, how the model-predicted occurrence at a given period of the annual cycle matched known areas of presence. Additionally, we used geolocator tracking data to validate the predicted areas of occurrence and –for the first time– plot the migration routes of a set of East Asian songbird species with contrasting life histories. We found that the overlap between areas predicted as suitable from the eBird data and areas that had records from ringing and tracking was highest in winter, and lower for the migration periods. On average, only 44% of the geolocator points fell onto areas that were predicted as suitable during autumn migration. During winter, almost 100% of the geolocator points coincided with the modelled distribution. We conclude that combining different data sources has great potential to gain a better understanding of the non-breeding distribution of Eastern Palearctic songbirds.

16:45	WEDNESDAY, 28TH AUGUST, 2019	WHITE STORK	OS-60
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Geographic differentiation in migration routes leads to strong migratory connectivity in the lesser kestrel (*Falco naumanni*)

Diego Rubolini¹, Salvatore Bondi², Ana Bermejo³, Mathieu Bourgeois⁴, Mathias Bouzin⁵, Javier Bustamante⁶, Javier de la Puente³, Angelos Evangelidis⁷, Annagrazia Frassanito⁸, Egidio Fulco⁹, Giuseppe Giglio¹⁰, Gradimir Gradev¹¹, Matteo Griggio¹², Lina Lopez-Ricaurte⁶, Panagiotis Kordopatis⁷, Simeon Marin¹¹, Juan Martinez¹³, Rosario Mascara², Ugo Mellone¹⁴, Stefania Pellegrino¹⁰, Philippe Pilard¹⁵, Stefano Podofillini¹, Marta Romero¹⁴, Marco Gustin¹⁰, Nicolas Saulnier⁵, Lorenzo Serra¹⁶, Athanassios Sfougaris¹⁷, Vicente Urios¹⁴, Matteo Visceglia¹⁸, Konstantinos Vlachopoulos¹⁷, Laura Zanca², Jacopo G. Cecere¹⁶, Maurizio Sarà¹⁹

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We performed a large-scale individual-based migration tracking study of the lesser kestrel (*Falco naumanni*), with the aim of determining patterns of migratory connectivity of the European breeding populations, its underlying geographical correlates, as well as inter-population differences in migratory routes and year-round variation in the spatial structure of breeding populations. We analysed migration data of 87 individuals from the three core European populations, located in Iberian, Italian and Balkan peninsulas. Migration data were recorded using light-level geolocators (n = 47) and satellite-tracking devices (n = 40). We confirmed that Iberian birds migrate to western Sahel (Senegal, Mauritania, western Mali), and identified the non-breeding areas of Balkan and Italian birds. Balkan birds migrated chiefly to central-eastern Sahel (Niger, Nigeria, Chad), whereas Italian ones spread from eastern Mali to Niger and Nigeria. This spatial differentiation of non-breeding areas led to strong migratory connectivity ($r_M = 0.58$), associated with high population spread (637 km, increasing eastwards) and non-breeding range spread (1149 km). Migratory routes were clearly differentiated and occurred on a broad-front across the Mediterranean Sea and Sahara Desert. We provided for the first time a complete snapshot of the non-breeding distribution of European lesser kestrel populations, documenting a strong migratory connectivity, a rare occurrence in long-distance migrants. Geographic conformation of the species' breeding range triggers connectivity, promoting differentiation of migration routes and broad-front migration across the

ecological barriers. Strong connectivity is then maintained as a result of high population and high non-breeding range spread.

Oral Session: Navigation

	FRIDAY, 30TH AUGUST, 2019	CORNCRAKE	OS-103
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An ontogenetic perspective on migratory strategy of a long-lived pelagic seabird: timings and destinations change progressively during maturation

Letizia Campioni¹, Maria Peixe Dias², José Pedro Granadeiro³, Paulo Catry¹

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The processes that drive the ontogeny of migratory strategies in long-lived animals with slow maturation remain enigmatic. While some short-lived migrants are known or believed to repeat the same migratory patterns along their lives, little is known on the time required for immature long-lived migrants to progressively acquire adult-like migratory behaviours, or which aspects take longer to refine during the maturation process. Here we studied the ontogeny of migratory strategies and related patterns of spatial distribution in a long-lived seabird species during the annual cycle. We deployed light-level geolocators on 4-9 years old immature Cory's shearwaters (*Calonectris borealis*) and breeding adults. We revealed that migratory timings and destinations of young shearwaters progressively changed with age. The effect of aging was remarkably evident on spring migratory performance and travel arrangements. Birds gradually shortened the duration of non-breeding period by advancing departure date and reducing travelling time which resulted in a sequential arrival at colony of the various age contingents. Aging immatures switched from a more exploratory strategy to a more conservative way of exploiting resources reducing both their year-round spatial spread across oceanic domains and total travelled-distance. Finally, immatures always performed a trans-equatorial migration to the Southern hemisphere, contrasting with 17% of the adults which remained in the North Atlantic year-round. Our study provides empirical support to the hypothesis that in long-lived species, the refinement of migratory behaviour and year-round spatial distribution is a progressive process mediated by age and experience where life-stage constraints may also play a role.

	FRIDAY, 30TH AUGUST, 2019	CORNCRAKE	OS-104
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Evidence for true magnetic navigation in a long-distance migratory songbird

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Migratory birds have been shown to be capable of true navigation, i.e., the ability to return to a known goal from a location they have never visited before by using information from the local environment. True navigation requires a navigational map in order to determine the relative position to the goal, which birds are assumed to develop during their first migratory journey. The exact nature of this navigational map (e.g. cues involved) and its spatial scale, however, is still controversial. We conducted two virtual magnetic displacement experiments and tested the orientation behaviour of adult migratory songbirds in Emlen funnels under natural and changed magnetic conditions. First, we changed only one magnetic parameter (magnetic declination), which in combination with the other unchanged parameters did not correspond to an actual location on the globe. Changed magnetic declination alone, however, suggested a displacement outside the natural distribution range of

the species. Second, we changed three magnetic parameters (magnetic declination, magnetic inclination and total magnetic intensity), corresponding to an actual location with the same declination as in the first experiment and, thus, being outside the natural distribution range. Birds responded with a change in mean migratory orientation matching a compensation for the virtual displacement in the second experiment only. This result strongly suggests that adult nocturnally migrating songbirds possess a navigational map, which seems to hold information on the spatial distribution of several magnetic parameters. Further, it shows that these birds are able to interpret magnetic conditions they have never experienced before.

	FRIDAY, 30TH AUGUST, 2019	CORNCRAKE	OS-105
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No evidence for compass calibration in European songbird migrants during both migratory seasons

Alexander Pakhomov¹, Anna Anashina¹, Nikita Chernetsov^{1,2}

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Many songbird migrants use information from various sources (stars, the sun, the Earth's magnetic field) for orientation. This information can be contradictory, so the compasses must be calibrated and have a hierarchy. Results of experiments on a variety of species demonstrate that while astronomical cues calibrate the magnetic compass during the premigratory period, the strategies during migration are more diverse. That includes simple domination of one of the compasses, calibration of the magnetic compass by celestial cues and vice versa. Additionally, most researchers use different protocols (polarized light or changed magnetic field, different species and seasons) when they perform cue-conflict experiments during migration. Therefore, it is difficult to compare the results of these studies and create the whole picture of this phenomenon. To solve that we decided to test songbird migrants in cue-conflict experiments during both migratory seasons using a uniform experimental protocol. Garden warblers *Sylvia borin* and European robins *Erithacus rubecula* were chosen as model species. We pre-exposed birds in a horizontally rotated magnetic field from the sunset to the end of nautical twilight (a cue-conflict phase). After that magnetic coils were turned off and we tested birds for one hour in modified Emlen funnels. Infrared cameras were used to record activity of birds in funnels for further analysis of their orientation with software BirdOriTrack. Our results show these species do not calibrate their compasses and with the data of other studies indicate the simple domination of one of the compasses in European songbird migrants. This study was supported by RFBR grant 18-04-00265.

	FRIDAY, 30TH AUGUST, 2019	CORNCRAKE	OS-106
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Developmental flexibility and the effect of non-inherited factors on the first south and northward migration of translocated juvenile black-tailed godwits

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Recent advances in tracking technologies have enabled the possibility to describe the migration of various bird species. Among other things, this has uncovered a large inter- and intra individual variation in the spatial and temporal migratory strategies exhibited by a single species. This is especially evident in black-tailed godwits (*Limosa limosa limosa*; hereafter “godwit”); previous tracking studies brought to light an enormous variation in the migratory timing and route of individuals, but we do not yet understand how this variation arises and persists. To gain a better understanding on the intrinsic and extrinsic factors shaping the first southward and northward migration of godwits, we hand-raised 80 juvenile godwits in The Netherlands. Subsequently, we released 40 of

these juveniles in The Netherlands and translocated 40 to eastern Poland. We then simultaneously tracked and compared the migration of adults from the Dutch and Polish populations into which the hand-raised juveniles were released. Although hand-raised godwits released in The Netherlands on average departed more than a month later than Dutch adults during both their first southward and northward migration, their routes did not differ. In contrast, the routes and timing of translocated siblings were not comparable to the migratory strategies shown by either their siblings released in The Netherlands or by Dutch adults; instead both during their first south and northward migration, translocated juveniles showed the same spatial and temporal patterns as Polish adults. Our results thus illustrate the significance of non-inherited factors on the development of migratory routines.

	FRIDAY, 30TH AUGUST, 2019	CORNCRAKE	OS-107
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The role of olfaction in orientation and homing behaviour of great tits (*Parus major*)

Katharina Mahr^{1,2}, Linda Nowack³, Felix Knauer⁴, Herbert Hoi²

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For a long time, birds were regarded as anosmic, using mainly visual and acoustic cues to gather information about their environment. The idea that birds are capable of perceiving scents and use olfactory cues and signals in different biological contexts is therefore relatively new. Particularly passerines, considered to have small olfactory bulbs, have been neglected as a model species. However, a growing body of evidence indicates that many avian species use smell in various functional contexts, particularly highlighting an important role in orientation. There is solid empirical evidence that the sense of smell is used by migratory species and may also provide environmental information affecting homing behaviour. To test whether olfaction is involved in short-distance orientation, we caught great tits (*Parus major*) from established feeding sites and manipulated their olfactory capacity with either zinc sulfate (anosmic/treatment) or distilled water (control). The birds were relocated and released at a distance of either 500 or 1500 m from the feeders. In addition to behavioural parameters, we monitored the sites to record the return rate and the time between release and return. We did not find significant differences in orientation behaviour or the number of individuals returning to feeders between treatment groups. However, we did find that anosmic birds required more time to return to the feeders. Our results suggest that great tits use smell to locate feeding sites, supporting the idea that chemical stimuli might serve as cues for short-distance orientation in birds.

	FRIDAY, 30TH AUGUST, 2019	CORNCRAKE	OS-108
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Migration routes of willow warblers (*Phylloscopus trochilus*): Evolution and navigation mechanisms

Kristaps Sokolovskis¹, Susanne Åkesson¹, Mikkel Willemoes¹, Max Lundberg¹, Staffan Besnch¹

¹Lund University, Lund, Sweden

Exact routes migratory birds take between breeding and wintering sites often defy logic. For example, *Phylloscopus trochiloides* and *P. collybita* both breed in E-Europe but winter in SE-Asia and E-Africa respectively. Cases of ecologically similar and sympatric species differing in migratory phenotypes are common. Even more interesting is polymorphism in migratory phenotypes within a species. With geolocators we tracked willow warblers (*P. trochilus*) from E-Siberia and revealed an intriguing migration pattern: they left breeding site in end

of August, crossed entire Eurasian tundra and perhaps even Urals before turning south to a stopover site near Black sea, with a fairly constant and surprisingly fast speed, possibly to take advantage of the longer day-length for better foraging in northern latitudes. Tracks from western edge of Eurasia revealed a different pattern: one fast latitudinal jump and fuelling in Iberian Peninsula. We argue that migration routes cannot be explained by birds tracking habitat gradient, instead it to some degree reflect range expansion. Comparison of tracks to modelled routes showed that the 13000 km journey of Siberian birds to Mozambique cannot be carried out by neither magnetoclinic nor sun compass alone. More tracks will help to understand whether they are guided by an egocentric (direction and timing) or a geocentric (aiming for a particular location regardless of starting point) mechanism. Currently, a massive scale (343 deployed loggers) project is in progress to investigate migration routes of willow warblers from a migratory divide in Central Sweden where western-route and eastern-route migrants breed side by side.

Oral Session: Parasites and Disease

10:30	FRIDAY, 30TH AUGUST, 2019	WRYNECK	OS-67
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Factors affecting mosquito attraction to birds: implications to avian malaria transmission

Josué Martínez-de la Puente^{1,2}, Rafael Gutiérrez-López¹, Alazne Díez-Fernández¹, Jiayue Yan³, Laura Gangoso⁴, Ramón Soriguer^{1,2}, Jordi Figuerola^{1,2}

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Avian *Plasmodium* are widespread mosquito-borne parasites infecting birds. Factors affecting the interactions between bird hosts and mosquitoes may strongly determine the transmission dynamics of these parasites. However, the relative importance of the mechanisms affecting the differential attractiveness of wild bird host to mosquitoes has been traditionally neglected. In this presentation, we summarized results from our studies assessing the role of different bird traits such as species, body mass, sex and infection by avian *Plasmodium*, in the attraction and feeding patterns of mosquitoes. Although *Plasmodium* parasites are expected to increase the attractiveness of infected individuals to mosquitoes, we did not find such effect on the rate of mosquito attacks to house sparrows (*Passer domesticus*), neither when birds were exposed individually nor when exposed in pairs (containing one infected and one uninfected individual). However, the experimental modification of the parasite load through a medication treatment significantly affected the rate of mosquito bites on birds. We also explored the role of bird odours in the attractiveness of birds to mosquitoes and found that mosquitoes were more attracted to odours from *Plasmodium*-infected than to uninfected birds. Overall, our results elucidate that the complex interactions between avian hosts and insect vectors can be driven by multiple factors including parasite infection, which may in turn determine the ecology of transmission of avian pathogens.

10:45	FRIDAY, 30TH AUGUST, 2019	WRYNECK	OS-68
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Parrots in peril –investigating beak and feather disease virus in wild Australian psittacines

Johanne M Martens¹, Helena S Stokes¹, Mathew L Berg¹, Ken Walder¹, Michael Magrath², Andy TD Bennett¹

¹Deakin University, Geelong, Australia; ²Zoos Victoria, Melbourne, Australia

Infectious diseases are a major threat to biodiversity world-wide. Beak and feather disease virus (BFDV) is a globally distributed pathogen of wild and captive Psittaciformes, one of the most threatened bird orders,

and has recently been found in several non-psittacine bird species. It can lead to immunosuppressive and often fatal disease. In spite of the severe conservation and welfare impact of BFDV on birds, little research has been done on BFDV prevalence, infection dynamics and fitness impacts in the wild. We tested prevalence in five species of wild abundant Australian psittacines, which we trapped year-round in walk-in traps and mist nets ($n = 137$). Additionally, we trapped Crimson Rosellas (*Platycercus elegans*), our main study species, in the nest box during two breeding seasons (breeding adults and nestlings, $n = 587$), to compare the prevalence of BFDV in breeding and nonbreeding birds. We also analysed *P. elegans* recapture data to estimate persistence and duration of infection. Using qPCR assays of blood samples, we detected BFDV in all five host species. We found no significant interspecies differences: preliminary results show that prevalence ranged from 8.8% (95% CI 1.9 – 23.7) to 21.8% (15.3 – 29.5). We found that prevalence varied with breeding status, being low in breeding *P. elegans* (9.2% (4.1 – 17.3)) and nestlings. Infection persisted for up to seven months, but 64.7% of BFDV-positive birds were BFDV-negative at subsequent recaptures. Our results provide vital information for global wildlife disease management and species conservation.

11:00	FRIDAY, 30TH AUGUST, 2019	WRYNECK	OS-69
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No bird is an island: population structure of vector-transmitted blood parasites in raptors

Nayden Chakarov¹, Guillermo Blanco², Annegret Stubbe³, Michael Stubbe³, Oliver Krüger¹

¹Dept. of Animal Behaviour, Bielefeld University, Bielefeld, Germany; ²Departament of Evolutionary Ecology, Museo Nacional de Ciencias Naturales (CSIC), Madrid, Spain; ³Institute for Zoology, Halle University, Halle, Germany

Every infected host individual harbours a population of parasites. These parasite infrapopulations are more or less isolated, depending on the mode and frequency of transmission. The resulting parasite population structure is expected to have a strong influence on parasite virulence and host-parasite coevolution. Our aim was to study *Leucocytozoon* in communities of birds of prey and describe its population structure as it develops over time and over spatial scales. *Leucocytozoon* is a malaria-related parasite transmitted by blackfly vectors and commonly infects raptor hosts already in the nestling stage. Firstly, we assessed the community of *Leucocytozoon* lineages infecting different raptor species in several populations across Eurasia. Further, we developed a set of microsatellites to achieve a finer resolution of the *Leucocytozoon* population structure and genotyped the parasites in the studied populations. The resulting patterns will be presented and their contribution to understanding vector ecology, transmission and host-parasite evolution will be discussed.

11:15	FRIDAY, 30TH AUGUST, 2019	WRYNECK	OS-70
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Mix haemosporidian infection occur more than expected

Tamer Albayrak¹

¹Mehmet Akif Ersoy University, Burdur, Turkey

Recent advances in the polymerase chain reaction (PCR) based methods have investigated factors shaping the abundance, prevalence, and geographical distribution of haemosporidian blood parasites. However, the double infection has received little attention. Moreover, the mix infection of the same genus of haemosporidian (Plasmodium-Plasmodium; Haemoproteus-Haemoproteus; Leucocytozoon-Leucocytozoon) is poorly known. The mix infections were characterized by analyzing the partial sequence of the mitochondria cytochrome b gene of 417 birds from 50 species. Clear double callings were used for mix infection of the same genus. The results demonstrate that the level of mix infections occur more than expected. The mix infections should be taken into consideration in further studies especially in an area with high genetic diversity.

11:30	FRIDAY, 30TH AUGUST, 2019	WRYNECK	OS-71
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Short-term consequences of malaria infection in common buzzard (*Buteo buteo*)

Tony Rinaud¹, Nayden Chakarov¹

¹*Bielefeld University, Bielefeld, Germany*

Parasites cause and maintain a great diversity of defence mechanisms on the levels of individual physiology and population-wide evolution of their hosts. Resistance is the combined ability of an infected host to decrease the intensity of an infection. In contrast, tolerance is the capacity to limit the damage caused by a parasite burden. Distinguishing these traits and deriving estimates for their quantification is an emerging and particularly challenging field of eco-immunology. We use an experimental approach in a wild population of common buzzards (*Buteo buteo*) in Westphalia, Germany to differentiate between resistance and tolerance. In our population, a large proportion of the nestlings are infected by *Leucocytozoon*, a malaria-related protozoan parasite. Tolerance and resistance to infection are compared between infected chicks and chicks treated against malaria. We use growth rates of nestlings and gene expression as proxies for both trait complexes. Tolerant bird are expected to not differ in their resistance-associated traits but to have upregulated genes involved in maintenance functions. Chicks resistant to *Leucocytozoon* should have immune genes more upregulated than maintenance ones and resistance-associated traits should differ according to the intensity of infection. First results will be presented. This study will help to elucidate host-parasite interactions and deepen our knowledge on immune system adaptations and parasitism-commensalism evolution.

11:45	FRIDAY, 30TH AUGUST, 2019	WRYNECK	OS-72
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Ecoimmunology in a seabird species: the link between immunology and foraging in the Gentoo penguin

Roger Colominas-Ciuró¹, Petra Quillfeldt², Juan F. Masello²

¹*Department of Animal Physiology, Faculty of Biology and Environmental Protection, Nicolaus Copernicus University, Toruń, Poland;* ²*Department of Animal Ecology and Systematics, Justus Liebig University Giessen, Giessen, Germany*

Foraging strategies are linked to habitat characteristics, which determine the availability and distribution of trophic resources, leading to behavioural responses that may result on potential physiological consequences. Thus, here we investigate whether the local foraging strategies (assessed by tracking devices) of Gentoo penguins (*Pygoscelis papua*) breeding in two different sub-Antarctic locations, distinctly unbalance their immunological state (white blood cells) in two different years. Moreover, we further investigate ecoimmunological patterns between breeding locations and age classes. Our results showed positive trends between the length of the foraging trips and some immunological parameters (i.e. lymphocytes and monocytes), suggesting that a better immunological quality afford individuals to forage longer distances. Eosinophils differ between years and locations which could be explained by the presence of a virus in one of the studied years, but since other immunological parameters did not show such trend, it could be an artifact result. Finally, several immunological parameters were age dependent (chicks had lower heterophils and eosinophils, but higher lymphocytes than adults). Overall, our results demonstrate a link between the immunological state and the foraging capacity of seabirds.

Oral Session: Physiology

15:30	WEDNESDAY, 28TH AUGUST, 2019	NIGHTJAR	OS-31
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Does corticosterone linked to the departure decision or to the metabolic response to temperature?

Arseny Tsvey¹, Julia Loshchagina², Sergey Naidenko³

¹Biological Station Rybachy of Zoological institute RAS, Rybachy, Russian Federation; ²Institute of Geography RAS, Moscow, Russian Federation; ³A.N. Severtsov Institute of Ecology and Evolution RAS, Moscow, Russian Federation

Mostly, birds organize their migrations in a repeated pattern of flight and stopover. Weather affects behavior and physiology of birds during both stages. Prevailing weather conditions along the migratory routes ultimately shape species-specific migratory strategies and proximately contribute to migration success of individuals. Corticosterone is a hormone essential for coping with environmental variation. Recently, based on the observation that corticosterone concentration is correlated with factors linked to departure probability, it was proposed that this hormone mediate between intrinsic and extrinsic (including weather) factors and decision of a bird to leave stopover site (Eikenaar et al. 2017, 2018). We test this hypothesis in European robin, *Erithacus rubecula*, captured in spring and autumn on the Courish spit of the Baltic Sea (55°05'N, 20°44'E). In line with the initial idea, we found an increase in baseline corticosterone concentration towards the end of migratory season and with positive wind support in autumn, but opposite or no trends were found in spring. Additionally we observed a negative air temperature effect, colder temperature was associated with elevated corticosterone concentration. However, as temperature predictably changes with date we could not accurately discriminate between date and temperature effect. Moreover, temperature itself was dependent on wind direction, at least in autumn, with northerly (supportive) winds resulting in cooler air. Owing a direct link between baseline corticosterone concentration and temperature-dependent energy turnover (Jimeno et al. 2017), we hypothesized that corticosterone variation in migratory robins captured on the Courish Spit presumably reflects metabolic adjustments to environmental (mainly temperature) variation.

15:45	WEDNESDAY, 28TH AUGUST, 2019	NIGHTJAR	OS-32
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Corticosterone levels correlate in wild-grown and lab-grown feathers in greenfinches (*Carduelis chloris*) and are related to tail damage and survival

Mari-Ann Lind¹, Richard Meitern¹, Peeter Hõrak¹

¹Department of Zoology, Institute of Ecology and Earth Sciences, Tartu University, Tartu, Estonia

Level of corticosterone, which is predominant glucocorticoid in birds, has become main indicator assessing birds' stress level in ecological studies. Feather corticosterone (CORT_f) provides information about corticosterone levels over longer period of time, however it is not yet fully understood whether inter-individual variation of CORT_f is mainly caused by intrinsic physiological factors or by extrinsic environmental stressors. We studied relations between CORT_f, plasma corticosterone (CORT) and behaviour in wild caught male greenfinches that were kept in captivity during the study. We found positive correlation between CORT_f levels in left and right lab-grown tail feathers of the same bird. CORT_f in wild-grown feathers correlated positively with CORT_f in lab-grown feathers and CORT levels were about 20% lower in lab-grown feathers. 4 birds that died in lab had significantly higher CORT_f levels in wild-grown feathers than rest of the birds. CORT levels were individually repeatable, however no correlations between CORT and CORT_f were found. In order to study the link between CORT_f and behaviour, the extent of tail damage from flapping against cage bar was assessed. Contrary to our predictions, birds with higher CORT_f had less tail damage. Therefore, tail damage might indicate differences of CORT levels in bird with different personality types rather than stress-induced CORT levels. Our study suggests that individual differences and intrinsic factors play important role in CORT_f levels, but also environmental factors have effect on CORT_f. However, due to the correlative nature of our study further experimental manipulations are needed in order to determine causal effects.

16:00	WEDNESDAY, 28TH AUGUST, 2019	NIGHTJAR	OS-33
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Easy life or healthy life? That's the question... for the house sparrows

Amparo Herrera-Dueñas¹

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Urban areas are sprawling ecosystems all over the world. These new environments present disadvantages for urban wildlife, but some animal species have been attracted by these new ecosystems and its possibilities. The house sparrow (*Passer domesticus* L.) is one of the species, apparently, well adapted to anthropised environments. However, in the last decades, the urban population are suffering a strong decline in some European cities. The reason for this decline remains unclear, but high pollution in urban areas and the quality of food resources arise as some of the potential primary causes. An interesting approach is the ecophysiological one to conservation issues. In particular, oxidative stress balance, which is an essential mechanism to adapt to life in the cities, and highly influenced by air pollution and diet quality. As I show on my thesis, the population decline may be related to the cost of these individuals' city life in terms of oxidative stress. High pollution levels in urban habitats exert pressure on the antioxidant defences of individuals. Moreover, the accessible but poor quality urban food sources have a negative effect on the provision of essential antioxidants and enhance the generation of free radicals. Therefore, the substantial decline of the population in cities may be related to the oxidative stress urban birds experience in comparison with rural ones. The implementation of certain policy changes in cities, such as reducing pollution and conducting campaigns on how to feed wildlife, may contribute to halting the decline of urban house sparrow populations in Europe.

16:15	WEDNESDAY, 28TH AUGUST, 2019	NIGHTJAR	OS-34
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Repeatable measures of oxidative balance affect survival but not reproduction in a long-distance migrant

Thomas Bodey^{1,2}, Ian Cleasby³, Jonathan Blount⁴, Graham McElwaine⁵, Freydis Vigfusdottir⁶, Stuart Bearhop⁴

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Physiological processes, including those that disrupt oxidative balance, have been proposed as key to understanding fundamental life history tradeoffs. Analyses in wild systems remain uncommon though, particularly when examining changes in oxidative balance within individuals across time, space and major life history challenges. Yet such studies provide crucial context for exposing the importance of relationships between oxidative balance and fitness outcomes. Here we examined the repeatability of commonly used measures of oxidative balance in longitudinally sampled free-living individuals of a long-distance migrant, the Brent goose *Branta bernicla hrota*. We found high repeatability in measures of lipid peroxidation and circulating non-enzymatic antioxidants in longitudinally sampled individuals compared to the rest of the sampled population, suggesting the potential for the existence of individual oxidative phenotypes. Given this intra-individual repeatability, we then examined the relationship between these physiological measures, survival and reproductive success across all sampled individuals. Surprisingly, higher survival was predicted for individuals with higher levels of damage, with no measured physiological metric associated with reproductive success. Our findings demonstrate that intra-individual repeatability in physiological parameters remains high relative to the variation exhibited within the sampled population when measured across years or pre- and post- a migratory challenge. These measures of oxidative balance from wild individuals can thus inform our

understanding of differences in key demographic traits, and this emphasises the need to investigate such relationships in other species undergoing similar challenging lifecycles.

16:30	WEDNESDAY, 28TH AUGUST, 2019	NIGHTJAR	OS-35
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The role of prolactin as a mediator of the host response to parasitic eggs: an experimental study with the common blackbird (*Turdus merula*)

Francisco Ruiz-Raya¹, Manuel Soler¹, Juan Diego Ibáñez-Álamo¹

¹University of Granada, Granada, Spain

Avian brood parasites lay their eggs in the nest of host species, thus exploiting the parental care that they provide to their offspring. Even though prolactin plays a critical role in the regulation of bird reproduction and parental care, little is known about the importance of this hormone in mediating anti-parasitic host defences. The aim of this study was to assess the effect of an experimental decrease in prolactin levels on the host response to parasitic eggs. We implanted bromocriptine, an inhibitor of prolactin secretion, in common blackbird (*Turdus merula*) females and assessed their response towards experimental mimetic eggs. We found that bromocriptine implanted females ejected experimental eggs at higher rates than control females. These results suggest that individuals with low prolactin levels show a lower attachment to eggs, which would result in higher probabilities of egg ejection. Thus, prolactin seems to mediate the host response to parasitic eggs by regulating the threshold for egg ejection, so individual differences in egg ejection may be due to individual variation in hormone profiles of hosts. Our finding highlights the importance of hormones as mediators of behavioural responses to avian brood parasitism.

16:45	WEDNESDAY, 28TH AUGUST, 2019	NIGHTJAR	OS-36
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Colony size can affect nestling immune function in common tern *Sterna hirundo*

Radosław Włodarczyk¹, Piotr Minias¹, Kamila Gach¹, Tomasz Janiszewski¹

¹University of Lodz, Department of Biodiversity Studies and Bioeducation, Lodz, Poland

High transmission rate of pathogens/parasites is regarded one of the major costs of sociality in birds. However, greater risk of infection in colonial birds might be compensated by specific immune adaptations. We predicted that nestlings raised in larger colonies should invest more in their immune function. To test this hypothesis we manipulated colony size of the common tern *Sterna hirundo* and carried out cross-fostering experiment between broods from small and large colonies. We provided large and small patches of attractive nesting area for terns (floating rafts) at artificial lake in central Poland in 2010. Since then, three small (25-35 pairs) and one large (105-110 pairs) colony were present annually at study site. In years 2013-2014 at the beginning of breeding season, 55 pairs of clutches were exchanged between large and small colonies. We performed skin-swelling response to phytohaemagglutinin (PHA) for chicks from control and experimental broods. We collected additional data about chicks condition (growth rate and heterophil/lymphocyte ratio as proxy of stress level). Surprisingly, we found a negative effect of foster colony size on nestling PHA response (nestlings raised in the larger colony had lower PHA response). In addition, PHA response correlated negatively with H/L ratio. This could suggest that low PHA response of nestlings raised in the larger colony could be mediated by an elevated level of social stress. We suggest that depression of immune function via social stress may constitute a strong selective pressure against large colony size in the common tern.

Oral Session: Physiology of Migration

15:00	FRIDAY, 30TH AUGUST, 2019	WHITE STORK	OS-115
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After the marathon: how do migration strategy, condition, and parasite infection affect aerobic performance?

Steffen Hahn¹, Silke Bauer¹, Fernando Spina², William B Buttemer³

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Crossing barriers is a challenging task for migratory birds and requires special physiological adaptations. Songbirds often greatly vary in body condition after barrier crossings, with some birds still carrying fuel reserves while others arrive depleted and entirely exhausted. Hence, individuals differ substantially in their ability to satisfy the demands of long-distance flight. We examined the relation between body condition of birds on migration and their aerobic performance and tested how these two variables were affected by infection level of blood parasites. To this end we measured the aerobic performances of four songbird species at a stopover site in the Mediterranean Sea, just after landfall. These species differed in their migration strategy, ranging from short-distance migrants crossing the sea from North Africa and long-distance migrants crossing both the Sahara desert and the Mediterranean Sea en route to their breeding grounds. We will show how short-distance and long-distance migrants differ in aerobic capacity after barrier crossing, how body conditions after barrier crossing affects peak oxygen consumption rates and thus aerobic capacity and how blood parasite infections can co-determine the individual aerobic performances. Our results shed light on the potential physiological constraints that migratory birds face when crossing barriers and the consequences these may impose on stop-over duration and overall migration speed.

	FRIDAY, 30TH AUGUST, 2019	WHITE STORK	OS-116
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„Who is the fattest?“–Comparative analysis of fat mass of migratory songbirds during stopover using quantitative magnetic resonance

Natalie A. Kelsey¹, Jochen Dierschke¹, Thomas Kliner¹, Franz Bairlein¹

¹Institute of Avian Research 'Vogelwarte Helgoland', Wilhelmshaven, Germany

Many migratory birds accumulate fat as energy reserves to cover vast distances during flight. The amount of fattening during migration depends on the migratory strategy: are long nonstop flights due to ecological barriers necessary or are regular stopover sites available. Differences in migratory fattening may also be caused by season (autumn vs spring), sex (female vs male) or age (hatching-year birds on their first migratory flight vs experienced adults). Our aim is to analyze these potential influencing factors quantitatively by using the new magnetic resonance method (QMR) on migratory songbirds during their stopover on Helgoland, a North Sea island in the German Bight. The QMR enables to measure the body composition of live birds without sedation and non-invasive within three minutes. Up to now, we were able to measure birds during four seasons (autumn and spring 2017 and 2018), providing sufficient data for 16 species (7 trans-Saharan migrants and 9 short to medium distance migrants). Among other results, we found that both trans-Saharan migrants and short to medium distance migrants showed on average a higher fat content during spring than during autumn stopover. In spring trans-Saharan migrants carried more fat than the short to medium distance migrants, while they were similar during autumn migration. Our results suggest that different migratory strategies may be used by trans-Saharan and short to medium distance migrants. Further, in some species experienced adult birds revealed higher fat amounts than hatching-year birds during their first migratory flight.

	FRIDAY, 30TH AUGUST, 2019	WHITE STORK	OS-117
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Corticosterone and migratory refueling in a short-distance migrant *Erithacus rubecula*

Julia Loshchagina¹, Arseny Tsvey², Sergey Naidenko³

¹*Institute of Geography RAS, Moscow, Russian Federation;* ²*Biological Station Rybachy, Zoological Institute RAS, Saint-Petersburg, Russian Federation;* ³*A.N. Severtsov Institute of Ecology and Evolution RAS, Moscow, Russian Federation*

Fat deposition is one of the main physiological adaptations for migration in birds. Fat stores are spent during migratory flight and replenished during stopovers. Corticosterone is involved in regulation of migratory refueling. However, the precise role of this hormone is still unknown. Most of the studies show that corticosterone promotes refueling while some of them did not find such effect. To test whether corticosterone facilitates refueling in migratory birds, we modeled migratory refueling in experimental conditions in European robins during autumn migratory season. 14 birds were caught in a wild and subjected to a fasting–re-feeding experiment. Birds were subdivided randomly into two groups. Experimental birds were fasted for two days after which they were allowed to refuel. In a control group, birds had unlimited access to food. To avoid repeated blood sampling within a few days, glucocorticoid metabolite (GCM) concentrations, which reflect corticosterone levels within the last few hours, were determined non-invasively in excreta on the day before fasting, on the first day after fasting and on the third day after fasting. In the control group, excreta were collected on the corresponding days. After 10 days of refueling, groups were inverted. During fasting, all birds increased their nocturnal restlessness comparing to the control group. After fasting, experimental birds had higher food intake than control birds and ceased their nocturnal activity. Food intake and fuel deposition rate were positively correlated with GCM levels on the first day after fasting. Further we discuss a link between nocturnal restlessness and GCM level.

	FRIDAY, 30TH AUGUST, 2019	WHITE STORK	OS-118
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Changes of the transcriptome in the intestines of a migratory bird

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¹*Institute of Avian Research, Wilhelmshaven, Germany;* ²*Institute of Pharmacy and Molecular Biotechnology, Heidelberg, Germany*

Twice a year many land-bird species cover vast distances between wintering and breeding areas, taking advantage of the temporal flourishing of resources at higher latitudes for reproduction. To be able to accomplish such endurance flight, birds need to accumulate energy in the form of lipid reserves. Hyperphagia, but also the increment of the digestion efficiency and nutrient absorption contribute to the birds rapid gain of fat deposits. We have studied the changes of the transcriptome in the intestines of the northern wheatear *Oenanthe oenanthe* at different stages of their autumnal migratory fattening, aiming to identify the biological functions related to the adaptations for migration. Genes coding for canonical digestive proteases, lipid-digestion related proteins like colipase, Golgi apparatus and endoplasmic reticulum secretory pathways and tissue growth factors are upregulated in lean birds. During the fattening phase and in fat wheatears, genes like gastrotropin responsible for fatty acids transport and mucin production are dramatically overexpressed. Genes related to tissue development, lipid metabolism, immune system activation and antimicrobial activity are also upregulated. Other genes responsible for fatty acid elongation and desaturation as well as circadian clock proteins show a non-significant, but markedly change in expression along the season. Our data highlight novel pathways seasonally regulated in the intestine of a long-distance migrant which contribute to a better understanding of the extreme and well-regulated body mass increment during the onset of migration.

	FRIDAY, 30TH AUGUST, 2019	WHITE STORK	OS-119
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Stress coping capacity during migration in an Old World warbler

Nikolaus Huber^{1,2}, Virginie Canoine³, Jessica Cornils², Ivan Maggini¹, Massimiliano Cardinale⁴, Thomas Ruf², Leonida Fusani^{1,5}

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Many passerines exhibit a remarkable physiological flexibility to facilitate migration, but it is unknown about whether these extensive adaptations include the ability to cope with stress. Here we studied how migratory garden warblers (*Sylvia borin*) cope with short-term stress during migration in relation to their body condition using an endocrino-immunological approach. We caught garden warblers during their spring migration on Ponza Island, collected blood samples at < 3, 15, and 30 min and measured total circulating corticosterone (CORT) levels. The use of CORT as a single metric to gain a comprehensive understanding of individual stress conditions has some limitations. Therefore we included the immunological method called Leukocyte Coping Capacity (LCC) measuring the ability of heterophil granulocytes to produce oxygen radicals (ROS). The use of this innate-immune parameter as proxy for stress relies on the observation that stressed individuals have a reduced capacity to produce ROS. We observed a robust increase of CORT in response to capture and handling. LCC significantly decreased within the 30 minute period after capture, reflecting an increase in stress levels and a decreased capacity to cope with the stress event. We did not find significant effects of body condition as indicated by fat stores or a calculate body condition index on CORT levels or the LCC response. We present these results from a reactive scope perspective and highlight potential costs and trade-offs between life history state, stress and immunity.

	FRIDAY, 30TH AUGUST, 2019	WHITE STORK	OS-120
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Is there an annual cycle of the leukocyte profile in migrant birds? The chiffchaff case

Irina Demina¹, Arseny Tsvey², Olga Babushkina¹, Julia Bojarinova^{1,3}

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It has been proposed that an immune functioning in wild animals is shaped by the trade-off between the probability of encountering pathogens and the availability of resources for maintaining immune system in active state. Due to resources' seasonality one can expect that immune functioning, e.g., absolute and relative counts of white blood cells, WBC (leukocyte profile) also follows an annual cycle. However, dynamics of the seasonal changes of leucocyte profile are controversial and specific inquiries so far addressed only a portion of annual cycle. Additionally, field studies cannot allow separating causes (internal or environmental) of the observed difference between various life-history stages, so the viable alternative is to model annual cycle under controlled laboratory settings. We experimentally simulated the natural sequence of life-history stages (LHS; autumn migration, wintering, pre-alternate moult, spring migration) in captive chiffchaffs (*Phylloscopus collybita abietinus*), under photoperiodic conditions experienced by these species in the wild. We report a clear seasonal pattern for two parameters of leucocyte profile: the total number of leukocytes and the ratio of heterophiles to lymphocytes. The highest WBC counts and the lowest HL ratio were recorded during pre-alternate moult. The

reverse pattern was observed during subsequent spring migration. During other LHS there were less distinct dynamics. To our knowledge, this is the first description of the annual cycle of the leukocyte profile in migratory passerine bird. We discuss the origins of variation and consequences of leukocyte profile dynamics *per se* and in relation to other measures of physiological condition. Grant RFBR # 19-04-01219.

Oral Session: Population Ecology

10:30	FRIDAY, 30TH AUGUST, 2019	CORNCRAKE	OS-73
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Fluctuating climatic conditions can alter response to brood size manipulation: a long term study of blue tits

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Costs of reproduction constitute central issue in life history evolution. Typically experimental manipulation of brood size is conducted to assess such costs in an array of studies. Brood size manipulation is meant to alter conditions of nestling growth. To date experimental studies often demonstrate large variation between species and populations in the magnitude of the effects of brood size manipulation. Relatively strong effects of the treatment is observed in so called poor years, while usually small, or even no effects are reported in so called good years. However still little is known of what factors are responsible for the observed yearly variation in the effects of brood size manipulations. Here, we test the idea that fluctuating climatic conditions may influence the magnitude of brood size manipulation treatment. Using a long-term dataset from blue tits for which brood size manipulation experiment was carried out for at least 11 years, we showed that the magnitude of brood size manipulation on offspring performance depends on ambient temperature. Specifically, we found that effects of brood size manipulation on offspring performance increase under adverse climatic condition (cold breeding season). Our data suggest that strong effects of brood size manipulation observed in so called poor years, and small such effects in good years may be driven by ambient temperature. So, our result may confirm that the cost of reproduction are likely to become apparent only when conditions are relatively unfavourable.

10:45	FRIDAY, 30TH AUGUST, 2019	CORNCRAKE	OS-74
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Winter food supplementation as a driver of subsequent breeding performance

Juli Broggi^{1,2}, Jan Ake Nilsson², Hannah Watson², Johan Nilsson²

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Bird winterfeeding has become a popular backyard activity around the world, particularly in north-western countries with cold winters. However, the ecological consequences of such activity are poorly understood. In seasonal environments, timing of breeding is a crucial aspect that can strongly influence reproductive output and ultimately fitness. Individual condition at the start of the breeding season is likely to be very important in determining breeding success, by influencing the onset and breeding investment. In seasonal environments, particularly at higher latitudes, earlier breeding normally confers substantial advantages by increasing development times. However, empirical evidence on the effects of winter feeding on avian breeding performance remain equivocal. We studied breeding performance over three consecutive seasons on a population of wild great tits (*Parus major*) from southern Sweden. Onset (laying date) and breeding investment (clutch size) were studied in a population exposed to supplementary and unmanipulated winter feeding conditions. Breeding

was positively affected by supplementary feeding, as birds breeding in the experimental area advanced their egg laying and increased their clutch size compared to birds from the control area. Breeding parameters varied over the years of study, although the experimental manipulation remained consistent, which suggests a cascading effect of winter feeding on subsequent breeding performance.

11:15	FRIDAY, 30TH AUGUST, 2019	CORNCRAKE	OS-75
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Population dynamics of intermittent breeding in the common eider (*Somateria mollissima*)

Alex Nicol-Harper¹, Tom Ezard¹, Patrick Doncaster¹, Geoff Hilton², Kevin Wood²

¹University of Southampton, Southampton, United Kingdom; ²Wildfowl & Wetlands Trust, Slimbridge, United Kingdom

Management interventions should be informed by population dynamics: depending on life history, some vital rates have greater influence than others. For example, in relatively long-lived species such as seabirds, population growth rates are usually most sensitive to adult survival. Population models generally assume that survivors always attempt to breed, but in many species, some previous breeders skip at least one subsequent breeding season. This intermittent breeding is one of the least understood breeding parameters in birds, but is prevalent in some populations of the well-studied common eider (*Somateria mollissima*). Observational and experimental studies demonstrate a positive correlation between bodyweight and breeding propensity, and suggest that intermittent breeding can be influenced by previous breeding attempts. Episodes of extensive non-breeding have also been associated with large-scale environmental conditions, such as Baltic algal blooms and Arctic predator cycles. Little is known about the effect of intermittent breeding on population dynamics. We have investigated this question for the common eider using matrix population modelling, with mean vital rates attained through meta-analysis methods. We show that population growth rate and its sensitivity to adult survival depend on whether intermittent breeding is incorporated. Transitions between breeding and non-breeding states were seven times more influential than the sum of all fertility contributions, second only to stasis as a breeder. This demonstrates that intermittent breeding deserves greater consideration in population projection models. Further in-depth studies are required to disentangle intermittent breeding as a long-term breeding strategy versus an unplanned response to current conditions.

11:30	FRIDAY, 30TH AUGUST, 2019	CORNCRAKE	OS-76
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The role of laying and hatching order in early-life growth and telomere dynamics in a wild passerine species

Tiia Kärkkäinen¹, Pauliina Teerikorpi^{1,2}, Wiebke Schuett³, Antoine Stier^{1,4}, Toni Laaksonen^{1,5}

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Female birds allocate resources in the eggs such as nutrients, hormones and carotenoids. The concentration of specific resources is known to change according to the laying order, which is known to impact chick phenotype. Additionally, sibling competition due to asynchronous hatching also has pronounced effects on nestling development and phenotype. Both pre- and post-hatching growth conditions have been shown to affect chick telomeres (*i.e.* the protective caps of chromosomes), a key hallmark of ageing. However, the exact roles of laying and hatching order in shaping early-life telomere dynamics has never been tested experimentally. Therefore, we carried out an experiment where we manipulated the hatching order of pied flycatcher (*Ficedula hypoleuca*) chicks. We marked all the eggs individually and replaced them with dummy eggs as they were laid.

After clutch completion the eggs were returned to the nests according to our experimental design. We created three experimental groups: [1] Natural order, in which the two last laid eggs were returned to the nest a day after all the others, [2] Reverse order, in which the two first laid eggs were returned to the nest a day after the others, and [3] Synchronized order, in which all the eggs were returned to the nest at the same time. We weighed and blood sampled the chicks when they were five and twelve days old in order to disentangle the relationships between position in the laying order and sibling competition, and to examine their effects on nestling growth and telomere dynamics.

11:45	FRIDAY, 30TH AUGUST, 2019	CORNCRAKE	OS-77
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Automated delineation of the number of bird territories using digital mapping and spatial statistics in freely available GIS technology

Piotr Skórka¹, Dorota Kotowska¹, Kazimierz Walasz²

¹*Institute of Nature Conservation, Polish Academy of Sciences, Kraków, Poland;* ²*Małopolskie Towarzystwo Ornitologiczne, Kraków, Poland*

Successful conservation of birds requires good estimates of the population size. The method considered to give absolute, accurate numbers of individuals is the territory mapping. Results are however highly variable among observers because interpretation of maps is subjective, laborious and may depend on former experience, map scale and bulk of data. We overcame these problems using digital mapping and spatial hierarchical clustering (SHC) in a freely available software. Observers mapped birds and noted their GPS location in forest-grassland mosaic plot in Poland. The mathematically established number of territories was then compared with the number of territories delineated in a traditional manner by three experienced map analysts. Map analysts differed in the number of delineated territories. The average coefficient of variation was 70 %. SHC resulted in the estimated number of territories that all dropped inside the confidence intervals derived by map analysts. The relative rank abundance of the number of estimated territories by SHC was similar to results estimated by map analysts. Despite the presented method takes only the distance criterion, it produces results comparable to traditional interpretation of maps. The advantage of the presented approach is that it generates results that are free of subjectivity, independent on the observer experience and it may provide additional information on the distribution of the territories and their size.

11:00	FRIDAY, 30TH AUGUST, 2019	CORNCRAKE	OS-78
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Reproductive success in the barn owl is linked to partner compatibility in glucocorticoid levels

Bettina Almasi¹, Paul Béziers², Lukas Jenni¹, Alexandre Roulin²

¹*Swiss Ornithological Institute, Sempach, Switzerland;* ²*University of Lausanne, Lausanne, Switzerland*

Reproductive success in bi-parental species depends not only on the quality of the parents, the care they each provide and environmental factors, but also on the ability of the parents to collaborate and divide reproductive tasks. Hormones, such as corticosterone (CORT), modulate physiological and behavioural functions that are associated with reproduction, and therefore, hormonal compatibility between pair members is likely to have consequences on reproductive success. Here, we investigated in the barn owl (*Tyto alba*) whether baseline and stress-induced CORT levels are correlated between breeding partners and whether this correlation is associated with fitness parameters. We found that the combination of CORT levels in the two partners predicts reproductive success. Pairs with similar baseline CORT levels during incubation produced more fledglings than pairs with dissimilar baseline CORT levels. And, pairs showing dissimilar stress-induced CORT responses during the period of offspring rearing produced more fledglings than pairs with similar stress-induced responses. Offspring body

mass, on the other hand, was associated only with maternal CORT levels in a context-specific way. Nestlings in large broods had high body mass if mothers had increased baseline CORT while nestlings of small broods had high body mass when mothers had low baseline CORT. Assuming that CORT levels reflect investment in parental care, our study suggests that parents coordinate their reproductive activities in a complex way to ensure a high reproductive success.

Oral Session: Social Interactions

15:30	FRIDAY, 30TH AUGUST, 2019	COLLARED DOVE	OS-109
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Sexual conflict over parental care in the rock sparrow: parents do not respond in the same way

Alejandro Cantarero^{1,2}, Mireia Plaza¹, Juan Moreno¹, Matteo Griggio²

¹National Museum of Natural Sciences, Madrid, Spain; ²University of Padova, Padova, Italy

As parental care is costly, it can be expected that there will be a sexual conflict between parents over the individual levels of parental investment because each parent has limited resources to invest in current reproduction. Theoretical models of parental investment predict that when one parent reduces its parental effort, the other parent should adjust its effort facultatively to compensate for the decrease in the mate's contribution. Here we tested for facultative adjustments in care in the rock sparrow *Petronia petronia*, a species in which both sexes can desert the brood and hence, with a strong sexual conflict over parental care. To that end, we examined how rock sparrow parents adjust their level of care in response to an experimental mate removal for a limited time period, mimicking the starting phase of a desertion process. For that purpose we compared male and female provisioning rates before and after an experimental mate removal. We found that only males behaved accordingly with a prediction of compensatory adjustment as they allocated more care to the offspring and returned faster to the nest after female removal. Our study supports a different compensation strategy in response to mate removal in species with biparental care and strong sexual conflict over parental care, and suggests alternative responses to the behaviour of the mate.

16:00	FRIDAY, 30TH AUGUST, 2019	COLLARED DOVE	OS-110
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Can we assay birds' exploration behaviour in the field? Validating a portable open field test

Edward Klueen¹, Katja Rönkä¹, Johanna Mappes², Rose Thorogood^{1,3}

¹University of Helsinki, Helsinki, Finland; ²University of Jyväskylä, Jyväskylä, Finland; ³University of Cambridge, Cambridge, United Kingdom

Individual variation is well recognised as being important in behavioural ecology, but also attracting increasing attention in ecology more broadly. At the same time there is a growing need to standardize methods to assay behavioural traits, particularly in the field. Here, we attempted to validate a portable, open field test for exploration behaviour using great tits (*Parus major*), a 'model species' for studies of exploration and personality. We tested 58 birds with known capture histories in a 'field cage' similar to those being used increasingly by behavioural ecologists, ecologists, and conservation biologists. After a short habituation period, birds were allowed to explore the cage and their movements recorded. We compared this behaviour with a well-established test for exploration that requires a standardised room. Although activity levels were not repeatable across these two tests, we found that the portable cage captured variation in the birds' propensity to explore. Although the repeatability of this measure was weak, we found that time in captivity explained variation in the propensity to explore both the cage and room. Furthermore, we also found that social responsiveness (measured using a mirror

test) predicted exploration propensity in both contexts. Our results therefore suggest that a portable cage could be used to measure exploration propensity in the field, but also highlight the need to account for differences in testing conditions and previous experience of individuals when comparing study results.

16:15	FRIDAY, 30TH AUGUST, 2019	COLLARED DOVE	OS-111
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Love the neighbour, or not? Does high breeding bird density reduce nest predation?

Magali Frauendorf^{1,2}, Bruno J. Ens^{2,3}, Andrew M. Allen^{2,4}, Henk-Jan van der Kolk^{1,2}, Eelke Jongejans^{2,4}, Hans de Kroon^{2,4}, Jenny Cremer⁵, Chris A. M. van Turnhout^{3,4}, Martijn van de Pol^{1,2}

¹Netherlands Institute of Ecology, Department of Animal Ecology, Wageningen, Netherlands; ²Centre for Avian Population Studies, Wageningen, Netherlands; ³Sovon Dutch Centre for Field Ornithology, Den Burg, Netherlands; ⁴Radboud University, Department of Animal Ecology and Physiology & Experimental Plant Ecology, Nijmegen, Netherlands; ⁵Wageningen Marine Research, Wageningen University & Research, Den Helder, Netherlands

Group formation is often observed and shaped by the trade-off between costs (e.g. competition for resources) and benefits (e.g. more eyes to scan for predators). Anti-predator behaviour like nest camouflage, predator distraction or mobbing can reduce nest predation rates. Especially in species with declining population numbers that benefit from mobbing predators away, declining breeding densities might result in a negative feedback loop. However, whether breeding density indeed has a positive effect on nest success might depend on the type of predator. Mammalian generalist predators might learn to recognise and exploit areas with higher breeding densities, whereas avian predators on the other hand might be mobbed away more successfully in such situations. We tested how density of breeding pairs influenced the nest success in a mobbing species, the Eurasian oystercatcher (*Haematopus ostralegus*), under different mammalian vs. avian predator compositions in the Netherlands. We performed a large-scale study, using data from 25,000 nests monitored over 30 years. Our analysis shows that under higher breeding densities, nest success increases in situations with high avian predator proportion. However, in areas with higher mammalian predator proportion, there is no clear effect of breeding density on the nest success. This suggests that it is beneficial to breed at high density in order to increase successful mobbing behavior when avian predators are dominant, but it is not beneficial when mammalian predators are dominant. Our results emphasize that especially in areas with high proportion of avian predators, declining population numbers will be driven by a negative feedback loop.

15:00	FRIDAY, 30TH AUGUST, 2019	COLLARED DOVE	OS-112
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Diverse social groups are less stressful

Attila Fülöp¹, Csongor I. Vágási², Gergely Osváth³, Péter L. Pap², Zoltán Benkő^{2,4}, Janka Péntzes², Ádám Z. Lendvai³, Zoltán Barta¹

¹MTA-DE Behavioural Ecology Research Group, Department of Evolutionary Zoology and Human Biology, University of Debrecen, Debrecen, Hungary; ²Evolutionary Ecology Group, Hungarian Department of Biology and Ecology, Babeş-Bolyai University, Cluj-Napoca, Romania; ³Department of Evolutionary Zoology and Human Biology, University of Debrecen, Debrecen, Hungary; ⁴Romanian Ornithological Society/BirdLife Romania, Cluj-Napoca, Romania

Phenotypic composition of groups is heterogeneous due to the among-individual variation in morphological or behavioural phenotypes (e.g. personality) within the social group. It has been shown that this heterogeneity can affect group-level behaviour and ultimately performance. It is barely known, however, whether group-level

properties and group composition influence the state and/or fitness of group members. We experimentally manipulated personality composition of house sparrow (*Passer domesticus*) social groups such that groups differed both in their average exploration (personality composition, PC) and the variance of exploration within group (personality diversity, PD) and studied how PC or PD affects the physiological state of group members. We found that PC influenced body condition and physiological stress (measured through the heterophil/lymphocyte ratio), while PD affected oxidative stress levels. Overall, our results indicate that individuals in more diverse social groups had better body condition and were less stressed than birds from more homogeneous groups. Our findings demonstrate that variety in group phenotypic composition is important in determining individual's physiological state. Studying the effect of group phenotypic composition on the state of group members should be more widely considered to understand the social group assembly rules and the evolutionary implications of sociality (e.g. maintenance of different personality types).

15:15	FRIDAY, 30TH AUGUST, 2019	COLLARED DOVE	OS-113
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Feather corticosterone is related to social network centrality in a free-ranging great tit population

Daan Dekeukeleire¹, Lionel Hertzog¹, Johan Aerts^{2,3}, Diederik Strubbe¹, Luc Lens¹

¹Terrestrial Ecology Unit, Department of Biology, Ghent University, Ghent, Belgium; ²Stress Physiology Research Group, Faculty of Pharmaceutical Sciences, Ghent University, Ghent, Belgium; ³Animal Sciences Unit, Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), Ostend, Belgium

Within social bird species, individuals differ in the number of conspecifics they interact with, and in the strength of these interactions (i.e. social network position). Such differences can have important fitness consequences, e.g. by mediating exposure to pathogens or access to social information on food resources. However, the causes and consequences of inter-individual variation in social interactions are not well understood. Recent studies suggest that stress-related hormones, such as corticosterone, may be a crucial underlying mediator of animals' social behaviour. In this study, we fitted great tits with PIT-tags and used feeding stations with PIT-tag-readers to collect data on the composition of winter flocks in a forest in Northern Belgium. We inferred the social network structure during the winter, and on a subset of individuals, we measured corticosterone levels in original tail feathers grown in late summer and induced tail feathers grown in winter. Feather corticosterone constitutes a long-term record of stress levels during feather growth. We show that great tits exposed to more stressful conditions in late summer were more central in the winter network, suggesting they are less 'choosy' with whom to forage. In turn, birds more central in the winter network showed lower corticosterone levels measured in the induced tail feathers. This suggests that these individuals experienced less stress during winter, possibly reflecting better access to social information of food resources. Our study thus provides evidence for a feedback process, whereby individuals experiencing elevated stress levels adjust their social associations over winter, which affect subsequent stress levels.

15:45	FRIDAY, 30TH AUGUST, 2019	COLLARED DOVE	OS-114
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New data on partner choice and nest ownership in black stork (*Ciconia nigra*)

Māris Strazds¹, František Pojer², Urmas Sellis³, Ülo Väli⁴

¹Laboratory of Ornithology, Institute of Biology, University of Latvia, Salaspils, Latvia; ²Nature Conservation Agency of the Czech Republic, Praha, Czech Republic; ³Eagle Club, Kanepi, Estonia; ⁴Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences, Tartu, Estonia

Extensive ringing programme of black stork juveniles in Latvia started in 1990. Up until 2018, 1833 juvenile storks had been ringed. In 2011, first remote sensing cameras were installed, and one of the nests has been permanently observed with a webcam since 2015. As of 2016, data from 20 cameras can be explored simultaneously. From this material, more than 772K pictures from 41 nests, along with the videos filmed at two webcam-equipped nests, have been used for analyses of territorial behaviour and mate choice during the breeding season in Latvia. Initial analysis of these data obtained exclusively from observations of ringed individuals with known sex and other individually identifiable birds suggest that the term “non-breeding pair” is not relevant for black stork. Similarly, the assumption that males „own” the nest appeared not to be correct at least in some cases. Here we have expanded the data set with satellite data tracking adult black storks from Czech Republic (1995–2001) and Estonia (2006–2018), accompanied with webcam and/or remote sensing camera data near relevant nests to see whether it characterises species as a whole. Comparison of various data sets does not contradict those findings; however, they indicate remarkable differences between individuals of the same sex in regard to site tenacity. One of important findings is that the non-breeding individuals can explore several nests at remarkable distance (up to 200 km) during the same breeding season. We shall also discuss possible reasons of site and partner change between seasons.

Oral Session: Species Interactions

16:00	FRIDAY, 30TH AUGUST, 2019	WRYNECK	OS-100
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Reaction speed of an avian prey to a simulated hawk attack in relation to hawk phenotype and visual conditions

Carina Nebel¹, Petra Sumasgutner¹, Adrien Paul Pajot^{1,2}, Arjun Amar¹

¹*FitzPatrick Institute of African Ornithology, Cape Town, South Africa;* ²*Bordeaux Sciences Agro, Gradignan, France*

To avoid predation, many species rely on vision to detect predators and initiate an escape response. The ability to detect predators, however, may be reduced in low light, although this has never been experimentally tested. In this study, we test the hypothesis that the reaction time of prey (feral pigeon *Columbia livia domestica*), to a simulated hawk attack (taxidermy mounted colour-polymorphic black sparrowhawk *Accipiter melanoleucus*) will differ depending on light levels. We predict that response will be slower under low light, which would translate into higher predation risk. That predator detection varies according to the ambient light levels in relation to the colour of the attacking predator underlies a key hypothesis for the maintenance of different colour morphs in polymorphic raptors. We therefore test whether speed of reaction is influenced by the morph of the hawk (dark/light) in combination with light conditions (dull/bright). We predict faster responses to morphs under conditions that most strongly contrast with the plumage of the hawk (i.e. dark morph under bright light level). In support of our first hypothesis, pigeons reacted slower under darker conditions. However, in contrast to our second hypothesis, we found no difference in response times between the hawk morphs irrespective of light levels. These findings experimentally confirm that birds detect predators less efficiently under darker conditions, and might alter their behaviours to reduce predation risk. However, our results provide no support for the hypothesis that different morphs have advantages through improved hunting efficiencies in different conditions due to crypsis.

16:15	FRIDAY, 30TH AUGUST, 2019	WRYNECK	OS-101
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Selective concept learning between two competing wild bird species

Jukka Forsman¹, Jere Tolvanen¹, Sami Kivelä², Olli Loukola²

¹Natural Resources Institute Finland, Oulu, Finland; ²Department of Ecology and Genetics, Oulu, Finland

An ability to understand conceptual relationships between stimuli, such as larger-smaller, is considered higher-level adaptive learning. Thus far, conceptual learning has been studied via asocial trial and error learning. Yet, social learning is common among animals but it is unknown whether conceptual learning through observing the choices of others occurs. We tested whether migratory pied flycatchers (*Ficedula hypoleuca*) can form conceptual relationships from the apparent choices of nest-site characteristics of resident tutoring tits (great tit; *Parus major*). Each wild flycatcher female observed one demonstrator tit pair that exhibited apparent novel preference of either large or small symbol (triangle or circle) and was then enforced to choose between two nest boxes with large and small symbol, while symbol shape being different than that on tit nest. Flycatchers (n=126) selectively copied or rejected the apparent size preference of the tits depending on the number and visibility of eggs in the tit's nest and the phenotype (tarsus length) of the flycatcher. The most common behavior was rejection of tit's apparent symbol size preference. Old females more likely copied the symbol size preference of tits than young females when there was a high number of visible eggs or only a few partially visible eggs but that strongly depends on the tarsus lengths; copying switched to rejection as a function of increasing tarsus length. Plausibly the quality of the tutor (egg number) and overlap in resource use with the tutor (varies as a function of body size) affected flycatchers' copying and rejection decisions.

15:15	FRIDAY, 30TH AUGUST, 2019	WRYNECK	OS-102
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Birds as ecosystem engineers: nests and their inhabitants

Marta Maziarz¹, Grzegorz Hebda², Richard K. Broughton³, Luca Casacci¹, István Maák¹, Magdalena Witek¹

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Birds build nests to raise their young, but by doing so they create new structures which can become homes for other organisms, including many invertebrates. As such, nesting birds can act as 'ecosystem engineers' by creating, modifying and/or maintaining novel microhabitats (Jones et al. 1994, *Oikos* 69: 373-386). Although bird nests are often colonised by complex communities of invertebrates, relatively little is known of the interspecific interactions within these communities, or the relationships between them and the avian nest-owners. Most studies in this area have so far focused on infestation by nest dwelling avian ectoparasites and their impacts on the hosts, almost exclusively among cavity-nesting birds using nest-boxes; similar information for open-nesting species is lacking. We aim to fill this knowledge gap by investigating the interactions between wood warblers *Phylloscopus sibilatrix* breeding in unenclosed nests on the forest floor, and the invertebrate fauna colonising these nests. Here, we will present 1) the composition of the invertebrate fauna inhabiting Wood Warbler nests, including nest-dwelling ectoparasites and ants raising their broods within the nests, 2) the role of the physical or thermal properties of the nests on their colonisation by the invertebrates, and 3) the impact of nest-dwelling invertebrates on the host birds. We will highlight the need for more studies, which are necessary to further understand the interactions between birds and the invertebrates exploiting the nests, and to assess the importance of nesting birds as ecosystem engineers.

15:00	FRIDAY, 30TH AUGUST, 2019	WRYNECK	OS-97
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Bird nests as a resource to others: the case of sociable weaver nests in the Kalahari

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¹University of Cape Town, Cape Town, South Africa

Some animals alter habitats by directly or indirectly modifying the availability of resources to other species. Termed ecosystem engineers, our challenge is to identify these species and predict when and where they will have large or small impacts on the surrounding community. Surprisingly, despite being master builders, little work has been done on birds as ecosystem engineers. Bird nests serve a critical function to the individuals that build them, but in many cases also provide habitat for other species or have even broader community impacts. We focus on the extreme nests of the sociable weaver (*Philetairus socius*). These birds build large extensive colonies that are home to hundreds of weaver individuals, but also host a wide range of other species, both avian and non-avian. We show the importance of these nests to the greater animal community of the Kalahari, quantifying the use by a variety of species and exploring how they use the nests. Overall, more than 10 bird species and 30 mammal species were documented interacting with nests for reasons such as breeding, roosting, shade, foraging sites, scent communication sites and vantage points. We also show how faunal input associated with these nests result in islands of fertility, causing levels of critical plant nutrients to be up to four times higher compared to those than under control tress without nests. We emphasize the need to further investigate how nests impact their environment and how they are used following their primary breeding purpose.

15:30	FRIDAY, 30TH AUGUST, 2019	WRYNECK	OS-98
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Diversity and structure of feather mite communities on seabirds from the north-east Atlantic and Mediterranean Sea

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The richness and structure of symbiont assemblages are shaped by many factors acting at different spatial and temporal scales. Among them, host phylogeny and ecological factors play essential roles still poorly studied in feather mite communities. Seabirds are interesting hosts because they harbour species-rich feather mite communities and breed in large colonies, often with close contact among different bird species, providing opportunities for symbionts to exploit several host species. We used procellariiforms breeding in the Atlantic Ocean and Mediterranean Sea as a model to describe the richness of their feather mite communities and test the factors influencing patterns of community structure at different spatial scales and at different host taxonomic levels. Based on morphological criteria, we identified 33 mite species, of which 11 were new species. Based on community similarity analyses, mite communities were clearly structured by host genera, whereas the structuring of mites within host genera (i.e. among host species within a host genus) or within a single host species sampled across several localities was relatively weak and sometimes negligible. A distance effect on similarity patterns in the community of feather mites was found only for *Calonectris borealis*. Host body size and migratory behaviour tended to be positively associated with mite richness and prevalence. Our results show that host phylogeny plays a greater role than geography in determining the composition and structure of mite assemblages. Feather mite specificity mainly takes place at the host-genus level, and thus, by considering richness at this taxonomic level, one can explain major patterns of community structuring for most mite species.

15:45	FRIDAY, 30TH AUGUST, 2019	WRYNECK	OS-99
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Host alarm calls attract the unwanted attention of the brood parasitic common cuckoo

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The brood parasitic common cuckoo *Cuculus canorus* hijacks the parental investment of its hosts, causing this to be misdirected towards the cuckoo nestling instead of the hosts' own progeny. How cuckoos recognise their host species and how they locate the nest of these hosts is still largely debated. Previous studies assumed that female cuckoos rely predominantly on visual signals (e.g. nest building activity of hosts and direct sight of the nest) to find suitable nests while being perched on vantage points. Consequently, the importance of hosts acoustic signals in the nest searching process of cuckoos was largely neglected. Here we provide experimental evidence that both female and male common cuckoos pay attention to their hosts', the great reed warbler *Acrocephalus arundinaceus* alarm calls relative to controls, and correlative data indicating that great reed warblers that alarm more frequently are more likely to be parasitised by cuckoos. We conclude that host alarm calls might function as important nest location cues for common cuckoos.

Oral Session: Timing of Migration

10:30	FRIDAY, 30TH AUGUST, 2019	WHITE STORK	OS-85
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Effects of large-scale climate indices on the timing of spring migration of willow warblers *Phylloscopus trochilus*

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We used data from regular daily mist-netting in the springs (1 April–15 May) of 1982–2017 at Bukowo (Baltic Sea coast, Poland) to determine whether the timing of spring migration of Willow Warblers *Phylloscopus trochilus* responded to appropriate large-scale climate indices of the preceding year. We devised an Annual Anomaly (AA, days) which estimated how early or late Willow Warblers arrived in relation to the overall pattern. We found that migration was, on average, 5.4 days earlier at the end of the 36-year period than at the start. We modelled AA using 14 explanatory variables in multiple regression. The variables were large scale indices of climate in Africa and Europe during the preceding year, averaged over biologically meaningful periods of two-four months. The best model (minimum AIC) explained 59% of the variation in AA and selected seven variables: North Atlantic Oscillation (two periods), Indian Ocean Dipole, Southern Oscillation Index, Sahel Precipitation Anomaly, Scandinavian Index and local mean temperatures. Thus the observed timing of migration of Willow Warblers in spring reflected the combined effects of the climate they encountered over the preceding year.

10:45	FRIDAY, 30TH AUGUST, 2019	WHITE STORK	OS-86
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Spatio-temporal patterns of day-to-day bird migration over the North Sea: the role of wind

Maja Bradarić¹, Ruben Fijn², Willem Bouten¹, Judy Shamoun-Baranes¹

¹Institute for biodiversity and ecosystem dynamics, University of Amsterdam, Amsterdam, Netherlands; ²Bureau Waardenburg, Culemborg, Netherlands

For most of the terrestrial birds, large water bodies are considered to be an ecological barrier. Studies have shown that ecological barriers can be altered into migratory corridors under adequate environmental conditions, with a suitable migration strategy applied. The success of crossing inhospitable areas seems to be closely tied to an individual's fat reserves and supporting winds during migration. Wind is believed to have a strong influence on avian take-off decisions and migratory patterns. Within the North Atlantic Flyway, the North Sea may create an ecological barrier which terrestrial migrants may have to transverse when migrating between Scandinavia and Southern Europe or Africa and between North-Eastern Europe and the UK. Studies showed that terrestrial birds, which make the vast majority of birds migrating over the North Sea, mostly migrate at night in mass migration events that occur a few times a year. The aim of this study was to determine whether birds decide to cross the North Sea when wind conditions are most likely to transform the North Sea from an ecological barrier to a migratory corridor. Assuming that birds take-off around sunset, we incorporated hourly ground speed and direction measurements of a dedicated bird radar into a trajectory model to infer potential departure locations on land, and potential flight paths across the North Sea. We assessed how winds influence the timing of day-to-day migration in spring and autumn. With our results we show how integrating spatial explicit models and measurements can be used to understand avian departure decisions.

11:00	FRIDAY, 30TH AUGUST, 2019	WHITE STORK	OS-87
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The sleep dilemma of nocturnal migrants

Andrea Ferretti¹, Niels Rattenborg², Massimiliano Cardinale³, Leonida Fusani^{1,4}

¹University of Vienna, Vienna, Austria; ²Max Planck Institute for Ornithology, Seewiesen, Germany; ³Swedish University of Agricultural Sciences, Lysekil, Sweden; ⁴Konrad-Lorenz-Institut of Ethology, Vienna, Austria

During spring migration, time is one of the main constraints for nocturnal migratory birds. The necessity to arrive first at the breeding ground leads birds to minimize time spent at stopover by the optimization of energy recovery. Previous studies have extensively shown the effect of physiological condition, in particular the amount of fat resources, on stopover decisions. After landing at the stopover site, migrants need to sleep in order to recover cognitively and physically. Nevertheless, birds might use sleep behaviour also to save energy, particularly the sleep postural choice might be involved in energy management. The aim of this study was to investigate the role of sleep behaviour in the modulation of energy consumption, with a focus on postures displayed during sleep time. The study was carried out on wild garden warblers (*Sylvia borin*) caught on Ponza island (Italy), an important spring stopover site in the Mediterranean. Birds were hosted temporarily in cages to record their activity after collection of physiological variables and released the following day. Our results showed that physiological conditions at capture predict sleep behavior during stopover. Animals in worse conditions were more active at daytime, probably reflecting food search efforts. These birds also showed sleep patterns that appear to be linked to lower energy consumption. Our study provides novel evidence on the importance of sleep behaviour in energy management during bird migration.

11:15	FRIDAY, 30TH AUGUST, 2019	WHITE STORK	OS-88
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Modelling decisions: modelling the influence of stopover site quality on decision making process of migratory warblers

Adi Domwe¹, Eyal Shochat¹, Ofer Ovadia¹

¹Ben-Gurion University of the Negev, Beer-Sheva, Israel

Along one of the world's most crowded migration routes, planted groves in the Northern Negev desert of Israel serve as important stopover sites for many migratory passerines. While some sites are crucial for successful migration, others may be ecological traps. To understand stopover site quality, I monitored two *Pistacia* groves in the northern Negev during three autumns: (1) Ein-Rimon – high quality site, (2) Ben-Gurion Seminary – low quality site. Despite the higher number of birds at Ben-Gurion Seminary, recapture rate was only 2.6% compared to 26.6% at Ein-Rimon, where the body mass of common passerines was also higher. These findings suggest that birds at Ben-Gurion Seminary depart soon after arrival, regardless of their body condition, and that this site is an ecological trap. We constructed a dynamic model, emulating bird's decision-making during stopover in these two stopover sites. The model shows that most birds arriving at Ben-Gurion Seminary would have a small window of opportunities to leave in search for a better site, and that most birds should chose to do so despite the high energetic cost. Birds that remained at this site could not accumulate sufficient amounts of fat to cross the Saharan Desert. In contrast, the model reveals that birds stayed at Ein-Rimon owing to high fuel deposition rate. At this site, most birds were able to accumulate fat that would suffice for desert crossing. Since tracking passerines is nearly impossible, this model can help scientists understand site-specific stopover behavior and improve the management of stopover sites.

11:30	FRIDAY, 30TH AUGUST, 2019	WHITE STORK	OS-89
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Interrupted breeding in a songbird migrant triggers the type of nocturnality similar to migratory restlessness

Andrey Mukhin^{1,2,3}

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During migratory periods many songbird species profoundly change their diel rhythm under the control of their intrinsic circannual programs and perform nocturnal long-range flights. Change to the so-called nocturnality is believed to be governed by endogenous programs. The general view that nocturnality in avian annual cycle is inseparably linked to migratory seasons was shaken recently by numerous new facts from field studies showing passerine birds performing nocturnal flights even during breeding. In the present study we tested whether birds with interrupted breeding are developing locomotor activity at the night-time similar to a development of migratory restlessness of caged birds during a migratory season. We artificially interrupted breeding in reed warblers by bringing them into captivity and recording birds' locomotor activity for 5–7 days. Over this time, most of the captive birds gradually developed nocturnal locomotor activity not observed in breeding birds. When the birds were later released and radio-tracked at their homing, the individuals with highly developed caged activity performed nocturnal flights. Our study suggests that an interrupted breeding triggers development of nocturnal locomotor activity in cages, and the level of activity is correlated with motivation to perform nocturnal flights in the wild. The similar pattern of gradual rhythm drift and stereotypical locomotor acts (as whirring, fluttering, head scans) with those in birds in migratory state leads us to conclude that summer nocturnal activity and migratory restlessness (*Zugunruhe*) observed in captive songbird migrants is very similar or even identical phenomenon and is under control of the same mechanisms.

11:45	FRIDAY, 30TH AUGUST, 2019	WHITE STORK	OS-90
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Seasonal dynamics of the Afro-Palearctic migratory flyways

Martins Briedis¹, Silke Bauer¹, Steffen Hahn¹

¹Swiss Ornithological Institute, Sempach, Switzerland

Bird migration between the European breeding and the African non-breeding areas are thought to progress in concert with the phenology of the environment in the temperate zone. Geographic features and environmental constraints *en route* affect many individuals from various species leading to large aggregations of migrants at certain geographic regions. It is, however, unclear how exactly the annual cycles of long-distance migratory birds are tuned with specific landscape characteristics and environmental seasonality. Here we present a broad-scale assessment of the spatial structure and temporal dynamics of the Afro-Palearctic migratory system and explore how the phenology of the environment guides long-distance migration. We used nearly 600 individual migration tracks from 23 Passerine and near-Passerine species of 55 European breeding populations. We show that there is a strong positive relationship between the longitude of individual breeding and non-breeding sites giving foundation to the two major flyways that connect Europe and Africa. The migratory divide was identified between 10–20°E – an area that in earlier studies has been established as a post-glacial contact zone for many taxa. The timing of migration, especially arrival at the breeding sites in spring, was typically later and migration window was typically longer on the Eastern Flyway. These flyway-scale differences in migration timing can be attributed to the phenology of vegetation green-up and senescence at the birds' breeding sites and *en route*. In conclusion, migration routes of the Afro-Palearctic migratory landbird can be organized into two broadly defined flyways with distinct differences in migration timing along them.

Oral Session: Urban Birds

15:30	WEDNESDAY, 28TH AUGUST, 2019	COLLARED DOVE	OS-49
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Phenology in the city: effects of urbanisation on the selection on timing of avian reproduction

Davide Dominoni¹

¹*University of Glasgow, Glasgow, United Kingdom*

In birds, urbanization has been generally associated with earlier spring reproduction. However, it is still unclear whether such advanced phenology is adaptive. We seek to answer this question in the blue tit (*Cyanistes caeruleus*), using six years of data and over 1000 breeding events from populations 12 urban and 8 forest populations breeding along a gradient of urbanisation in Glasgow (Scotland). We previously showed that abundance of caterpillars, tits' main food resource in spring, at our urban sites was lower and did not show any seasonal peak compared to the forest sites. Thus, we hypothesized that timing of reproduction in urban blue tits will be less strongly under selection than in forest areas. We showed that urban females lay their eggs on average 5 days earlier than forest ones, but with a much larger variation around the mean. While in the forest populations earlier breeding was associated with increased reproductive success (as measured by fledgling success and chick body mass before fledgling), this relationship was not found in the urban populations. We therefore conclude that the strength of selection for early breeding is stronger in forest than urban areas. Thus, the advanced breeding time found in many urban areas is likely the consequences of plastic responses to altered environmental stimuli that may advance timing of reproduction, such as higher temperatures and the presence of artificial light at night. In my contribution I will present these results and discuss their implications for the regulation of phenological interactions in urban environments.

15:45	WEDNESDAY, 28TH AUGUST, 2019	COLLARED DOVE	OS-50
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Are urban birds stressed? A study of an urban exploiter, the house sparrow (*Passer domesticus*)

Erika Beaugeard¹, François Brischoux¹, Pierre-Yves Henry², Charline Parenteau¹, Colette Trouvé¹, Frédéric Angelier¹

¹Centre d'Etudes Biologiques de Chizé (CEBC), UMR 7372 CNRS-Université de La Rochelle, Villiers-en-Bois, France; ²Centre de Recherches sur la Biologie des Populations d'Oiseaux (CRBPO), Mécanismes Adaptatifs et Evolution (MECADEV) UMR 7179 Sorbonne Universités-MNHN-CNRS, Paris, France

Urban landscapes are associated with abiotic and biotic environmental changes that may result in potential stressors for wild vertebrates. Urban exploiters have physiological, morphological, and behavioural adaptations to live in cities. However, there is increasing evidence that urban exploiters themselves can suffer from urban conditions, especially during specific life-history stages. We looked for a link between the degree of urbanization and the level of stress in an urban exploiter (the house sparrow, *Passer domesticus*), which has recently been declining in multiple European cities (e.g., London, UK). Specifically, we conducted a large-scale study and sampled sparrows in 11 urban and rural sites to evaluate their feather corticosterone (CORT) levels. Although adult feather CORT levels were similar among all sites, juvenile feather CORT levels were strongly and positively correlated with the degree of urbanization. This supports the idea that house sparrows may suffer from urban environmental conditions, especially during their development. We did not find any correlation between juvenile feather CORT levels and body size, mass, or body condition, suggesting that the growth and condition of urban sparrows are not impacted by elevated developmental CORT levels. Although feather CORT levels were not correlated with baseline CORT levels, we found that feather CORT levels were slightly and positively correlated with the CORT stress response in juveniles. This suggests that urban developmental conditions may potentially have long-lasting effects on stress physiology and stress sensitivity in this urban exploiter.

16:00	WEDNESDAY, 28TH AUGUST, 2019	COLLARED DOVE	OS-51
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Investigating the ecology of an opportunistic predator living in urban ecosystems: the yellow-legged gull in Barcelona

Joan Navarro¹, Raül Aymí², Maria Carmona^{1,2}, Adrián Méndez¹, David Nos¹, Jordi Figuerola³, Tomás Montalvo⁴

¹Institut de Ciències del Mar - CSIC, Barcelona, Spain; ²Institut Català d'Ornitologia - ICO, Barcelona, Spain; ³Estación Biológica de Doñana - CSIC, Sevilla, Spain; ⁴Agència de Salut Pública de Barcelona – ASPB, Barcelona, Spain

Human activities do not affect all species in the same way and landscapes transformed by human development may still provide profitable environments for opportunistic species. These species are able to colonise these habitats, increasing their population sizes. This is the case of different avian species that are able to exploit the opportunities provided by humans in urban areas. In this project, we are investigating the spatial ecology, habitat use and trophic habits of the urban population of yellow-legged gull (*Larus michahellis*) of the city of Barcelona, and how these foraging-related aspects affect its pathogen load and dispersion, contaminant values and physiological state. We are combining individual marking programs (colour rings), GPS-tracking, trophic metrics (stomach content and isotopic markers), ecophysiological parameters, epidemiological measures (bacteria and virus) and pollution markers (PCBs and PCDEs). Preliminary results revealed that yellow-legged gulls mainly exploit urban habitats and human-related installations close to the city. Also, we found age-related differences in the spatial distribution. Regarding to the trophic habits, surprisingly, Barcelona's yellow-legged gulls mainly exploit avian resources (urban pigeons and exotic parrots) followed by marine resources and food present in the garbage. Also, we found a dependence of part of the population to artificial feeding provided by humans. Spatial and trophic results explain the inter-individual differences in the pathogen and pollution results. In conclusion, this project is a clearly example of the importance of conduct multidisciplinary studies with wildlife living in urban ecosystems to understand how this species are adapted to human-related environments.

16:15	WEDNESDAY, 28TH AUGUST, 2019	COLLARED DOVE	OS-52
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Development of urban behavioural type is associated with time since urbanization in a reed-nesting waterbird

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¹*Faculty of Biology, Biological and Chemical Research Centre, University of Warsaw, Warsaw, Poland;*

²*Department of Biodiversity Studies and Bioeducation, Faculty of Biology and Environmental Protection, University of Łódź, Łódź, Poland*

Behavioural and physiological adaptations are recognised as crucial determinants for successful establishment and persistence of animal populations in a novel urban environment. Here, we examined mechanisms responsible for the development of urban behavioural type in a common waterbird, the Eurasian coot *Fulica atra*. We compared the behaviour of coots from a rural population and two urban populations that differed in the timing of colonisation event (1960s vs 2000s). We found that some behavioural characters associated with urban life (aggression during nest defence and boldness towards humans during foraging) were more strongly expressed in the older urban population when compared with the recently established urban population. By contrast, coots from the two urban populations showed a similar likelihood of exploiting human-derived food resources, as well as they showed similar levels of physiological stress. Urban coots were generally more aggressive, bolder, and less stressed than their rural conspecifics. Increasing expression of boldness and aggression with the time since urbanisation suggests that these adaptations might have become genetically accommodated via novel selective forces associated with the urban environment. On the other hand, a large behavioural and physiological divergence of coots from the recently established urban population and their rural conspecifics suggested that phenotypic plasticity and phenotype sorting may play a key role in the initial stages of urban colonisation. Our results indicate that a combination of different processes (phenotypic plasticity, phenotype sorting, and microevolution) can determine successful colonisation of urban areas by the Eurasian coots, and possibly other bird species.

16:30	WEDNESDAY, 28TH AUGUST, 2019	COLLARED DOVE	OS-53
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Breeding in the city: are nest-boxes really worse than natural cavities?

Joanna Sudyka¹, Irene Di Lecce¹, Marta Szulkin¹

¹*Centre of New Technologies, University of Warsaw, Warsaw, Poland*

Nest-boxes are often provided across cities as a conservation measure, however it is not clear if these artificial cavities are optimal for maintaining and enhancing urban biodiversity. While nest-boxes offer a convenient framework for studying breeding performance due to simple sampling, such studies may not reflect natural fitness variation, which evolved in natural cavities. Here, we examine various breeding-related traits of great tits (GT, *Parus major*) and blue tits (BT, *Cyanistes caeruleus*) nesting in natural cavities of an urban forest characterised by elements of primeval ecosystem (Las Bielański in Warsaw) and in nest-boxes located in the same forest. We present data from two breeding seasons. Our results from the first season clearly show differences in nest microclimate (temperature and humidity), with natural cavities providing much more stable environment. On the other hand, predation rates are higher in natural cavities. Consequently, in comparison with natural cavities, nest-box breeding birds experienced shifts in phenology: earlier lay date in BT and onset of incubation in GT resulted in larger hatching asynchrony. Next, BT from natural cavities invested less in egg number, but due to higher hatching success, their fledging success was not lower. Finally, BT chicks from natural cavities spent less time in the nest, and attained larger structural size. We demonstrate that breeding performance of birds varies between the two types of nests in an array of features, with possible consequences for fitness and urban biodiversity in the long run. We stress the importance of maintaining natural cavity sites within cities.

16:45	WEDNESDAY, 28TH AUGUST, 2019	COLLARED DOVE	OS-54
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The long-term impacts of garden bird feeding on British bird communities

Kate E. Plummer^{1,2}, Kate Risely¹, Mike P. Toms¹, Gavin M. Siriwardena¹

¹*British Trust for Ornithology, The Nunnery, Thetford, United Kingdom;* ²*College of Life and Environmental Sciences, University of Exeter Penryn Campus, Cornwall, United Kingdom*

There is a multi-billion dollar global industry dedicated to feeding wild birds in residential gardens. Traditionally adopted to 'help' birds through winter, when populations are naturally constrained, garden bird feeding has changed extensively since becoming commercialised in the mid-20th century. This extraordinary boost to food resources is almost certainly reshaping entire bird communities, as species vary in the extent to which they exploit food supplements. While some of the effects on individual species are starting to reveal themselves, the large-scale, long-term impacts on community ecology remain unknown. Here we reveal a transformation of the bird communities using garden bird feeders in Britain over a 40-year timeframe, and provide evidence to suggest how this has translated into national population change. We find that increases in bird diversity at feeders have been driven by interspecific numerical dominance changes, as species previously rarely observed in gardens have increasingly exploited the growing variety of foods on offer over time. Urbanised areas of Britain are consequently nurturing growing populations of feeder-using bird species, while other bird populations that have equal access to, but do not use, feeders remain unchanged. Our findings identify an on-going, gross impact that people are having on the wildlife around them, suggesting that, by choosing to feed wild birds, homeowners could be contributing to the national-scale restructuring of bird communities.



12. Posters

Poster Session (even numbers)

	WEDNESDAY, 28TH AUGUST, 2019	UNIVERSITY BUILDING	PP-2
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Body condition of males and females during breeding in a species with female-only desertion: a case of whiskered tern *Chlidonias hybrida*

Mateusz Ledwoń¹, Grzegorz Neubauer², Agata Żmuda¹, Adam Flis³

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²*Laboratory of Forest Biology, Wrocław University, Wrocław, Poland;* ³*Institute of Nature Conservation, Polish Academy of Sciences, Kraków, Poland*

Uniparental natural offspring desertion in species with biparental care occurs in many species of bird, particularly Charadriiformes. In this group of birds, offspring desertion by the female parent is more common than by the male. According to the differential parental capacity hypothesis, females are more predisposed to desert because they can have weaker physiological state than males as a consequence of laying costs. In this study we investigated body condition (scaled body mass) in over 800 males and females whiskered tern during nine breeding seasons. In this species, the deserting parent is almost exclusively female. We trapped adults between 11 days before hatching to 13 days after hatching. The condition of males and females did not differ during breeding and increased in both sexes during incubation. Three days before hatching condition of both sexes started to decrease, and significantly decreased throughout the chick period. The condition of both males and females increased throughout the breeding season of June to August. Notably, condition of females that deserted during the chick-rearing period remained stable during the egg and chick phases, while the condition of females that did not desert decreased from the laying period to the chick period. We found no support for the hypothesis that the female-only desertion observed in Whiskered Tern was associated with differences between the condition of each sex. Reduced body mass during the chick period could be adaptive for parents because it reduces energy expenditure during flight, when both mates intensively forage and deliver food to chicks.

	WEDNESDAY, 28TH AUGUST, 2019	UNIVERSITY BUILDING	PP-4
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Interspecific variation in natural antibodies and complement activity in a community of tropical birds

Elena Arriero¹

¹*University Complutense of Madrid, Madrid, Spain*

The emerging field of comparative immunology aims to explain variation in immune traits across species, and the ecological, physiological or evolutionary factors that underlie this variation. The ability to resist infections is expected to be under intense selection pressure, because infectious diseases may have a severe impact on fitness. However, the immune response is energetically costly, and the investment in immune function in different species will be traded-off against life history traits, and modulated by the pressure from parasitism. In this study we focused in two measurements of the innate component of the immune defense, the circulating levels of natural antibodies and the activity of complement. We sampled adults and nestlings of different bird species in a community of birds in Kinabalu National Park, Malaysia. Our results show large interspecific variation in both components of the immune defense, and differences in the ontogeny of these traits. While nestlings of all species showed detectable levels of natural antibodies one week after hatching, there was a large variation in complement activity in nestlings, with many species not showing activity at that age. We also explored associations between adult and nestling immunity in the different species, and phylogenetic signal in these traits.

	WEDNESDAY, 28TH AUGUST, 2019	UNIVERSITY BUILDING	PP-6
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Ambient temperature and rainfall impact the offspring PHA-response and body mass via parental reproductive investment

Emilia Grzędzicka¹

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Animals are exposed to the more frequent stressful weather events that may impact parental decisions and their investment in offspring. Unfortunately, there is lack of studies on the importance of weather factors for the parental investment in offspring immunity. Research on two species of tits, the great tit *Parus major* and the Eurasian blue tit *Cyanistes caeruleus*, shows influence of weather factors on the condition of chicks *via* parental investment. Ambient temperature impacts the effect of a sheep red blood cell (SRBC) challenge of the adult female's immune system on the offspring's phytohaemagglutinin (PHA) responses. In both studied bird species, offspring wing web swelling was lower after immunisation of the mother compared with the control group of females. In Eurasian blue tits, the nestlings' PHA responses were positively related to ambient temperature in both experimental groups, while in great tits they were positively related to temperature in the control group, but no significant relationship was found in the SRBC nests. Research also examines whether and how heavy rainfall influences the Eurasian blue tits' offspring PHA-response and their body mass. With a more intensive rainfall, the weaker chicks responded to the PHA antigen, but achieved greater body mass. In the next years, it can be expected that temperature and heavy rainfall will become the increasingly important environmental cues, based on which birds will adapt their reproduction, and which will affect population trends, as the immune response increased at higher ambient temperature and weakened during the intensive rainfall is a survival indicator.

	WEDNESDAY, 28TH AUGUST, 2019	UNIVERSITY BUILDING	PP-8
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Metabolic rate and night-time body temperature in a small passerine

Fredrik Andreasson¹, Andreas Nord^{1,2}, Jan-Åke Nilsson¹

¹Lund University, Lund, Sweden; ²Institute of Biodiversity, Animal Health and Comparative Medicine, Scottish Centre for Ecology and the Natural Environment, University of Glasgow, Glasgow, United Kingdom

Many bird species use night-time hypothermia, i.e. a reduction in body temperature that exceeds regular circadian variation, as an energy-saving strategy when food is scarce and when ambient conditions are harsh. Even small reductions in body temperature, which is the norm in northern passerines, can entail large energy savings and increase winter survival. Yet, we know little about how metabolic rate and body temperature co-vary in cold ambient temperatures in these species. We measured resting metabolic rate and body temperature in ambient temperatures from 25 °C to -15 °C in winter-acclimatized blue tits (*Cyanistes caeruleus*). Resting metabolic rate increased linearly with decreasing ambient temperature below thermoneutrality, whereas body temperature showed a quadratic response, being the lowest from 0 to -10 °C and increasing slightly as air temperature dropped further. Birds in their first winter had higher metabolic rate below thermoneutrality compared to older birds, and their estimated lower critical temperature (14 °C) was also slightly higher than in old birds. This was probably not a consequence of differences in plumage insulation because minimal thermal conductance did not differ between the two groups, but could be an effect of the well-known fact that young animals that might still be growing have higher metabolic rate than older conspecifics. Our study shows that metabolic responses to cold are age-specific but that, regardless of age, increased heat production below thermoneutrality together with body insulation allows the birds to defend a stable, slightly hypothermic, body temperature over a wide range of cold ambient temperatures.

	WEDNESDAY, 28TH AUGUST, 2019	UNIVERSITY BUILDING	PP-10
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Parasite load of proliferate chewing lice species *Myrsidea claytoni* relates to the blood index of black-and-red broadbill *Cymbirhynchus macrorhynchos*.

Ekaterina Zubkova^{1,2}, Andrey Bushuev^{1,3}, Anvar Kerimov^{1,2}, Oleg Tolstenkov^{2,4,5}

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Reasons of the irregular distribution of parasites on their hosts represent an important question in ecophysiology. We examined for ectoparasites 28 passerine bird species ($n \geq 10$) in the tropical forest of the Southern Vietnam. Most of the chewing lice species showed typical aggregated distribution on their hosts with few hosts keeping most of parasite population and many hosts being free of parasites. However for one species of host, black-and-red broadbill (*Cymbirhynchus macrorhynchos*) we found unusual infestation parameters of its parasite chewing lice *Myrsidea claytoni* with 100% prevalence and relatively high intensity. To test the conditions affecting the parasite load (chewing lice, feather mites and louse flies), i.e. external factors (year of study, habitat) and internal parameters of the host (basal metabolic rate, blood indexes, brood patch status, molt stage, body mass) we performed GLM analysis. Despite the small sample size (31 birds), we revealed significant positive relation between parasite load of *M. claytoni* and the lymphocyte/erythrocyte blood index in the black-and-red broadbill. Interestingly another chewing lice species *Guimarasella sp.* inhabiting the same host did not show significant relations with blood characteristics. We explain the observed contrast by the different life style of the chewing lice. *M. claytoni* belongs to the motile blood foraging Amblycera chewing lice, while *Guimarasella sp.* represents less motile feather consuming Ischnocera lice. We suggest that some features in broadbill behavior should explain the easiness of chewing lice exchange within host population when mostly the defensive (including immune) response of the host limits the parasite proliferation.

	WEDNESDAY, 28TH AUGUST, 2019	UNIVERSITY BUILDING	PP-12
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Assessing physiological stress and behavior in a passerine in the Southern Hemisphere: influence of season and experimental protocol.

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Much research has been carried out on behavioral and physiological traits in Northern Hemisphere passerines, giving place that most if not all generalizations about passerine biology come from that hemisphere. Similar research from the Southern Hemisphere is lacking, particularly if we want to know world-wide generalizations about avian biology. We carried out a study in *Zonotrichia capensis*, a widely distributed passerine in South-America, assessing plasma levels of corticosterone and exploratory behavior, during the reproductive season and non-reproductive season. We also assessed the influence of measuring behavior or physiological responses in different orders, given that many studies focus on both biological aspects. We found that seasonal effects and protocol design influenced the results of physiological and behavioral research, with a higher stress response during the non-reproductive season, with a lesser slope in those animals that experienced first the behavioral experiment. We also found that birds showed more hopping and less flight and perching during the breeding season. These results show that measurements of physiological stress can influence behavioral assessment and that seasonal changes influence behavioral responses to similar conditions. (CONICYT-PIA-CCTE AFB-170008)

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Influence of avian malaria and other haemosporidian parasites (Apicomplexa, Haemosporida) on leucocyte profile of rosy starlings (*Pastor roseus*)

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The way pathogens as avian malaria (*Plasmodium spp.*) and related haemosporidian parasites (*Haemoproteus* and *Leucocytozoon spp.*) influence host immune response have been under debate since decades. Leucocyte profile or white blood cell (WBC) count was considered as good candidate describing host-parasite interactions. With this study, we try to find a relationship of WBC concentrations with prevalence and parasitaemia of haemosporidian parasites in rose starlings. All types of WBCs were evaluated based on their morphology observed on Giemsa stained thin blood smears. Haemosporidian parasites were detected and identified based on microscopic examination, PCR and sequencing. We found high prevalence of haemosporidian parasites (87.1%) in examined rose starlings (n=31) with predominant infections of *Haemoproteus pastoris* (cytochrome *b* lineage LAMPUR01) (64.5%). We found insignificant relationship between parasite prevalence or parasitaemia and the number of WBCs, as well as with the heterophil/lymphocyte (H/L) ratio or the total concentration of leucocytes in the blood. However, we found a negative correlation between parasitaemia of *H. pastoris* and monocyte number. These results are in accordance with our knowledge about the role of the monocytes as phagocytic leucocytes that are specialized in ingesting large foreign particles and cell debris, and are found to be involved in immune response during acute stage of the parasite infections. Our findings might be associated with the mechanism of immunosuppression, resulting in natural relapse of *H. pastoris* during the breeding season of rose starlings and add to our understanding of host-parasite interaction in this crucial period of the birds' life.

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Habitat selection of the white-winged snowfinch *Montifringilla nivalis nivalis* at multiple temporal and spatial scales

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Species inhabiting high mountain areas are highly specialized in their habitat requirements, as they have evolved complex life-history strategies to cope with the extreme abiotic conditions and strong seasonal fluctuations of these environments. As these factors change not only in time but also in space, it is important to study habitat selection of a species at multiple scales, in order to explore its adaptive response to seasonal environments. In the present study we aimed to study habitat selection of the snowfinch *Montifringilla nivalis nivalis* at multiple temporal (breeding vs. non-breeding season) and spatial (plots with diameter of 100, 250 and 500 m radius) scales. We found that snowfinches select high altitude habitats during both seasons, although they seem to be less selective during the non-breeding period. This suggests that snowfinches have physiological and morphological specializations that constrain them in a high mountain habitat throughout the year, but at the same time they show a plasticity that allow them to be “more generalist” during the non-breeding season. This flexible strategy could also explain the nomadic behaviour that the species exhibits during winter. Further investigations are essential to understand how this strategy is shaped among the different European populations and to what extent it could help them to adapt to climate change.

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Methods of measuring the synanthropization degree on the example of the magpie *Pica pica* (L.)

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The research was carried out in the area of the northern part of the Lodz voivodeship (central Poland). The data was collected from March 2014 to May 2016. The research was carried out on 13 urban and 4 rural areas. The center of Łódź (the third largest city in Poland) and the meadows by the Kacap valley (in the eastern Poland) were chosen as places with extreme degrees of synanthropization. In total, 2295 nests within an area of over 810 km² were counted. The proposed method to determine the degree of synanthropization is the measurement of distance between the nest and the residential building. The areas were arranged according to this method. The distribution of the studied areas is negatively correlated with the average distance between the nest and the building. This means that the closer the magpies nest to the building, the distribution becomes more positive. This indicates that the higher the degree of synanthropization is, the higher the attractiveness of a residential building becomes. Therefore, more magpies try to find a place in its closeness than would result from a random (normal) distribution. Arrangement of chosen for nesting tree and bush taxa by correspondence analysis gives similar results as obtained by measuring the distance between the nest and the building. The J 'index achieves the lowest values on the areas with the lowest and the highest degree of synanthropisation.

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European robin (*Erithacus rubecula*) and caterpillars - is there an effect of food supply on the breeding phenology?

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The aim of the research was to determine the breeding phenology of robins in the Białowieża National Park and to check whether caterpillar availability affects the date of hatching. The survey was carried out in 2016-2019 from March 20 to June 20. The research area were located in the strict nature reserve of the Białowieża National Park (BPN) in the eastern part of Poland. There were three sample plots: K –ash-alder riverine, on the edge of BPN (33 ha), W –oak-lime-hornbeam forest, on the edge of BPN (25,5 ha), M –oak-lime-hornbeam forest, 3 km from the border of BPN (30 ha). Breeding phenology was described according to data collected from regular nests controls. The chick diet was examined using spy cameras placed near the Robin's nest. Availability of caterpillars was evaluated based on the weight of excrements. 48 excrements collectors was placed under 4 tree species: linden, oak, maple and hornbeam. Collectors were emptied every 2 days. Research confirmed that caterpillars are a significant part of the chicks feed. There is a lot of information about some species match the breeding date to caterpillar outbreaks. Our studies on robin do not confirm this, such as research conducted in Białowieża on other bird species. It seems that matching the time of hatch to the appearance of caterpillars, widely described in the world literature, is less important in forests with a high degree of naturalness.

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Long-term changes in laying dates in the common pochard *Aythya ferina* and the tufted duck *A. fuligula* linked to weather conditions and climate oscillations in the south of western Siberia, Russia

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The breeding biology of ducks was studied in the south of Western Siberia at Krotovo Lake (53.72 ° N; 77.88 ° E) during 1970 –2018. Intensive searches for duck nests were conducted since early May until late July. The weather information provided by the nearest meteorological station (Karasuk) and NAO-indexes from the open-access website were used in the analysis. The mean clutch initiation dates varied significantly from year to year: common pochards nested earlier (23 May \pm 1.0; min 12 May, max 3 June) and tufted ducks nested later (3 June \pm 1.0; min 25 May, max 18 June). The duration of an egg-laying period was slightly longer in the tufted duck. In both species the time interval between the date of the spring temperature rising above 0 ° C and the egg-laying initiation date extended with the warming of the spring. There were no significant trends in the timing of egg-laying dates during the entire study period, whereas since 1979 the trends towards an earlier breeding became highly significant (Mann-Kendall test: >2.9 ; $p<0.003$). The mean timing of egg-laying dates advanced in both species since 1979 (-2.4 ± 0.8 days decade⁻¹). The breeding period in both ducks was significantly influenced by the local weather conditions and the global climate oscillations (for the common pochard $R^2=0.37$, $F_{[2,32]}=9.3$, $p=0.0007$; for the tufted duck $R^2=0.24$, $F_{[2,31]}=5.0$, $p=0.01$). Understanding the mechanisms of climate change affecting duck populations is important in wildlife management planning. The study was supported by the Federal Fundamental Scientific Research Programme for 2013-2020 (AAAA-A16-116121410118-7).

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The impact of environmental factors on variability of common buzzard *Buteo buteo* population parameters in area with high share of marshlands –40 years study period from Sobibór Forest, eastern Poland

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We carried out breeding biology and ecology study of the common buzzard *Buteo buteo* for 22 breeding seasons in two periods: 1979-1990 and 2009-2018. Study area (118.3 km²) was located in Sobibór Forest, western Polesie and 86.7% of area were forested. The high share of swamp and moist habitats (41.2%) was very characteristic. We used the multiple regression to define the habitat preferences and impact of environmental factors on breeding parameters. We found inside-area differences between densities due to buzzards preference to breed near the marshlands and oak forests and avoid pine forests under 80 years old. Buzzards although preferred to settle forests near to grasslands, roads and forest framework and cultivations. Their built nests in older stands. Buzzards have been ousting from optimum habitats by top-predators: the eagle owl *Bubo bubo* and the white-tailed eagle *Haliaeetus albicilla*. Numerical breeding parameters (clutch size, hatching numbers and fledglings numbers) varied between years because of positive impact of high vole index and negative of hard weather conditions. Hatching success was lower after long, severe winters, because females abandoned nests due to freezing and starvation. Positive effect on all breeding parameters had high share of feeding grounds. Birds were probably providing more food to the chicks and due to leaving nests for shorter period, protection of chicks from predators were presumably more effectively. We observed the density dependence regulation of buzzards' production. Short distance to top-predator nest had direct negative impact on fledging success and indirect impact on remaining breeding parameters too.

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Differences regarding habitat preferences of the Eurasian coot (*Fulica atra*, Linnaeus 1758) in the breeding and non-breeding season in local conditions of Câmpenești (Cluj, Transylvania)

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In this paper, we want to present the differences regarding the ecological preferences of Eurasian coot (*Fulica atra*) between the non-breeding and the breeding season in the local conditions of Câmpenești (Cluj, Transylvania) between 2017-2018. During this period we made 35 counts on each of the 7 ponds in Câmpenești. In the non-breeding season, there was no correlation between the coots abundance and the surface of the pond, but in the breeding season, we found a significant correlation in this sense. A more pronounced correlation was noted between the coots abundance and the reed surface in the non-breeding season and slightly weaker in the breeding season. There was a poor correlation between the coots abundance and the reed percentage of the ponds in the non-breeding season and no correlation in this case in the breeding season. Between the two seasons, there was a difference reflected by a significantly higher number of coots in the non-breeding season. Another difference was remarked in local dynamics. The local movement existed in both seasons but was more pronounced in the non-breeding season. In the non-breeding season, the coots preferred pond 5 with a larger reed surface and in the breeding season pond 3 with a larger size but a smaller reed bed. In conclusion, we can say that there is a significant difference between the two seasons. There is also a similarity in the sense that in both seasons there is specificity for a certain type of habitat.

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Breeding success and dispersal in yellow wagtail (*Motacilla flava*)

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The decision whether to be faithful to a known locality or to breed elsewhere belongs to the key life-history traits affecting individual fitness and population demography, especially in migrant birds. Among factors influencing such decision, the breeding success is of high importance. After unsuccessful breeding an individual could just alter its breeding site within breeding patch (short-distance dispersal) or move to another breeding area (long-distance dispersal). Here, we assessed an implication of the previous breeding success on breeding dispersal of yellow wagtail (*Motacilla flava*) in Russky Sever National Park (Vologda region, Russia). Based on the large sample of color-marked birds, we estimated adult apparent survival and breeding dispersal distances within 5 km² study plot. We tested: 1) an impact of individual breeding success on adult apparent survival probabilities using multistate mark-recapture models in MARK; 2) an impact of previous breeding success on breeding dispersal distance using linear mixed models in R. We found that the adult apparent survival after successful breeding was significantly higher than after unsuccessful breeding indicating that majority unsuccessfully breeding individuals emigrated from the study area. Breeding dispersal distances within study area were not influenced by the previous breeding success or sex. Thus, the breeding success affected the breeding area fidelity, but did not make significant impact on breeding site choice among wagtails returned to that study plot. Our investigation was supported by the Russian Fund of Basic Researches (18-34-00466).

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Low first-year apparent survival of passerines in abandoned fields

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The first-year survival is one of the key life history traits in migratory passerines. Quantifying this trait is necessary to identify factors affecting population dynamics. Here we used a long-term mark-recapture dataset (2002–2018) to examine apparent first-year survival in three migratory passerines species breeding in abandoned fields of north-western Russia: booted warbler *Iduna caligata*, whinchat *Saxicola rubetra* and yellow wagtail *Motacilla flava*. We examined apparent survival rates of birds ringed as nestlings using Cormack-Jolly-Seber model in MARK. The analysis was conducted for each species separately and within the multispecies approach. Additionally, we tested effect of the fledgling date on apparent first-year survival. Our results showed that apparent first-year survival rates were extremely low in all three species and reached the lower limits known for migratory passerines. We found no species-specific differences in first-year survival. The fledgling date had a significant impact on first-year survival of whinchat but did not affect first-year survival of booted warbler and yellow wagtail. The possible reasons of the observed apparent first-year survival rates are discussed. We assume that observed low values could be determined by the habitat quality in abandoned fields. The study was funded by the Russian Foundation for Basic Research, grant number 18-34-00466 and 19-04-01043.

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Effects of urbanization on nestling diet and reproductive success in great tits

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Habitat urbanization can drastically alters conditions for reproduction in birds. In this talk we report a study in which nestling food availability, nestling diet and reproductive success were investigated over several years in two urban and two forest populations of great tits (*Parus major*). We found that the biomass of arboreal caterpillar, a main component of nestling diet, was significantly (8-24 times) lower over the brood rearing period in urban habitats relative to forests. Great tits have lower clutch size in urban than in forest populations in most years. For their smaller broods, urban parents could achieve a higher average hourly feeding rate per nestlings than forest parents. Average prey size was smaller in cities, while the average hourly prey volume per nestlings did not differed between habitats. However, the diet of urban nestlings contained a significantly smaller proportion of caterpillars then the diet of forest nestlings, which probably resulted in a lower quality nestling food. Nestling body mass shortly before fledging was smaller and starvation-related mortality occurred more frequently in the cities, resulting in a lower fledging success than in forest broods. These results suggest that urban great tit parents cannot compensate fully for the low caterpillar availability during breeding, which significantly reduce their reproductive success relative to forest populations.

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Effect of experimentally manipulated rearing conditions on natal dispersal in blue tit (*Cyanistes caeruleus*)

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Natal dispersal is an important trait affecting fitness and dynamics of individual life-histories as well as whole populations. Avian natal dispersal has been related to genotype or sex, as well as some environmental factors, like date of hatching and fledgling mass. However, we still have relatively poor understanding of processes that affect post-natal dispersal in birds. The aim of our study was to examine whether experimentally manipulated rearing conditions can affect natal dispersal in the blue tit. We used 15 years of data from a nest-box population in the southern part of Gotland, Sweden. In some years, birds took part in an experimental brood-size manipulation. We tested whether worsened rearing conditions affected fledglings' post-natal dispersion patterns. Our results show that birds from enlarged broods more often leave their natal plot (defined as a uniform piece of woodland, separated from other plots by cultivated fields and meadows) and recruit to breeding in a new forest patch. They also have tendency to disperse further than birds from non-manipulated nests. Our analysis confirms that females disperse further than males. Thus, natal dispersal in the blue tit seems to be affected by both external and internal factors.

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The effect of climate and habitat on the breeding phenology of blue tits (*Cyanistes caeruleus*) in the UK.

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Phenological synchrony in food webs is crucial to maximise fitness of higher trophic levels, especially in temperate woodland ecosystems with ephemeral resource peaks. Understanding the cues blue tits (*Cyanistes caeruleus*) use to correctly time their breeding, and their responses to changes in these cues, is of great value in informing predictions on how this species may fare with a changing climate. To date, the effects of climate on phenology have largely been investigated without considering the effects of habitat, and typically confined to a single site or geographic region. For blue tits, their nesting habitat defines the food resources available for chicks later in spring and therefore likely influences nesting phenology and productivity. In this poster I will explore the predictors of blue tit breeding phenology across the UK using nesting data, from the British Trust for Ornithology's Nest Record Scheme, in combination with climate and habitat data. I found there has been an advancement in breeding phenology, since 1980, which is best predicted by temperature and differs with oak density. Given future climate predictions, these findings could have implications on population dynamics, and nesting habitat may not buffer the potentially detrimental effects warming springs may have.

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Predation of the European robin *Erithacus rubecula* nests in the primeval forest (Białowieża National Park, Poland)

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Nest predation is considered as a primary factor causing nest losses of many birds. Using diverse hunting methods, predators can shape birds' nest-site selection and strategies for safe reproduction. The European robin *Erithacus rubecula* is a common and widespread species in Europe and parts of Asia, known for its nesting opportunism. However, most information for robin breeding biology comes from transformed habitats, such as secondary woodland. Białowieża National Park (BNP) is a relic of primeval forest where we can observe robin behavior as a result of natural adaptations. Aims of the study were to identify predators of robin nests and their effect on breeding success in the primeval forest of BNP. The study was conducted in 2017-2019 on the three sample plots, chosen to reflect different forest types, diverse structure and location within BNP. Predators were identified using camera traps installed at robin nests, with regular nest inspections throughout the nesting cycle period to evaluate breeding success. In comparison to other studies, European robins in BNP nested more often in tree-holes and uprooted trees, which appeared unlimited and indicated the primeval nesting choice and strategies for nest defence. A wide variety of predators attacked robin eggs and nestlings, which was the most common cause of breeding losses, and reflected the large suite of potential predators under the natural conditions of BNP.

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Melanin-based plumage ornamentation as a signal of individual quality in the black-headed gull

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The role of melanin-based plumage ornaments in sexual selection and mate choice of birds is gaining increasing recognition. The aim of this study was to assess reliability of a melanin-based plumage ornament (brown hood) as a signal of individual quality in a common larid species, the black-headed gull *Chroicocephalus ridibundus*. The size of hood was measured in over half a thousand black-headed gulls breeding across several colonies in Poland. We found that hood size correlated positively with some components of physiological condition. There was also a negative relationship between hood size and the level of physiological stress, as assessed with leukocyte profiles. These correlations were apparent in males and females, suggesting that hood can provide an honest signal of individual quality in both sexes. In contrast, we found little support for associations of hood size with allelic composition of toll-like receptors (TLRs). As far as we are aware, our study is one of the first to show honest signalling role of melanin-based ornaments in the family of gulls Laridae.

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Birds mortality as a result of collision with acoustic screens during the breeding and non-breeding period in urban and suburban area

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The aim of the study was to analyze the mortality of birds as a result of collisions with acoustic screens depending on the types of acoustic screens, their location, life cycle period of birds and the effectiveness of actions reducing the likelihood of collisions. The research was conducted in Olsztyn city (NE-Poland) and its surroundings - two zone of acoustic screens in Olsztyn (total length –500 m), four zone along the national road E16 (total length –888 m). Transparent panels had a total length of 844 meters, and on 304 meters of their length, silhouettes of birds of prey were glued. The results of fieldwork carried out from May to November 2013 and 2015 were used to analyze mortality. The mortality rate was significant higher outside the city. The most common victims of the collision are the common whitethroat *Sylvia communis*, feral pigeon *Columba livia f. urbana*, and whinchat *Saxicola rubetra*. It was found that the type of acoustic screen has a decisive impact on the mortality of birds as a result of a collision - all birds were found under transparent panels. The average bird mortality rate was estimated at 2.59 individuals/1,000 m/week. During the breeding period, 39 victims (by 15 controls) were recorded, and in the post-breeding period 31 victims (by 17 controls) a result of collision with acoustic screens. There was no evidence of effectiveness of sticking the silhouette of raptors to the level of mortality.

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Age-specific differences in parasitaemia and the influence of haemosporidian infections on survival of sedge warblers *Acrocephalus schoenobaenus*

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Haemosporidian parasites that cause avian malaria, often exert significant impact on various life-history traits and the fitness of individuals. These infections have been shown to lower the host's condition, delay the arrival and settlement of territories, reduce the breeding success and offspring quality. In turn, the reduced condition, loss of migration performance, increased risk of predation on weakened individuals, as well as accelerated senescence (telomere shortening) affect survival. Changes in blood parasitism are often age-dependent. Since the differences in both prevalence and infection intensity between subsequent age classes could result from selection against the most infected individuals, but also from within-individual changes, it is advisable to analyse this pattern using longitudinal data. During the nine-year study, sedge warbler males from the population in the Nida Valley (southern Poland) were mist-netted and blood sampled at spring arrival. Multiple samples collected from the same individuals allowed for the analysis of infection dynamics during the lifetime. A newly developed qPCR assay was applied to assess the infection intensity of SW1 and SW3 *Haemoproteus belopolskyi* lineages, the most prevalent in this population. The infection intensity of both lineages was significantly related to males' longevity. The majority of adults were observed during only one, the first breeding season, which indicates the highest mortality at this age. Survivors had significantly lower parasite load than non-survivors. The decrease in infection intensity with age was related to between-individual changes (selection), but resulted also from differences in parasite load during the lifetime of individual males (immunity).

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Reproductive success related to uropygial gland volume varies with abundance of conspecifics in barn swallows *Hirundo rustica*

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To face pathogen challenges, animals have evolved a broad range of barriers and defense mechanisms to avoid parasite infection and/or to minimize negative effects. Uropygial gland secretion has been proposed to have antimicrobial and antifungal properties, which may potentially influence bird fitness. However, whether uropygial gland secretion may affect the breeding success of birds remains poorly studied. Here, we explore whether the relationship between uropygial gland volume and reproductive success could be determined by the abundance of conspecific in barn swallows (*Hirundo rustica*). We showed that barn swallows with larger uropygial glands had higher breeding success (greater total number of fledglings reared) when living in environments with higher abundance of conspecifics. In contrast, barn swallows with larger uropygial glands had lower reproductive success when breeding in environments with lower abundance of conspecifics. Because a larger number of swallows nesting within the same building may boost abundance and transmission of pathogens, this novel outcome is consistent with a heritable trait that has evolved as a consequence of divergent selection imposed by pathogens.

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Telomere dynamics in relation to brood parasitism in magpies

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Brood parasites exploit their hosts leaving them with the costs of rearing parasitic chicks. The effect of these costs in hosts' survival and longevity remains unknown in many host species. Telomeres are related to longevity and shorten with cell divisions at a rate that is affected by lifestyle and reproduction. Thus, this rate is used as a biomarker of the costs of reproduction in terms of survival. Here, we investigated whether telomere length is associated with age in magpies (*Pica pica*) - host of the great spotted cuckoo (*Clamator glandarius*) - and quantified the costs of rearing parasitized or unparasitized broods in relation to telomere dynamics. We sampled 52 magpies of known age and measured their relative telomere length by qPCR. Moreover, we forced 27 individuals to rear during consecutive breeding seasons one of the following experimental brood treatments: one cuckoo, one magpie or several magpie chicks, and took blood samples before and after the experiment, to obtain a telomere rate of change (TROC). We found that younger magpies have longer telomeres. TROC differed between treatments depending on their initial telomere length: individuals with longer telomeres had smaller TROC when they reared a cuckoo than when they reared several magpies. These results suggest that the costs of parental care and parasitism in terms of survival vary with age in magpies: when magpies are young (and have longer telomeres), rearing a cuckoo is less costly than rearing several magpies. This might have implications in the evolution of host longevity.

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The effect of brood sex ratio on offspring growth

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According to the sex allocation hypothesis, it may be beneficial for the parents to adjust the sex ratio of their offspring to the environmental conditions or their own traits. Indeed, in many species, brood sex ratio correlated with some environmental or parental traits. However, only very few studies attempted to investigate whether the observed brood sex ratios are beneficial in terms of fitness. To study the potential costs and benefits of sex ratio adjustment, we performed a cross-fostering experiment in the collared flycatcher (*Ficedula albicollis*), a species where males have the potential to grow faster under good conditions, but are more sensitive to poor environmental conditions during growth, and show higher variation in fitness than females. Here we present the effects of the experiment on nestling growth and mortality. We expected that nestlings reared in male-biased broods grow slower, but this effect is less pronounced if the original brood of the foster parents was also male-biased. However, our results show that neither the pre- nor the post-manipulation brood sex ratios of the foster parents were related to the growth rate or the mortality of the chicks. The interaction of the two sex ratios had no significant effect either. Further analyses are needed to decide whether the experiment had indeed no fitness consequences or the costs were paid exclusively by the parents.

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Personality traits and their evaluation in the pied flycatcher in natural environment

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The behavioural types in animals could be identified by novelty tests carried out both in artificial environment (open field) and in nature. The pied flycatcher (PF), the favourite model species of European ornithologists, is poorly studied in terms of its behaviour in novel environment. Estimation of the exploration score in the

open field was not successful in this species, perhaps, because of peculiarities of its hunting behaviour. In order to study coping behaviour of PF mates rearing nestlings we used the approach similar to that approved by Garamszegi et al. (2014) on free-living collared flycatcher bachelor males in spring. We estimated the latencies in feeding nestlings and other behavioural features of parents in two consecutive tests: 1) after placing the video camera near nest-box; 2) after attaching a white sheet of paper under the nest-hole. The reaction of birds did not depend on gender and was similar in both tests on within individual level. Within individual integrity of results revealed by two different tests suggests the opportunity to use these field manipulations as a tool for identifying behavioural phenotypes. Details of the experiments and perspective of using these tests are discussed. Financial support was provided by RFBR, grant 18-04-00536.

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Impact of rail and road noise on woodland birds

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The construction of new roads and tracks as well as the modernization of existing ones takes up new areas and destroys natural habitats. It causes high mortality in collisions with vehicles and changes in the distribution in relation to asphalt and rail roads. The influence of many factors, including noise or pollution may adversely affect birds. My presentation show the results of noise impact on birds, emitted by vehicles and trains in forest complexes located in eastern Poland. Intensive traffic along the asphalt road (DK 19 Lublin –Rzeszów) caused a decline in the number and species diversity of birds along the road. Species using low frequencies avoided the proximity of the road, as did species that build nests on the ground or low above the ground. The results of observations carried out along the railway tracks (Lublin-Warszawa) showed a different tendency. The number and biodiversity of birds was greater at the tracks than in the depths of the forest. Insectivorous species preferred the proximity of the railway. This different behavior of birds can be explained by the strong influence of the edge effect, poor human penetration and other character of the noise source. The source of noise along the asphalt road with high traffic intensity is linear, continuous and permanent. While on the railway tracks the source of noise is punctual, fast moving and there are long breaks between traveling trains. Birds easily adapt to such conditions, especially in the situation of abundance of food caused by the edge effect.

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Ethology and breeding biology of marsh harrier (*Circus aeruginosus*) in Lublin Region, Poland

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Marsh harrier (*Circus aeruginosus*) is a bird of prey (Accipitriformes), which occurs mainly in mires, rushes near fish ponds and lakes. Like other harriers, marsh harrier exhibits peculiarities such as strong sexual dimorphism, aerial displays (sky-dancing, flight-play) and food-passing (both in the air and on the ground). Research focuses mainly on the analyses of factors determining breeding success, e.g. phenotypic quality of males, expressing in aerial displays agility. Observations were made in selected habitats (fishponds, calcareous marshes) in Lublin Region (Eastern Poland) in 2018 and 2019. Breeding behaviour analyses involved comparisons between male and female sky-dancing, changes in food-transfer methods during the season. Time budget, inter- and intraspecific interactions, nest site selection factors, breeding success were also observed. First

conclusions regarding factors determining breeding success in marsh harrier were drawn, but the research will be continued during next seasons.

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Sexual differential investment and influence of disturbances on reproductive success of common cranes (*Grus grus*)

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Embryonic development in birds highly relies on parental investment. Eggs have to be kept warm and protected from environmental influences and predators. Parental investment and the effect of disturbances on the breeding biology of common cranes have been investigated in Northeastern Germany from 2016 to 2018. Effects of daytime, state of incubation and different habitats on incubation patterns were analyzed and major predators were identified. Nests of cranes were left unattended for less than 2.5% of the time, whereas natural causes accounted for only 15.8% of cranes' absence. Females spent more time incubating, compared to males (45.4% vs. 39.1%). Incubation during night and early morning was mainly carried out by females indicating that males take higher responsibility for protection of offspring and incubating females by repelling threats, e.g. predators, during these periods. Cranes showed high individual variation in terms of reactions to disturbances. Since most frequently disturbed breeding sites represent least successfully predated sites, we assume cranes to accustom to threats in more frequently disturbed habitats, enhancing probability of reproductive success. Three major predators have been identified, being responsible for the loss of 26.0% of clutches: red foxes (*Vulpes vulpes*), Northern ravens (*Corvus corax*) and North American raccoons (*Procyon lotor*). Whereas ravens and raccoons benefited from cranes' absence, red foxes successfully predated on cranes' nest in the presence of adult cranes. Results indicate that parental experience and reproductive history, as well as age, could have an effect on reproductive success of common cranes.

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Influence of disturbances on the incubation temperature of Eurasian cranes (*Grus grus*) in different habitats

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One of the main consequences of increasing nesting population densities and range expansion of European cranes (*Grus grus*) in Germany is the increasing proportion of individuals nesting in open areas due to the disappearing amount of forested areas. In the last years there have been indications of a reduction in reproductive success in certain areas. We were interested in the challenges faced by individuals nesting in forested versus open land habitats. The different temperatures to which embryos are exposed in both micro-climatic situations as a consequence of behavioural differences shown by the breeding pair or disturbances at each habitat type may play an important role for the reproductive success. In this study we wanted to investigate if there are variations in incubation temperatures in crane nests located in different habitats exposed to different types and levels of disturbances. We recorded daily temperature variations of 17 nests during the breeding seasons of 2016 and 2017 positioning thermo data loggers in and outside nests. We were especially interested in extreme temperature fluctuations and their causes. Therefore, we set cameras to capture information on disturbances and the resulting behaviour of breeding pairs. Conducting lm and glm models we analysed the influence of day time, breeding

period, and habitat type on nest temperature. Preliminary tests indicate that breeding pairs seem to be able to cope with disturbances and variations in the outside temperatures without affecting their reproductive success.

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Colony is not a unit: foraging behaviour of Mediterranean gulls breeding in different neighbourhoods of the same colony

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Bird colonies are often considered as homogeneous ecological units. However, when colonies are split in physically separated nesting areas, distinct sub-colonies can be identified. Whether such fine-scale spatial subdivision of the colony environment leads to behavioural differences between sub-colonies is still poorly known. In this study, we analysed the foraging behaviour of 10 GPS-tagged Mediterranean gulls *Ichthyaeetus melanocephalus* nesting on two spatially separated islets (sub-colonies A and B) of a coastal saltpan. Overall, birds foraged more on land (63% of the trips) than at sea (3%). Probability of land- or sea-foraging was dependent on meteorological and sea conditions and differed between A- and B-birds among different breeding stages. Despite a similar maximum distance of foraging trips from individuals of the two sub-colonies, birds from sub-colony A showed a less marked increase in trip duration over the breeding season. In addition, duration of foraging trip at land was shorter in A- than B-birds. Our results can be explained by two different but not mutually exclusive hypotheses. First, A-birds settled approximately 11 days earlier than B-birds, suggesting higher quality breeders, which were likely better foragers. Alternatively, a differential effort in defending their nests can be hypothesized due to the different interspecific composition of breeders on each sub-colony (mixed colony with another gull species in islet A, and with one tern species and avocets in islet B). This study highlights the need to take into account colony sub-unit structure to comprehensively investigate the foraging behaviour of colonial birds.

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Sex-specific incubation behaviour in uniparental penduline tit

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We investigated the incubation behaviour of female and male penduline tits *Remiz pendulinus* during six breeding seasons, between 2011 and 2016, at the Milicz fish-ponds in south-western Poland. In this species, both males and females may have several mates during the breeding season, and parental care is provided only by one parent, a male or a female. Clutches incubated by a female were more frequent and, on average, larger than those incubated by a male. The temperature in the nest during incubation was similar in female-only and male-only cared clutches. We examined the impact of weather conditions (ambient temperature and wind speed) and progress of the breeding season on male and female incubation behaviour at 74 nests with female-only care and 18 nests with male-only care. Nest attentiveness (total time spent incubating per hour), mean incubation bout length (a single stay inside the nest) and mean incubation recess (period when incubating parent was off the nest) did not differ significantly between females and males. However, the two sexes responded differently to changing environmental parameters. Male nest attentiveness was unaffected by date and weather conditions,

while females spent more time incubating at lower temperatures. Female incubation recess increased with increasing temperature while males shorten recesses in higher temperatures. Both male and female incubation bout length was longer at lower temperatures. Female incubation bout length and incubation recess increased throughout the breeding season.

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Extended phenotype as a signal in interspecific information use

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The extended phenotype entails both the organism's physical body and alterations it induces to its immediate surroundings. Nests are a typical example of extended phenotypes and recent studies have shown that bird nests are an important source of information in an interspecific context. Pied flycatchers use the nests of great tits as a signal for a good breeding site and they gain fitness benefits by breeding close to their potential competitor. However, it is not yet known how great tits' phenotype and visible clutch size affects their settlement decision and what are the full costs and benefits of coexistence for flycatchers. Our aim was to examine how a physical phenotype (tarsus length) of great tits and flycatcher and the clutch size of a great tit explains the choice of a nesting site by pied flycatcher to breed either near or farther away from tit nest and whether there is a fitness consequence for the flycatcher. Our results show that great tits clutch size did not have an effect on the pied flycatcher settlement decision. However, both the tits and flycatcher's physical phenotype had an effect. Small and mid-sized flycatcher females chose to nest near great tit more likely when there was a bigger great tit female present at the site. Additionally, flycatcher females investment to their offspring (egg mass) was greater when there was a bigger great tit female present, regardless of the settlement decision.

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Sex-differences in feeding rate to nestlings in southern grey shrikes in agricultural areas

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The southern grey shrike, *Lanius-meridionalis*, exhibits social monogamy and biparental care of nestlings, but little are known to have sex differential feeding rate to the nestlings or time spent in the nest. In this study, we analysed both aspects in the agricultural area of the Iberian Peninsula. With a video-camera we have filmed 15 nests, 5 on 2008 and 10 on 2010. The nests were selected in a way that: a) They did not meet in the same territory during the two years of study to avoid duplications; b) breeding success: at least one nestling fledged; c) the distance to the nearest nest was >500 m. The percentage of each habitat type was calculated in all nests always within a circle of 250 m as radius. Feeding rate mean value (\pm SD) in the set of 15 nests was 2.33 ± 0.68 feeding h⁻¹ nestling⁻¹ (range 1.53 - 3.59). Feeding rate was significantly larger in females than in males, and males spent less time in the nest than females. There was a significant correlation between female feeding rate and number of chicks in the nest, but there was no correlation with the age of the nestlings, or the percentage of habitat types in the vicinity of the nest. Breeding adults positively selected vineyards and natural vegetation to hunt their prey. Both prey accessibility and prey quality are likely the cause of this behaviour in breeding shrikes.

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Moth and towering song flight serve different function in the black-headed bunting

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Even though the black-headed bunting *Emberiza melanocephala* is a common species in South-Eastern Europe, the knowledge about its biology is mostly lacking. We studied male black-headed bunting song flight display from 2011 to 2016 in Mediterranean Croatia (43 ° 49'N 15 ° 43'E). Throughout the breeding season, male's displays behaviour was noted during 20-minutes standardized observation protocols (N = 323). Songs were mostly delivered from exposed perches, and occasionally during song flights. Two types of song flights were recorded: Moth –standard song produced during a horizontal flight, and towering –specifically structured song produced during ascending/descending flight. Males arrived at the breeding grounds before females and immediately started to sing suggesting that standard song is directed towards other males. Playback experiments with conspecific song triggered a focal male to start singing and to approach the loudspeaker with moth song flight, confirming the role of standard song in territory defence and indicating the role of moth flight as a threat display. The towering didn't commence before female arrival and it was typically performed in the presence of a receptive female, implying courtship as the main function. The towering song was less stereotyped than the standard song and is presumably physically demanding as it necessitates for a male to steeply ascend into the air. A high positive correlation between the number of towering and the number receptive females (i.e. initiated nests) confirmed its role in courtship. We provide, to our knowledge, the first full account of towering song flight of males black-headed bunting.

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Melanism influences the use of social information in a polymorphic owl

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Why some individuals rely on social information when assessing resources, whereas others of the same species disregard such information remains a major conundrum. Melanins are one of the main pigments responsible for most of intra-specific color variation in vertebrates and their variation is often associated with changes in physiological and behavioral traits. Here, we explored for the first time whether melanism is related to individual propensity to use social information in a color polymorphic bird, the scops owl *Otus scops*. We manipulated social information on predation risk at the nest by means of alarm calls and found that nests exposed to a risky treatment raised by brown females produced fledglings with a worse immunology than non-brown females. This effect was due to changes in parental behaviour contingent on coloration because brown females returned earlier to nests but provided smaller prey to owlets than non-brown females when exposed to the risky treatment. These results provide support for a role of melanins underlying intraspecific variation in the propensity to use social information, which could be a previously ignored mechanism facilitating the maintenance of melanin-based color polymorphisms by allowing individuals with alternative color variants perform differently under alternative social environments.

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Birds conceal their eggs as an antipredatory strategy when they detect predator chemical signals

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Predation is the principal cause of offspring mortality during the breeding period. Thus, the risk of predation can determine the reproductive success of birds. However, natural selection has favoured antipredator adaptations to reduce the risk of egg predation and increase the reproductive success. For example, many bird species cover their eggs to hide them from predators. Egg covering as an antipredator behaviour has been generally studied on bird species that nest in open areas, but some bird species that nest in cavities, such as the blue tit (*Cyanistes caeruleus*), also cover their eggs. However, the function of egg covering remains unexplored in cavity nesters. We performed an experimental study aimed to analyse whether egg covering is an antipredator strategy in the blue tit. We simulated an increase in the perceived risk of predation by adding predator scent inside the nest-boxes during the egg laying period. We also added lemon essence (odorous control) or water (odourless control) to other nest-boxes. During the laying period, we visited the nest boxes on alternate days to determine whether eggs were covered and replaced the papers with the correspondent scent. Birds exposed to predator chemical cues in the nest covered their eggs more frequently than birds exposed to an odorous control. Therefore, these results suggest that egg covering behaviour may have evolved an antipredator strategy to reduce the risk of egg predation and increase the reproductive success in cavity nester birds.

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Carry-over effects of developmental conditions on lifetime risk of parasitism and productivity in a cuckoo host

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Early life conditions have profound effects on adult phenotypes and fitness, but these effects have not been yet investigated in the context of obligate avian brood parasitism. Here we hypothesize for the first time that adverse developmental conditions of individual chick hosts may negatively impact on their productivity through an increase in the risk of parasitism during their lives. During 11 years, we studied individually marked magpies (*Pica pica*) in a southern Spain population parasitized by the great spotted cuckoo (*Clamator glandarius*) and we analyse how climatic and rearing conditions experienced as a nestling at the natal nest influenced female's productivity and probability of suffering cuckoo parasitism. We found that females born after warmer winters and hatching earlier in their nests produced less offspring through their life. We also found that females born after warmer winters and sharing the nest with more siblings were more prone to suffer parasitism during their life. Globally, these findings would suggest that early developmental condition may greatly determine host fitness through an increase in susceptibility to suffer the negative effects of brood parasitism and stress the importance of considering carry over effects of developmental conditions of hosts on their interactions with brood parasites.

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Sex roles evolution in shorebirds –cooperation opportunity within ÉLVONAL project

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Sex roles are some of the most diverse social behaviour, since courtship, pair-bonding and parenting exhibit immense variation between and within species. Despite the intensive sex role research over the last decades, significant issues remained to be resolved. We are focusing on shorebirds –an avian taxa that exhibit an unusually diverse sex role behaviour including conventional sex roles and sex role reversal (i.e., females competes for males and the males look after the young). Within the cross-disciplinary ÉLVONAL project that uses behavioural ecology, population demography, comparative genomics and theoretical modelling, we are investigating the causes and implications of sex role variation. By building upon decades of skills, experience and knowledge in various shorebirds, we are carrying out experimental, demographic and genomic projects to separate the roles of ecological and demographic processes on sex roles. This ambitious project started in 2018 for five years that has the potential to go beyond state-of-the-art in sex role research, and it will propose future directions for this research field. To understand the fundamental associations among key components of sex roles: courtship, pair bonding, incubation and parental care, we are investigating dozens of shorebird populations worldwide with help of many collaborators. We are happy to discuss a new prospective cooperation with dedicated researchers enthusiastic about shorebirds. Find more information here: <https://elvonalsshorebirds.com/>.

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Do uninvited pygmy falcons give sociable weavers sleep-deprived nights?

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The direct lethal effects of predators consuming prey are well appreciated. Focus has increased however in non-lethal effects of predators on prey, caused by ‘fear’ or the presence of predators. In birds, predator avoidance behaviours may reduce foraging time and parental visits to the nest and increase vigilance behaviour, which pose fitness costs to the individuals. Here, we present a system where prey are forced to live close to their predator. Sociable weavers build massive colonial nests and African pygmy falcons are obligate users of these nests for year-round nesting and roosting. Coexistence is forced on the weavers, having invested in building a nest that may last for decades. Our study found that yearly falcons occupy 14% of the ca. 300 colonies in our study area. Pygmy falcons sometimes prey on sociable weavers which forces the later to be on alert and alarm call, mob or flee whenever falcons approach the nest. We studied how the presence of falcons influences weavers’ roosting and emerging behaviours. We hypothesize that weavers at colonies hosting falcons reduce their sleeping hours by initiating roosting later at night and emerging earlier in the morning, to avoid encounters with falcons and reduce predation risks. We video-recorded weaver nests with and without falcons, during roosting and emerging. Invariably, weavers would leave the nest, even those already roosting in the chambers, whenever falcons approached the nest to roost. The disturbance created by falcon presence seemed to alter roosting but not emerging behaviours in weavers.

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Distribution of avian communities in a moderately urbanized city

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Urban landscapes are associated with environmental changes that may impact avian communities. Previous studies have shown that avian biodiversity is impoverished in urbanized areas. Surprisingly, most studies have focused on large cities while neglecting cities of medium size. However, these cities are potentially of high ecological value because they are very numerous worldwide and represent a significant percentage of the urban land use. We monitored avian biodiversity in a town of moderate size in Western France (Niort, ~70 000 inhabitants). Birds were counted during 3 sessions on 100 sites covering the town, and the surface of different types of habitat (buildings, roads, green spaces, etc.) was calculated in each site. Species richness and Shannon Index were calculated for each site and we identified the urban landscapes which were the most beneficial to avian biodiversity. As expected, we reported a reduced biodiversity in areas with more pavement and modern buildings, whereas biodiversity was higher in areas with more green spaces. Interestingly, we also found important differences among species: (1) most species were predominantly present in the most “green” sites; (2) some species were found in the entire town including highly urbanized sites; (3) a few species were predominantly found in the most urbanized sites. Overall, our study demonstrates that, even in a moderately urbanized environment, avian biodiversity decreases as the level of urbanization increases. We also found that environmental policies and green spaces are crucial to promote avian urban biodiversity.

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On wings and hooves – impact of grazing by large herbivores on birds in an alluvial environment

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Grazing by large herbivores creates a heterogenous landscape, and heterogeneity usually increases biodiversity. Thus, grazers such as horses and cattle are increasingly used in nature reserves to counteract succession. However, the impact of grazing by large herbivores on birds is controversial. For example, insects attracted by grazers may lead to increased resource availability for insectivorous birds, but trampling of grazers could damage nests of ground breeding birds. We investigated whether space use and movement patterns of horses and cattle predict space use of birds and structure of bird communities in the nature reserve Petite Camargue Alsacienne, France. Our study site is a 32 ha area managed by year-round freely roaming Konik horses and Highland cattle, which were recently introduced into the nature reserve after a former cornfield was transformed into an alluvial environment. We equipped horses and cattle with GPS collars to investigate utilization distribution, and surveyed development of bird communities starting from the time the grazers were introduced. We present first results on changes in bird abundance and community structure related to utilization distribution of horses and cattle.

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Changes in waterbird community structure and functional diversity in shallow lakes: The role of water level and submerged macrophytes

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Water level (WL) and submerged macrophytes are critical elements of shallow lake ecosystems. We analyzed historical mid-winter waterbird survey data, water level measurements and submerged macrophyte records from sediment cores using generalized linear models to explore the effects of these two important factors on community structure and functional diversity of wintering waterbirds in Lake Beyşehir and Lake Uluabat, two shallow lakes in Turkey. A collection of response and effect traits was chosen to calculate functional diversity metrics. Null models were used to obtain standardized effect sizes for the calculated functional diversity measures. We discovered that abundances of omnivorous and herbivorous waterbirds were higher during macrophyte-dominated years in both lakes. The effect of WL was more pronounced in Lake Beyşehir where low WL years attracted significantly more omnivorous and herbivorous waterbirds, and more waterbirds in total. Functional diversity analyses showed that functional richness and dispersion of the wintering waterbird communities were mostly lower than the expected values. Functional evenness and functional divergence showed no patterns. Functional dispersion (FDis) was higher during low-macrophyte years in both lakes, which conformed with the recent discoveries of high FDis in communities of disturbed and fragmented habitats. Our results suggest that macrophyte-dominated conditions in shallow lakes attract more wintering waterbirds, especially herbivorous and omnivorous species, some of which are globally threatened, and that the influence of abiotic and biotic community assembly processes may be changing with environmental conditions as shown by the higher FDis under low-macrophyte conditions.

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The effects of agri-environment schemes on farmland birds – a quantitative meta-analysis

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Agri-environment schemes (AES) serve to reverse long-term declines in farmland biodiversity across Europe by financially supporting farmers who implement defined environmental preservation options. The degree to which AES achieve their goal, however, remains controversial. Individual studies often yield contrasting results, which may at least partially arise due to differences in investigated AES, targeted bird species, landscape complexity, or habitat types. We present preliminary results of a quantitative meta-analysis that synthesizes AES efficiency across a large-scale and heterogeneous literature based on a unified measure of effect size. Beyond a quantification of overall AES efficiency, we investigate how much of the observed effect size variation can be attributed to relevant moderator variables. These include, for example, habitat types (e.g. pasture vs. arable land), AES categories (e.g. abandoned arable land vs. cereal fields, adjusted harvesting schedules vs. conventionally managed fields, wild bird seed mixture vs. game cover), study regions, or the investigated bird species or foraging guilds. Our analysis rests on data extracted from approximately 70 studies that compared bird abundance or species richness (i) between sites with and without AES, following a treatment vs. control design, or (ii) across sites along a gradient of implemented AES, following a correlation design. We expect this survey, first, to identify global patterns in the efficiency of agri-environment schemes and to reveal prominent gaps in research knowledge, and second, to provide conservation practitioners with tools to make better-informed decisions about best-practice AES given their regional set of target species and habitat characteristics.

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Effects of forest management on bird assemblages in the mature oak-beech woods of the Carpathians: undervalued sites for rare species

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Forest management influences the composition and structure of bird assemblages, primarily by changing their habitats. The degree of these changes depends on what type of silviculture system is applied. A majority of studies concern bird responses to silviculture in heavily-managed forests and relatively few concern close-to-nature forest management (e.g. the shelterwood system). In this study, we examined bird assemblages in mature oak-beech forests located in the Western Carpathians (Slovakia and Poland, 2018). A comparison of bird assemblages between unmanaged stands (nature reserves) (N=40 census points) and stands undergoing close-to-nature forest management (N=60) revealed that overall bird diversity was similar and depended primarily on the geographic locality, complexity, and intensity of forest management. In contrast, the species annexed in the Bird Directive of European Union (in this case, five woodpeckers: white-backed, middle-spotted, Syrian, black, and grey-headed, and two flycatchers: collared and red-breasted), were present mostly in reserves, and their diversity depended strongly on the presence of old trees, a high volume of the wood of dead trees, local topography, and forest complexity. Hole-dwellers and insectivores overdominated in the unmanaged forest stands. The abovementioned data show that the mature oak-beech forests of the Carpathians sustain a high diversity of forest birds, even in stands with close-to-nature silviculture. This proves that the shelterwood system is an adequate method for forest management in this type of forest in the Carpathians. However, for an effective conservation of rare and specialized species, strict protection of mature wood stands is essential.

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Assuring the long-term viability of Conservation-Reliant Species: the case of the lesser kestrel *Falco naumanni* and the European roller *Coracias garrulus* in Southern Portugal

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Reactive conservation approaches - only implemented when populations are already endangered and focusing on reversing the impact of threats on the short term - may lead to the need to perpetuate implementation of conservation actions, thus creating conservation-reliant species. In Southern Portugal, lesser kestrels *Falco naumanni* and European rollers *Coracias garrulus* would typically nest in adobe-made human structures, which have a short life-span following their degradation. Artificial nest-sites have thus been provisioned to compensate for the continuing collapse of adobe-made structures, making these species increasingly dependent of conservation actions. Using long-term monitoring data, this study examines the conservation and funding implications of sustaining lesser kestrels and rollers, by evaluating decline rates of adobe-made structures and estimating financial costs of artificial nest-site provisioning. We focused on the Castro Verde Special Protection Area, a UNESCO Biosphere reserve, with increasing populations of lesser kestrels and rollers (577 and 58 pairs respectively in 2017). At this site, 68% of lesser kestrels and 66% of rollers nested in artificial nest-sites. After abandonment, an adobe-made structure will harbour lesser kestrel colonies for ca. 30 years and all existing suitable structures are expected to collapse by 2084. They will have to be progressively replaced by artificial structures, and these must be maintained, so to sustain current population levels will cost about 4.5 thousand €/per year. Increasing ornithological and nature-based tourism in the region has the potential to generate enough revenues for conservation, fostering long-term viability of these species in the area.

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High number of tourists decreases the spatial distribution of hazel grouse (*Tetrastes bonasia*) and predation on artificial nests in a high-mountain habitat (Tatra National Park)

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Human presence and activity can significantly impact and reduce habitat availability for wildlife. We investigated: (1) the distance of sites where hazel grouse (*Tetrastes bonasia*) was recorded from hiking trails and (2) the predation on artificial nests in relation to tourist intensity in two forest types (spruce and beech) in the Tatra National Park (Poland). The study was carried out from 2009 to 2014. Presence of hazel grouse males was detected in spring (April and May). Artificial ground nests (with 5 eggs) were placed during May–June. Each artificial nest was monitored for about 27 days and checked once a week. Eighty seven artificial nests were monitored using camera traps. Number of tourists at all the entrances to the valleys and on the hiking trails was counted. A total of 79 sites where hazel grouse were present were found. The number of occupied sites decreased with increasing distance from the hiking trails and increasing numbers of tourists. One hundred seventy five artificial ground nests were monitored. Fifty nine nests (34%) were predated (mostly by the pine marten (*Martes martes*)). Predation on artificial nests was higher near hiking trails with smaller numbers of tourists and those located far from hiking trails with greater tourist numbers, compared to other sites. Differences in the proportion of robbed nests among spruce and beech forests were not found. We concluded that hiking trails and the number of tourists are important factors influencing the occurrence and reproduction of ground-breeding birds.

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Ecological and ethological determinants of Syrian woodpecker occurrence in urban habitats

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Syrian woodpecker *Dendrocopos syriacus* (SW) is the only European synanthropic woodpecker species, which is also rare and protected under Bird Directive of EU. Biology of SW is well known only for its rural populations. Moreover, data about the coexistence of SW with great spotted-woodpecker *D. major* (GW) are missing. The main topics of these studies were: i) to determine the environmental factors crucial for the occurrence of both species in cities, ii) to evaluate the differences in behavioral reactions of both species in responses to playback stimulation. It was evaluated that niches of these two species overlapped in only 29%. SW preferred scattered woods with a high share of walnuts, fruit trees, poplars and willows, especially of older age. On the other hand, GW chose larger woods (e.g. parks) and could breed also in coniferous trees. Behavioral studies showed that in pairs of SW both sexes defend their territories and that females could be even more active than males (GW did not show such pattern). Moreover, SWs were more active in direct interspecific interactions than GWs. These studies, beside broadening knowledge about ecology and ethology of SW and GWs in urban populations, showed that co-occurring woodpeckers should not be omitted in population research, which are executed on only one of these species in sympatric populations. Moreover, it was proved that urban environments are important and undervalued sites for SW occurrence and that for effective conservation of this species crucial is a maintenance of old orchards and softwood trees.

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Habitat requirements of woodcocks (*Scolopax rusticola*) in the Swiss Jura mountains

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Distribution and population size of the woodcock in Switzerland are declining for reasons hardly understood. Important factors could be changes in forest habitats and management as well as human disturbances or hunting and predation. As part of a VHF telemetry study, we investigated the small-scale habitat requirements of twenty male woodcocks in the Jura mountains throughout two consecutive breeding seasons by comparing habitat composition within and outside of the home ranges. We found that large, heterogenous woodlands providing ample food supply were preferred whereas fragmented woodland areas subjected to high potential human disturbance were avoided. Our study provides important insights into the differential habitat requirements of the woodcock in Switzerland and allows to derive efficient conservation measures.

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Variation in home range size of the white-backed woodpecker

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Knowing a species' area requirements and the mechanisms affecting them is of great importance for developing effective conservation measures. The endangered white-backed woodpecker *Dendrocopos leucotos* is typically found in forests with little or no forest management. Although this species is of high conservation concern and has already been used as a target species in conservation projects, knowledge gaps exist regarding its area requirements. We studied variation in home range size of white-backed woodpeckers in managed forests in western Austria, eastern Switzerland, and Liechtenstein in relation to sex, season, habitat, and local population density. We also tested whether reproductive success (number of fledglings) was related to the home range size during the breeding season. Fifty individuals were fitted with radio transmitters in 2017 and 2018 and data collected throughout each year. The nestlings of each tagged woodpecker were counted shortly before fledging. We used 99% fixed kernel density estimation to estimate home range sizes. Home range size significantly differed between the seasons and ranged from 21 ± 11 ha ($n = 23$) during the breeding season to 107 ± 52 ha ($n = 12$) in fall. Home range size did not differ between the sexes. Home range size during the breeding season decreased with the average volume of standing deadwood and the available forest area in the landscape. Reproductive success was not related to home range size. Our results suggest that standing deadwood and extensive forests should be retained for the conservation of this species.

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Habitat use of flying subadult white-tailed eagles (*Haliaeetus albicilla*): implications for land use and wind power plant planning

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Large-scale construction of wind power plants may threaten large raptors at both individual and population levels. The most efficient way to prevent negative effects of wind power plants is to avoid building on presumably high-risk sites, which requires an understanding of the movement patterns and habitat use of vulnerable species.

We used satellite transmitters to study the movements of sub-adult white-tailed eagles (WTE). We developed an RSF to model their habitat use at the Finnish coast, which holds about 80% of all planned and constructed wind power plants in the country. We made a collision risk assessment by calculating how likely areas are to be visited by WTEs at both planned and existing wind-farm areas. We found that sub-adult WTEs preferred areas close to their natal sites, the coastline and archipelagos. They avoided the open sea, urban areas and other constructed areas such as cottages, industrial areas and agricultural fields. The WTEs flew lower over the sea (median 20m) than over land (median 80m), and time spent flying at risk heights (50–200 meters) was greater over land (28%) than over the sea (19%). Due to preferences for different habitat types and varying flight heights, our estimates of relative collision risks differed up to 1,000-fold at the Finnish coast. This illustrates the power of our resource selection model, which can be used to model WTE flying behaviour and habitat use in any given area and provide useful information for landscape planning when searching for the safest areas for wind-energy development.

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Where behavioural studies and conservation meet: synchronizing artificial ponds management with the black stork's (*Ciconia nigra*) fall passage foraging patterns

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Decline in numbers for long-distance migrants has been lately approached from the migrational costs point of view. Detailed knowledge on feeding ethology and responses to anthropogenic distress at man-managed stopovers is where behavioural sciences and conservation policies overlap. To disclose factors shaping the inherent foraging habitat selection mechanisms of a species is essential. Several studies have addressed this issue with regards to black storks's conservation (epitomic "umbrella species", frequent fall passage migrant at man-managed wetlands), but understanding the species intricate behavioural mechanisms calls for more information. We described and assessed black stork's foraging patterns in relationship with exogenous factors (water level, human activity) at the species' most important fall passage stopover from central Romania: Dumbrăvița fishing complex, to maximize the ponds' stopover potential. Foraging groups were recorded and monitored weekly during evening feeding sessions (16:00-18:00) for two consecutive fall passages (August-September; 2017, 2018). Foraging diurnal pattern was fish harvesting-correlated, comprising two main feeding periods: morning and afternoon. Active evening feeding peaked around 17:00 and after 17:30 (harvesting activities dependent). One particular group pattern (line feeding), two foraging techniques (grabbing –visual prey location; probing –tactolocation) and agonistic interactions were recorded. Visual techniques dominated in terms of frequency and allocated time. The number of attempts for each feeding strategy was water depth dependent. Foraging areas were distributed accordingly to drainage management decisions and the species preference for vegetated perimeters. Available resources tallied with the species' cyprinids proclivity. We propose several measures for synchronizing management practices with the species ethological needs.

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International actions to conserve the European turtle-dove *Streptopelia turtur* –implementing the Species Action Plan

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With a >30% decline across Europe since 1998, the European turtle-dove is considered globally threatened (IUCN: VU) and a conservation priority. A 2018 International Species Action Plan (SAP) identified habitat degradation (on breeding and wintering grounds), illegal killing and unsustainable hunting as the main drivers of population decline. Ongoing international actions contributing to the implementation of the turtle-dove SAP include: Diagnostic mapping at flyway scale to chart the geography of migration, mortality and abundance, leading to the identification of priority areas for intervention; Research into the links between population trends and land cover to find common landscape features that help or inhibit turtle-dove recovery; Addressing unsustainable hunting through adaptive harvest management; Identification of research needs and opportunities. An International turtle-dove study group, linked to the Migrant Landbird Study Group (MLSG), is convened to promote research on turtle-dove breeding biology and on population and movement ecology (including tracking), to facilitate the exchange of information and to support joint projects. The group will work collaboratively to define a research agenda for the species, to establish geographical and thematic investigation priorities and to identify funding opportunities. It aims to provide a vehicle for researchers, conservationists and interest groups to take part in the conservation of a priority species.

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Long-term telemetry study of reintroduced ural owls *Strix uralensis* in the Duerrenstein Wilderness Area, Austria (IUCN Category I, UNESCO World Heritage Site)

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In the first half of the 20th century the ural owl *Strix uralensis* became extinct in Austria. In 2008 a project was started to reintroduce the owl to Austria's woodlands. The Duerrenstein Wilderness Area (IUCN Category I, UNESCO World Heritage Site), including Spruce-Fir-Beech Primeval Forest Rothwald, is a natural mountainous forest, rich in deadwood and rich in natural breeding cavities for owls. Therefore, it was chosen as one of two release sites. In the Wilderness Area long-term telemetry is used to monitor success and to learn about ural owls' habitat selection, foraging preferences, breeding success and dependence on beech mast and rodent cycles. From 2009 to 2018, 154 owls were released in the Wilderness Area. 14,210 daily owl positions and 16,800 kilometers of movement have been registered by 114 transmitters of three telemetry systems: radio telemetry (n = 64), satellite telemetry (n = 3) and since 2014 GPS-GSM-telemetry exclusively (n = 47). For the release the ideal age of around 90 days was determined. Movement routes of up to 150 km, survival rates of about 75% in the first year after release, and various causes of death (*e.g.* predation by golden eagle) were recorded. Since 2012, ural owls were found breeding in nest boxes. With telemetry, several ural owl broods were found regularly in natural cavities in maple and beech trees since 2014. First priority is raising awareness for the importance of deadwood and natural breeding cavities for biodiversity and breeding success of owls.

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Wetland management: the impact of reed height on migratory birds

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Taiwan is located along the route of migratory birds in East Asia, and the Shezidao peninsula is an area where migratory birds frequently visit. Based on ecological restoration strategy, constructed wetlands were built on low water revetment in this area to increase the habitat diversity. However, due to the changeless condition of

hydrology, common reeds became the dominant species in the wetland, so the diversity of wetlands has been decreased. This study observed the relationship between the growth state of common reeds and the activities of migratory birds with habitat management, and proposed the highest efficiency of habitat management. This research removed 38.96% of the reeds in the wetlands one month before the migratory birds arrived, and continued to record the growth rate of the reeds while bird surveys were conducted. The results showed that the migratory birds of the *Charadriidae* and *Scolopacidae* family had adapted to different reed heights. The peak number of *Charadriidae* birds recorded was 60 at an average reed height of 89.68 cm, while the peak number of *Scolopacidae* birds recorded was 35 at an average reed height of 134.21 cm. The number of migratory birds decreased with the growth height of the reeds and the regression analysis showed a significant negative correlation ($P < 0.05$). Hence, in the management of wetlands, it is recommended that under the condition that hydrology cannot be changed, overgrowth of common reeds is necessary to be continuously monitored and managed in order to prevent a reduction of bird biodiversity.

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Socioeconomic impact and effects on biodiversity of the yellow-legged gull population in a Natural Park of SE Spain

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Yellow-legged gull population has considerably increased during the last decades in “Salinas y Arenales de San Pedro del Pinatar” Natural Park (SE Spain), as in many other areas of Central and Western Mediterranean Sea. Near this natural area, there are very predictable food resources available as tuna farms and trawlers in the Mediterranean Sea or refuse dumps in land. The Natural Park hosts important breeding bird colonies of other 9 species of seabirds and waders for which the site is Ramsar wetland and SPA. Since 1994, location and number of breeding pairs of colonies has been recorded. Since then, the area where the colonies are located (excluding those of yellow-legged gull) has decreased from 406 in 1994 to 85.4 ha in 2016 (79%). This is directly related to the habitat loss for breeding as the vegetation coverage has increased in a large part of the area due to the fertilization of the soil caused by the gull faeces. Since 2000, mitigation measures to control the yellow-legged gull population have been implemented. These measures have probably allowed the breeding of lesser species reducing predation rate or kleptoparasitism, but they have not prevented the decrease of the surface where the colonies are within the Natural Park, which is becoming smaller. Increase of the yellow-legged gull has also socioeconomic impacts in the saltworks that are in the area since part of the salt production must be discarded because of risk of contamination by *Listeria* and *Salmonella* sp.

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Climate change and vagrant birds on Svalbard

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An increase of the average annual temperature in the Arctic in the 21st century is a proven phenomenon. Average annual temperature on the Svalbard has increased by 2–4 degrees. The Svalbard avifauna has increased by 54 species since 1988. An indicator of climate warming is increasing of the frequency of occurrence of vagrant bird species on archipelago. Our research was carried out in the Barentsburg in 2004–2018. Several vagrant bird species were recorded during this period. A steady positive trend of the Mallard records is established. Only males were recorded before 2010. Females and sometimes pairs were recorded during the breeding season in the

last years. Until now the reproduction of this species on Svalbard has not been recorded. Our observations in 2017 revealed a group of two males and female, which during the breeding season was staying and did not breed in the vicinity of Barentsburg. Nevertheless, it is possible to conclude that the active penetration of this species on Svalbard may lead to the appearance of sporadic breeding cases on the archipelago in the nearest future. The number of the Waxwing records has increased. We registered the Bullfinch male in 2016 and the Alpine chough in 2018 for the first time. Thus, the number of vagrant species and the frequency of occurrence of some usual vagrant species increase on Svalbard during last years on the background of climate warming. Study supported by MMBI projects.

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Number and abundance birds on the territory of Omsk Airport

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At present, we have noted 24 species of birds on the territory of Omsk Airport. The Eurasian tree sparrow, house sparrow, carrion crow and the forty dominate in abundance. The most dangerous of this list are 13 species: western jackdaw, rook, Buteo, European honey buzzard, montagus harrier, pallid harrier, carrion crow, the black-headed gull, Caspian gull, grey partridge, carrion crow, rock dove and magpie. Thus, over the twenty-six-year research period, the total abundance of birds in the territory of the Omsk airport remained virtually unchanged. Generally we can say that species richness increased in 4 times, when we compared 1987 and 2013. It means that this process has been affected by migration and increased feeding of the territory of the Omsk airport for migratory predator birds, whose abundance has increased in the post-Soviet period after the abolition of the use of herbicides in agriculture. When we speak about abundance on the territory of Omsk Airport, we marked that the maximum total abundance of birds was in autumn 2013, e.g. in the second half of October (296 birds) and in the second half of November (262 birds). This is explained in the first case by a significant concentration of migratory birds from the north-east of Northern Eurasia on the territory of Omsk Airport. In November, the increase in bird abundance is explained by the accumulation of local corvidae and passerine birds during intra-aerial migrations in the urbanized territory of Omsk, which has an increased feeding capacity and a protected airport regime.

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Project Owl: long-term monitoring of a nocturnal species of national conservation concern

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Tawny owl (*Strix aluco*) is a species of conservation concern in Great Britain. Estimated population trends from large scale breeding bird surveys suggest a shallow continuing downward trend since the 1970s. However, as with other nocturnal species they are poorly monitored by standard daytime surveys leading to the BTO carrying out two targeted complementary surveys with different levels of participation and structure. The 2018 Tawny Owl Point Survey was the third of similar surveys carried out in 1989 and 2005 and consisted of multiple visits to random preselected tetrads, conducted within the two hours after sunset between mid-August and mid-October. The point survey aimed to estimate trends in range, geographical patterns and habitat association with particular reference to urban and forestry cover. By using occupancy models we estimated detection and occupancy probabilities and their habitat associations. We also examined extinction and colonisation rates

between the surveys and whether these differed between habitats. The Tawny Owl Calling Survey 2018/19 was the second of a similar survey carried out in 2005/2006 and consisted of asking citizens to listen for owls from gardens and other self-selected locations for one evening a week for as many evenings as they could for six months. The calling survey was aimed at assessing the impacts of urbanisation, weather conditions and other factors on tawny owls' calling behaviour and our ability to detect their presence. Here we present results from both of these surveys as we seek to better understand the status of tawny owls in Great Britain.

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Changes in modern status and numbers of Eurasian collared dove *Streptopelia decaocto* (Frivaldszky, 1838) on the North of Ukraine

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Eurasian collared dove during its breeding expansion in Eastern Europe according to the literature sources reached Western part of Ukraine (Transcarpathian region) in the middle of 20th century (1944). Until the end of 60s, this species settled in the whole territory of the country and as a typical synantropic species started to occupy different human settlements. The maximum numbers in its breeding sites the dove reached in the end of 20th century when it was recorded not only in large and small towns but also in each village. Although, according to our observations, during the last decades the rapid declining of this species numbers started especially on the North of Ukraine (in the Forest zone) where along this time, on the contrary to the southern Steppe zone, the birds disappeared almost totally in the villages and rapidly declined their numbers in the towns. As a possible reasons of this phenomena the natural numbers stabilization after its rapid increasing is among them but also the increasing of natural enemies of the doves –hooded crow *Corvus cornix* (L., 1758) and other predators.

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Nuclear genetic analysis reveals shallow population structure in the European golden eagle (*Aquila chrysaetos*)

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Connectivity and gene flow between populations of the golden eagle (*Aquila chrysaetos*), an iconic apex predator and umbrella species, are poorly understood. Field studies that explore the natal dispersal of golden eagles picture this raptor as a philopatric species, but with the ability to roam far. Our population genetic study is based on 14 microsatellite loci and is complemented by novel and previously published mitochondrial DNA (mtDNA) data. The present dataset includes 121 eagles from Scotland, Norway, Finland, Estonia, the Mediterranean and Alpine region. Our sampling focus lies on the Alpine and Mediterranean population as both mtDNA lineages found in golden eagles –the Holarctic and the Mediterranean one –are known to co-occur there. Cluster and structure analyses of nuclear DNA support a shallow split into Northern (Scotland, Norway, Finland and Estonia) and Southern populations (Mediterranean and Alpine) in Europe, similar to the distribution of the two mtDNA lineages. Additionally, Scotland shows significant differentiation and low relative migration levels

that indicate genetic isolation from the mainland populations. Alpine and Mediterranean golden eagles that are known to harbour two divergent mtDNA lineages do not show a corresponding structuring in the nuclear genome but form a largely homogeneous gene pool with little evidence of structuring, indicating that the presence of Northern Holarctic mitochondrial haplotypes is due to past admixture rather than recent long-distance dispersal. Although not conclusive with respect to taxonomy, our data do not support the presence of a distinct subspecies in the (Western) Mediterranean.

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The breeding bird atlas of Bucharest (Romania): Preliminary result

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Nowadays, birds are in danger because of urbanization, a process with a negative impact on habitats and wildlife. Adaptation is the key of successful evolution and so, birds are conquering new territories such as urban areas. Because of urbanization and other negative impacts human have on wildlife, conservation of urban birds is starting to be a necessity. Urban bird atlases offer solid information about the distribution and breeding status of birds and can help in urban planning, education, research, pest control and many other fields of work. In Romania, the first urban atlas was accomplished for Cluj city in 2017. Our study will give information about birds from the capital city, Bucharest, the biggest city in Romania. Fieldwork was conducted with the help of volunteers in the period of April-May, from 5:00 to 10:00 AM, starting from 2016. Data was collected from squares of 1x1 km, summing a total of 54 complete squares in 2018, from 251 squares covering the whole city. At the end of 2018, 184 bird species were identified inside the city limits and over 12.000 observations were made. Occasional observations and data from artificial nests were accepted too. Because of the small number of recorders, we divided the squares into two classes of importance, main area which includes a total of 109 squares inside a buffer zone of 6 km from the city center and a secondary area for the rest of the squares, focusing our efforts to finish the squares from the main area.

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Contrasting heterozygosity-fitness correlations across life in a long-lived seabird

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Selection is a central force underlying evolutionary change and a dynamic process that can vary in strength and direction, for example across time and space. The fitness consequences of individual genetic diversity have often been investigated by testing for multilocus heterozygosity-fitness correlations (HFCs), but few studies have been able to assess HFCs across life stages and in both sexes. Here, we test for HFCs using a 26-year longitudinal individual-based data set from a large population of a long-lived seabird (the common tern, *Sterna hirundo*), where 7,974 chicks and breeders of known age were genotyped at 15 microsatellite loci and sampled for life-history traits across the complete life cycle. Heterozygosity was not correlated with fledging or post-fledging prospecting probabilities, but was positively correlated with recruitment probability. For breeders, annual survival was not correlated with heterozygosity, but annual fledgling production was negatively correlated with heterozygosity in males and highest in intermediately heterozygous females. The contrasting HFCs among life stages and sexes indicate differential selective processes and emphasize the importance of assessing fitness consequences of traits over complete life histories.

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DNA methylation is associated with environmental variation: a case study of urban and rural birds

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Changes in DNA methylation are expected to facilitate more rapid adaption to changing or novel environments, compared with slow changes in gene sequence. Environmental cues can induce and remove methylation, resulting in changes in gene expression and subsequently phenotypic traits. There is increasing interest in the potential for DNA methylation to mediate adaptive phenotypic change and explain individual variation at the level of the phenotype, yet there are still relatively few studies in natural populations. We have previously shown evidence for variation at the transcriptomic level – i.e. gene expression - in blood and liver tissues, which corresponds with functional variation in physiological traits, between urban- and rural-dwelling great tits *Parus major*. Here, we investigate the potential role of DNA methylation in mediating ecological effects associated with the urban environment. Reduced representation bisulphite sequencing revealed a large number of differentially methylated sites between urban- and rural-dwelling great tits. Many of the differentially methylated sites occur within functional genomic regions - e.g. promoters, transcription start sites, gene bodies - consistent with the hypothesis that changes in DNA methylation are induced by the environment. We discuss the functional significance of the observed variation in methylation and the evidence for DNA methylation as a mediator of environmental adaptation.

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Effectiveness of scaring off the insects and variation of tail-color in slate-throated whitestart *Myioborus miniatus* (Swinson, 1827) –the effect of adapting to the environmental conditions?

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Myioborus genus have a diverse proportion of white and black in the coloration of the tail. slate-throated whitestart has specific hunting behavior, consisting of a scare of insects with the movement of the tail spread and then fast pursuit and capture of fleeing insects (flush-pursuit predators). The coloration of the tail is treated as an adaptation to the effective prey, which should be subject to selection pressure depending on the lighting conditions in feeding sites and the visibility of the tail by insects. An experiment was carried out to verify the hypothesis about the relationship between tail coloring and feeding strategies in the cloud forest on eastern slopes of the Andes (altitude c.a. 2050-2150 m) near the YanaYacu Biological Station & Center for Creative Studies, Napo province, Ecuador. An insect scare experiment was carried out using three tail models: 1) typical for the slate-throated whitestart from Ecuador, 2) with an increased proportion of white, 3) dark, without white. The insects (*Homoptera* and *Diptera*) were scattered, measuring the distance of insect escape from the model, recording the lighting conditions, temperature and humidity in foraging sites. The greatest distance of insect escapement was found using a model with a typical colored tail model of *M. miniatus* from Ecuador, only in the case of a low level of reflected and stagnant light. The results of the experiment confirmed the pattern of coloration to the efficiency of scaring - perhaps this is the result of feeding strategy of birds in places with low light levels.

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Spatio-temporal diversification of the pale sand martin complex

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Pleistocene climate fluctuations have strongly influenced biodiversity patterns by altering species distributions and promoting population diversification and speciation. The pale sand martin *Riparia diluta* is distributed in heterogeneous environments in Central and Eastern Asia with four subspecies breeding at a broad range of elevations from the lowland of South China (80m) to the Qinghai-Tibetan plateau (above 3500m). The different subspecies have distinct mtDNA lineages and their divergence happened under the influence of Pleistocene glaciation cycles during the last million years. Thus the pale sand martin complex provides a promising system to study regionally differential impacts of past climatic change on population diversification along the speciation continuum. To disentangle the role of geography on genome wide variation, genomic data was generated using GBS (genotyping by sequencing) for different populations of three pale sand martin subspecies. Genome-wide variation revealed a clear separation between the lowland populations from South China (*R. d. fohkienensis*) and high latitude populations from the Qinghai-Tibetan plateau (*R. d. tibetana*) and Northern Central Asia (*R. d. diluta*). There is no sign for gene flow between populations of *R. d. fohkienensis* and *R. d. tibetana* in their parapatric region. All populations are genetically more similar within than between subspecies indicating that the divergence is not the result of isolation by distance. While *R. d. diluta* and *R. d. tibetana* show distinct mitochondrial lineages, there was no clear genome-wide separation between them. Further analyses will focus on inference of the demographic histories of the different subspecies.

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Assessing the potential of Sentinel-2 imagery to monitor habitat dynamics of endangered grassland waders

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Most populations of grassland waders are amongst the most threatened bird guilds in Europe. Earth Observation (EO) data and Remote Sensing (RS) technologies offer an excellent opportunity to monitor processes that are essential for species conservation. The new Sentinel-2A satellite provides Earth images at higher temporal, spectral and spatial resolution than other sensors. Here, we assessed the potential of Sentinel-2 imagery to monitor habitat dynamics of an endangered grassland wader in Iberian Peninsula —the common snipe (*Gallinago gallinago*). An appropriate monitoring system for the species must account for water-vegetation dynamics during the breeding season. To do so, we first computed the Normalized Difference Vegetation Index (NDVI) and the Normalized Difference Water Index (NDWI) from Sentinel-2A images for each bi-monthly period throughout the breeding season. Then, we created a new set of variables to describe the intra-seasonal water-vegetation dynamics: (1) mean values of the breeding season for each index (as productivity indicator), (2) the coefficient of variation and (3) the deviation (as seasonality indicators), (4) the minimum value (as limiting factor) and (5) the maximum value for the breeding season (as indicator of ecosystem carrying capacity). Habitat suitability models were calibrated using the intra-seasonal water-vegetation variables at the contact level (N =

211) and projected at the native spatial resolution of Sentinel-2A imagery (10 m). The local water-vegetation dynamic models showed a good predictive ability (AUC = 0.849, Boyce index = 0.976). This study evidences that Sentinel-2 time series provides an excellent opportunity for cost-effective monitoring of endangered grassland waders.

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Taking the measure – Quantifying observer knowledge to improve detection parameters in niche-models

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One of the greatest factors influencing detection probability are the observers' ability to spot and identify different bird species. While including the observer as a factor in trend and distribution modelling, as well as accounting for the first-time observer effect partially address differences in detection, none of these methods takes into consideration the species-identification skill and the learning-curve associated with it. Hereby we present an index used in our relative abundance models for the Romanian Breeding Bird Atlas. Each survey plot used in the model was assigned to one of 9 ecological regions, assuring a certain amount of species-homogeneity. The index was calculated based on the total number of species observed and plots surveyed in the respective region, taking into account not only the number of species observed, but also the number of plots visited by each observer, thus being more forgiving in the case of observers with few plots. Using the cumulative number of species observed for each year, the index also reflects the learning-curve of the observers. In our models, in order to cover most aspects of the observer-related variance, we also used the cumulative number of data collection visits, thus quantifying our field-workers' growing experience with the survey method. These two variables not only got a generally high score when ranking the variables by importance, but also seemed to improve our models.

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Common quail seasonal migrations and global climate changes

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There are some differences in term of going of definite stages of biological phenomena in some countries in connection with global climate changes. Even the forecast was made how the distribution of breeding birds in Europe will be after 100 years (Heath, 2000). So logically the question arises –are there any tendencies in the terms of common quail *Coturnix coturnix* L. migration in Ukraine? On the base of own data collected during 40 years (1975-2015) and literature data (Radionov, 1970; Tavrovsky, 1980) we tried to answer the question. All phenological data were divided in to two periods 20 years each for comparison. As a result, we got four excerpts –two for spring two for autumn migrations. Because of the analysis, we got the following: the early arrival is observed in four regions of Ukraine (Chernigiv, Vinnytsya, Poltava and Zaporizhzhya) and in five regions

(Khmelnys'tk, Dnipropetrivs'k, Odesa, Kharkiv and Lviv) it started to arrive later. According to our studies the common quail started to depart considerably early in six regions (Kyiv, Zaporizhzhya, Dnipropetrovs'k, Kirovograd, Poltava and Cherkasy) and in the contrary later in 10 regions (Volyn', Zhytomyr, Sumy, Ternopil', Crimea, Donetsk, Lugansk, Mykolaiv, Odesa and Kharkiv). Therefore, our studies showed that during the last 40 years the terms of Common Quail migration has been changed in different ways in different regions. Why so? Because climate changes means redistribution of temperature and humidity among different regions.

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Spatial organization of the bird in steppe zonobiom of Northern Eurasia (Western Siberia and Northern Kazakhstan)

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There are three related systems of population: undeveloped land, built-up areas and wetland communities. The first of them form a community floodplain: meadow-steppe, field and floodplain meadow types. The second - the population of birds, lowland marsh, lake and river: Irtysh and Tobolsk types, the third - synanthropic ornithocomplexes. Major trends of territorial changes in abundance and distribution of birds in the forest and steppe in the first half of summer determine of afforestation plowing, humidification, wetlands, water content and flow of water bodies, as well as built-on area, ruderal and anthropogenic habitats increased food capacity of cities and towns. Increase in built-up and the appearance of landfills increases the density of the population of birds. Territorial heterogeneity of bird population research in forest and steppe in the second half of summer (from July 16 to August 31) is determined by forestation, building, water area, wetlands, human food resources, plowing, ruderal and largest city. Seasonal differences between the structure of bird related to the post-breeding dispersion of species and late birds migrations. Afforestation water cut and wetlands remain valid. Differences in the impact of zoning and heat supply landscape is not significant. This emphasizes the dominant influence of agricultural and residential load on forest-steppe and steppe landscapes, reducing landscape-geographical boundaries between the steppe and forest-steppe. Thus, in I and II part of the summer the main territorial changes of birds population in steppe of Western Siberia and Northern Kazakhstan are similar and related to human food resources, afforestation, moisture and water habitats.

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Sex-specific migratory strategies in a long-lived seabird?

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Migratory seabirds spend most of their non-breeding period offshore, which makes it difficult to study their behaviour during this time. Miniaturized light-level geolocators, however, allow tracking of small seabirds, such as common terns (*Sterna hirundo*), to study their spatial behaviour during migration and in the wintering area. Using these devices, a pilot study recently showed that common terns from our long-term study population, located in the Banter See at Wilhelmshaven on the German North Sea coast, use the East Atlantic Flyway to reach their wintering areas at the West African coast. This study also suggested that wintering areas may differ between males and females, but the sample size was very small. In our follow-up study we collected extensive and repeated data of individuals across three years (>70 tracks from 28 males and 24 females), which we will

use to provide detailed insight into the migratory routes of common terns and to establish whether there are sex-specific wintering areas. Such knowledge is crucial for assessing environmental effects on sex-specific survival, as well as carry-over effects of migration on phenology and reproductive performance.

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Tracking long-distance migration of the black-headed bunting *Emberiza melanocephala* along the Indo-European flyway

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The black-headed bunting (*Emberiza melanocephala*) is a long-distance migrant of the Indo-European flyway, with poorly known patterns of migration. From 2014 to 2017, we equipped 60 Black-headed Bunting males with the light-level geolocators on breeding grounds in Croatia. Here we present geocator data from 16 recaptured birds to provide the first insight into the migration routes, staging and year-round phenology of the species. After leaving the breeding grounds in mid-July birds reached the 6200 km distant Central Indian non-breeding sites (Maharashtra) in approx. two months. The individual birds stopped-over 4–9 times and each migration leg was on average 1032 km long. Main post-breeding stop-overs were distributed in Balkan peninsula (mostly Greece), Central Anatolia (Turkey), Zagros Mountains (W Iran), Indus Valley (Pakistan) and Gujarat (W India). The return trip in spring was twice as fast, starting in early April and ending at the beginning of May, with 3–4 stopovers distanced 1457 km on average. These stopovers were distributed along the coast of the Arabian Sea and the Persian Gulf, Mesopotamian plain and Mediterranean coast around Balkans. Pre-breeding migration routes were significantly more southern compared to post-breeding, resulting in a clockwise loop migration. Individual migration patterns indicated that Iranian plateau is an ecological barrier during the post-breeding migration, while on the pre-breeding migration birds seem to take advantage of irrigated agriculture fields to cross the deserts of the Arabian Peninsula.

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Understanding individual differences in migratory behaviour: the first southward and northward migrations of juvenile black-tailed godwits

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Previous tracking studies show that black-tailed godwits (*Limosa limosa limosa*, hereafter “godwits”) breeding in The Netherlands winter both north and south of the Sahara. They spend 2–93 days migrating south to these sites, and after the wintering period depart for the north over a long, five-month period. Repeated measures of individuals show that these considerable timing differences between individuals are consistent across years (repeatability is >0.85). This leads us to ask how these consistent differences arise—through genetic differences, plastic differences, or both? To investigate whether these large differences in migratory behaviour are the result of different developmental trajectories, we outfitted 40 juvenile godwits with satellite transmitters in 2016 and 2017. Here, we present the first southward and northward migrations of these juveniles and compare them to the migration of breeding adults. Compared to adults, juvenile godwits departed from The Netherlands later, flew non-stop to West Africa more often, and had higher mortality. Interestingly, the date on which juveniles started migrating south correlated positively to their hatching date. One juvenile migrated north in its first year,

while most waited until their second year. One did not migrate north until its third year. Juveniles migrated later than adults, had a higher mortality, and used a variety of routes including some that differed from adult routes. Finally, we relate first northward migration to first southward migration and explore whether differences in the timing and route of northward migration can be explained by different developmental trajectories on first southward migration.

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Towards understanding isotopic niches throughout the distribution ranges and annual cycles of migratory birds

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Ecological niche is defined as a multidimensional space whose dimensions are expressed by environmental variables. By analogy, isotopic niche is a multivariate space defined by stable isotopic ratios of elements which describe various characteristics such as prevailing photosynthetic pathway of primary producers in the ecosystem or trophic level of the consumer at the time of tissue growth. Migratory species move between their breeding and non-breeding ranges twice a year and frequently spend more time on their non-breeding grounds. On the contrary, niche use is usually well known only from the breeding grounds because non-breeding niche use has been directly tracked only in a few breeding populations of a limited number of species. To fill this gap of knowledge, we are planning to compare multi-isotopic niche position and breadth (between species, among individuals within species, and within individuals) and distribution of individuals within the niche in five long-distance and five short-distance migrants sampled across their breeding range. The extent of niche switching or tracking will allow us to answer questions regarding the year-round specialization of species and impact of breeding latitude on niche use throughout the annual cycle. Ultimately, the information on niche tracking between the seasons could help us better understand impacts of climatic changes on demography of migratory populations and target conservation efforts on both breeding and non-breeding grounds.

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The role of wind in Cyprus wheatear migration

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Migrating animals should minimise time and energy when migrating, travelling directly to their destination, with time generally being minimised in the pre-breeding migration. Detours from the most direct route may arise however because of barriers and weather conditions. Here we used 13 geolocators to follow Cyprus wheatears for their full annual cycle in two separate years migrating between Cyprus, over the Mediterranean and the Sahara to winter in north-east sub-Saharan Africa. We predicted that spring migration would be quicker than in autumn, and that any route detours would be related to wind conditions experienced during migration. Against our first prediction, we found that spring migration was slower than in autumn, taking 17 ± 4.5 days compared to 2.6 ± 0.9 days. Spring migration for all birds included an eastern detour, whilst autumn migrations were direct. The faster autumn migration is likely a consequence of consistent tail-winds that follow a rapid and direct crossing of the Sahara, but in spring the same winds are against a direct migration and so the birds most likely follow an eastern detour that is more efficient given the wind conditions, and may also allow short stop-overs and refuelling opportunities that may be necessary, but unavailable, when crossing the Sahara directly in a headwind.

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Investigating peregrine falcon (*Falco peregrinus*) migratory connectivity in the Americas using mark-recapture data from Peru

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The connections between migratory birds' breeding, migration routes, and wintering areas have important implications for avian population demographics, conservation, and evolution. Among the world's most widespread migratory bird species, the peregrine falcon (*Falco peregrinus*) has been the subject of intense study on its breeding grounds and migratory stopover sites but few data are available on its migratory connectivity and wintering ecology in South America. Peregrines in Peru include both Nearctic migrants and resident birds. Using mark-recapture data collected between 1982 and 2015, we present the first evidence connecting wintering Nearctic peregrines in Peru with their natal and breeding territories in North America. We report 208 captures of peregrines in Peru with natal origins in North America, including banded birds from Alaska and Minnesota as well as a captive-bred individual from Nebraska that may represent the longest known migration resulting from a species reintroduction program. We also report new records of wintering peregrine arrivals in Peru that represent an advance of ~2-3 weeks compared to the earliest previously published reports. Peregrines exhibit differential migration, where birds of different ages and sexes exhibit spatial and temporal differences in their migratory behavior. Previous research suggesting Nearctic peregrine males average much greater migration distances than females is consistent with the male majority (72%) we found in our sample of Nearctic peregrines in Peru. These findings provide new insights into peregrine migratory connectivity and wintering distributions and highlight the success of reintroduction efforts of this species following its extirpation from eastern North America.

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Early autumn water birds gatherings in southern part of the Kyiv reservoir

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The Kyiv reservoir plays important role for seasonal bird movements. While the diurnal birds of prey, pigeons, passerines and some others migrate along the water body's banks, the water birds migrate mostly during the night and in a daytime they rest on a water surface forming the gatherings of many species. The counts of such gatherings allow indicating their species abandons numbers and terms of migration of definite species. Our counts we conducted during the end of July until the beginning of October in 2013-2018. Therefore, the counts we focused on early autumn gatherings. During the counts, 4615 birds of 39 water birds species we recorded. In spite of the total not numerous numbers of recorded birds the conclusion is possible to do that large gatherings in this place this time are not formed yet and birds do not stay too long exposing not constant numbers and species composition. However, between the species only two dominants, we recorded *Anas platyrhynchos*, which reached 30.57% and *Larus ridibundus* on the second place (27.67%). Comparatively with first one, the percentage of other duck species is too small and equal only 1%. Percentage of other gulls species just on contrary is considerable – 13.44%. *Phalacrocorax carbo* was a subdominant (18.33%). Considering the terms of observation, the species richness of the waders is significant – 13 species, but their total share is only 4.96%. *Philomachus pugnax* and *Actitis hypoleucos* were recorded the most often. A number of rare and few migratory waders were also observed: *Pluvialis squatarola*, *Charadrius hiaticula*, *Arenaria interpres*, *Calidris canutus* and *C. alba*.

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Evolution of migratory behavior in birds –a biogeographical perspective

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Birds are known to modify their distributions seasonally. How these movements have evolved and what consequences they have on the species distributions are poorly understood. Earlier discussions on the evolution of migratory movements mainly dichotomized into ‘Northern-Home’ hypothesis (moving for non-breeding) and ‘Southern-Home’ hypothesis (moving for breeding). Lack of single conclusion implies peculiar origin of migration amongst avian lineages. We hypothesize that the current migration patterns evolved gradually from former distributions, with migration resulting from range expansion of either migratory species (dispersal from one or more of the original breeding, stop-over or wintering sites) or sedentary species (original breeding grounds visited for major or minor part of the annual cycle). Recent tracking technology has made it possible to study detailed spatio-temporal migratory patterns for numerous species. We use these data at breeding, stop-over and wintering sites to investigate likely biogeographic origin. Origins were inferred from genus phylogenies with main focus on closest relatives to ensure contemporary origin. We demonstrate distributions likely extending breeding and wintering grounds from mid-point of migration route, seemingly from shorter-distance migrants in Asia, as well as more commonly inferred patterns of extension from wintering to breeding ground and vice-versa. We conclude that biogeographic origin likely differs amongst Afro-Palearctic long-distance migrants. The diverse biogeographic origin points to complex inferences from current distributions and the importance of considering migration as a factor involved in shaping distributions.

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Mapping habitat use by turtle doves throughout their full migratory cycle

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The European turtle-dove (*Streptopelia turtur*) is a globally-threatened species that has experienced a population decline across Europe of over of 30% since 2000. Its migratory ecology means it is vulnerable to pressures acting on its European breeding grounds, Sahelian wintering grounds, and/or at stop-over sites and on migration. Better understanding of this species’ migratory movements and habitat use throughout its annual cycle could help identify drivers of population decline. Here, we combine tracking data from 28 satellite-tagged birds over 35 annual cycles with habitat information from breeding, wintering, and stop-over sites to build a picture of the species’ migratory behaviour and habitat associations throughout the year. Satellite-tagged birds spent, on average, 54% of their annual cycle in Africa, 30% in Europe and 16% on migration. Northward migration took a total of 20-25 days with birds spending a significant amount of time in northern Africa between crossing the Sahara Desert and the Mediterranean Sea. In contrast, southward migration took 23-40 days with significant time spent in Iberia before crossing the Mediterranean, but little or no stop-over time in northern Africa. Non-breeding grounds were distributed across floodplains in Senegal, Gambia, Mali and Mauritania. We also combine tracking data with remotely-sensed environmental variables to develop species distribution models for wintering and passage areas and map potentially suitable habitat across the western Sahel and northern Africa. This allows us to target further research into the pressures and drivers of decline, as well as potential solutions.

Poster Session (odd numbers)

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The evidence of torpor in a tropical passerine, the scarlet-backed flowerpecker (*Dicaeum cruentatum*)

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Scarlet-backed flowerpecker (Dicaeidae, Passeriformes) is among the smallest passerine birds. We studied the energetics of free-living tropical birds in the Cat Tien National Park (south of Vietnam) and found that the resting metabolic rate (RMR) of scarlet-backed flowerpeckers was very low, 1.57 mlO₂/g·h on average (the avg. morning body weight was 5.0 g). The flowerpeckers' RMR value was 2.6 times lower than the expected basal metabolic rate (BMR) from a general passerine scaling curve (McNab, 2009) and 3 times lower than the BMR of the Van Hasselt's sunbird (*Leptocoma brasiliana*), which is equal in size (based on our data from the same study location). The sample size included 4 RMR measurements from 3 individuals (one individual was recaptured and re-measured 2 years after the first RMR measurement). The dramatically low RMR of scarlet-backed flowerpeckers could be an evidence of torpor, a state, which is very rare in passerines compared to some other avian orders. An interesting feature of this species is the ability to enter torpor at relatively high ambient temperature (T_a). We did not measure the body temperature of individuals, but it could not be lower than 28 °C, because we performed respirometry within the thermoneutral zone of most tropical birds (T_a = 27-28 °C). We suppose that the peculiarity of scarlet-backed flowerpeckers' energetics relates to their diet. Despite their small size, flowerpeckers feed mainly on plant foods, such as berries, nectar, and green seeds.

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Bacteria killing capacity in birds: cross species variation, phylogenetic signal and relation to oxidative physiology

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Bacteria killing activity (BKA) is an important and easy to interpret measure of constitutive innate immune function, that reflects the ability of the blood to eliminate bacteria. Its value therefore reflects the strength of the first line of defence against invading pathogens and the susceptibility of individuals to a variety of bacterial infections. Although this index is widely used in within species studies, we know very little about its cross-species variation and how it relates to other physiological and life-history components of various species. Therefore, in 2018 we sampled 134 birds, belonging to 37 European species and measured the BKA from plasma using three incubation regimes (12, 20 and 24 hours). Twelve hours of incubation captures the most variation across species and results in the lowest frequency of 100% bacterial elimination, therefore is the most suitable setup for cross-species comparisons. BKA values had medium, but significant within-species repeatability (0.49, $p < 0.0001$), indicating the suitability of this immune measurement for phylogenetic comparative studies. Species specific BKA had relatively strong phylogenetic signal (Pagel's $\lambda = 0.64$). BKA was unrelated to life history (body mass), to other immune measures of immune traits (white blood cell counts, natural antibodies

and complement levels) and two important markers of oxidative physiology (malondialdehyde concentration and total antioxidant status), but was strongly positively associated with levels of glutathione (GSH). This latter result might reflect the importance of GSH in ensuring cellular integrity during phagocytosis, an associated component of the BKA.

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Insulin-like growth factor 1 affects the expression of plumage traits in a passerine species

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Avian plumage colours and ornaments are ideal models to study the endocrine mechanisms linking sexually selected traits and individual parameters of quality and condition. Within this context, the insulin-like growth factor 1 (IGF-1), an evolutionarily highly conserved peptide hormone, is a particularly interesting candidate. It represents a potential link between body condition and the individual capacity to grow elaborated ornamental features, due to its important role in regulating cell proliferation and differentiation and its high sensitivity to the nutritional state of individuals. We are the first investigating whether IGF-1 levels during moulting affect the expression of multiple ornaments in a sexually dichromatic passerine species, the bearded reedling (*Panurus biarmicus*). We collected blood samples of males and females shortly before the moulting completed and measured the size and colours of ornamental traits. Our results indicate that in males, structural plumage colours, the size of the melanin based ornament (beard) and tail length vary independently. IGF-1 levels predict the length of the tail and the expression of male structural plumage components (UV-colouration), but not the melanin based ornament. In females plumage colour and tail length were not related to IGF-1 levels. Overall, our results indicate for the first time that IGF-1 plays a role in the development of secondary sexual characters in a passerine species.

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Diet influence on black stork (*Ciconia nigra*) breeding in captivity (on the example of Kyiv Zoo)

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Black stork is a species that nests in Eurasian forest zone and there is a separate population in South Africa. On a global scale, there is no threat to the number of the species, but in many countries this species is rare. In Ukraine it is listed in the Red Book its quantity is about 800 pairs. In the zoos of the world, black storks breed occasionally - with 85 zoos maintaining this species, only in six zoos black stork bred in 2017. Therefore Kyiv Zoo scientists are engaged in developing methods of black storks stable breeding in captivity. We have already achieved some successes: in 2014 and 2015 - 1 pair was breeding, in 2017 - 3 pairs, in March 2018 - 1 pair of birds laid eggs. We believe that successful breeding of black storks depends on the presence of sufficient amount of A, D3 and E vitamins in their diet. Before breeding pairs started laying eggs we added drug that contains these vitamins to their diet and in spring 2017 we fed black stork with live river fish (Crucian carp, *Carassius carassius*) containing roe. Freshwater roe also contains a large number of these vitamins. In 2016 we did not add to the diet products containing A, D3 and E vitamins and as a result black storks did not breed. Perhaps in

the wild breeding of this species is also connected with the presence of sufficient amount of fat-soluble vitamins in the diet.

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Age-related patterns of yolk androgen deposition consistent with adaptive brood reduction in spotless starlings

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Female birds can influence the early development of their offspring by adjusting egg size or by a differential egg resource allocation. Maternal investment can be shaped by natural selection, given the fitness costs related to parental effort. Among egg components, yolk androstenedione (A4) and testosterone (T) play an important role in affecting the behaviour, growth and survival of the offspring. Despite their relevance for nestling development, the factors accounting for within- and between-clutch variations are poorly known. By a cross-sectional sampling, we tested the effect of female age, laying order and laying date on the deposition of yolk A4 and T. We found a lack of differences in overall yolk androgen levels across ages. However, different age females showed specific deposition patterns considering laying order and laying date. Comparing first-year with older females, our results revealed that yolk T levels did not change with female age at the beginning of the breeding season, whereas first-year females transferred lower hormone levels at the end of the breeding season. Within clutches, both androgens increased across the laying sequence, suggesting that late nestlings benefit from an increased allocation that could compensate hatching asynchrony. However, when considering A4 we found that, whereas older females always increased A4 levels across the laying sequence, first-year females did not increase it when environmental conditions became hardest, thus increasing the likelihood of brood reduction. These findings support that yolk androgen variation is particularly important at the within-clutch scale, by providing females with a tool to modify nestling hierarchies.

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Insulin-like growth factor-1 levels increase in response to food restriction in a passerine

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A central goal in evolutionary ecology is to characterize patterns of selection on the optimal phenotype for a given environment. Hormones are labile phenotypic traits, and therefore show a highly variable response towards environmental changes, but not all individuals display the same degree of plasticity of these traits. Insulin-like growth factor-1 (IGF-1) is an important regulatory hormone, but we do not have any information how plastic the IGF-1 stress response is during food shortage. We measured individual daily food consumption in captive bearded reedlings (*Panurus biarmicus*) kept at ad libitum food. During our study we experimentally decreased food availability by 30% (food restricted) or increased by 110% (control) calculated from the daily food consumption for three days. We repeated the treatments so that each individual received both treatments twice. We previously showed that the IGF-1 levels are highly variable among individuals and decrease in response to stress, therefore we hypothesized that IGF-1 will decrease during food shortage, and IGF-1 response will show a difference in plasticity among individuals. As expected, birds lost body mass during food restriction.

However, contrary to our expectation IGF-1 levels increased due to the treatment. Furthermore, the magnitude of change in IGF-1 levels showed individual consistency. Overall, our results reveal for the first time that IGF-1 have role in shaping physiological plasticity which could have an effect on survival, thus may influence the structure of population.

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Short-term effects of immune challenges on physiological health and telomere attrition

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The physiological condition of a free-living bird can be affected by all sorts of environmental stressors, from food availability or ambient temperatures to parasite prevalence or predation risk. Changes in physiological traits could affect other traits such as telomere dynamics and fitness, but relationships and pathways between different physiological traits are not well described so far. Telomeres shorten with cell division and correlate with immune function. Here, we repeatedly challenged the immune system in adult zebra finches (*Taeniopygia guttata*), using lipopolysaccharides (LPS) and keyhole limpet hemocyanin (KLH) injections. We measured several physiological parameters before and after the immune challenges. We quantified 12 physiological and biochemical blood parameters using a VET Scan and measured telomere shortening. We will thus evaluate the responses of these immune challenges on electrolyte status, liver integrity and renal function. We will also compare these physiological traits between sex and age classes. We will study the cost of immune defense on physiological function and on the short-term effects of immune challenges on telomere length.

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Diversity of nest predators of ground-nesting passerines in the abandoned fields

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Predation is the leading cause of nest failure for many passerines. Variability in nest survival is often influenced by the temporal and spatial dynamics of nest predator community. Here we present the identity and temporal variation of activity of potential and actual predators at nests of grassland passerines in the abandoned fields in National Park "Russky Sever" (northern Russia). The identification of predators is based on the visual observations and monitoring by trail cameras. We describe a diverse nest predator fauna belonging to all classes of terrestrial vertebrates. Our results reveal a high annual and intraseasonal variability of predators' community. The dominant predators of passerines nests were hooded crow *Corvus cornix* and common adder *Vipera berus*. Nests depredation by hooded crow occurred more likely at the beginning of breeding season while predation rate by common adder increased as days passed. Among the rare and incidental nest predators could be mentioned common frog *Rana temporaria*, corncrake *Crex crex* and water shrew *Neomys fodiens*. Our study highlights the efficiency of using trail cameras in nest predation studies. We conclude that a high diversity and great variability of nest predators is a key feature of abandoned fields. This study was funded by the Russian Foundation for Basic Research, grant number 16-04-01383 and 19-04-01043.

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Reproductive parameters of the critically endangered yellow-breasted bunting *Emberiza aureola*

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The reproduction biology in yellow-breasted bunting was studied in 1973–2005 in the south of Western Siberia. Birds arrive in the third decade of May. The first egg in the earliest nest was laid on 1 June. The overall potential length of the reproduction initiation period for the Yellow-breasted Bunting is 43 days, which is 3 weeks less than that for the reed bunting (*Emberiza schoeniclus*). Throughout the range yellow-breasted bunting is characterized by late clutch initiation dates, although eastern populations arrive to breeding regions earlier than western. The frequent destruction of nests by terrestrial predators leads to prolongation of the reproduction period. Adult birds usually fly away in late July or in early August. The average clutch size is 4.82 eggs (n = 60) with a prevailing size of 5 eggs (66.7%). The average number of nestlings is 4.62 (n = 26) and of fledglings is 4.41 (n = 22). The average size of eggs is 20.32 × 15.04 mm (n = 178). From 57 observed nests, 29 (50.9%) were depredated, 5 (8.8%) were abandoned, one nest was trampled by calves, 22 nests (38.6%) were successful. The average assessment of the breeding success of the species according to the Mayfield method is only 6.5%, according to the results of stochastic modelling it is 6.3% (n = 55). Vulnerabilities of the yellow-breasted bunting are short nesting period and low productivity. The study was supported by The Federal Fundamental Scientific Research Programme for 2013–2020 (AAAA-A16-116121410118-7).

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Age-related differences in reproductive success in a mute swan population - selection hypothesis confirmed

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In the majority of long-lived bird species, age-related differences in reproductive success has been demonstrated. The general pattern is for breeding success to increase during early breeding attempts, stabilize at mid-age classes and decrease as a result of senescence process. Different hypotheses have been proposed to explain this phenomenon. The selection hypothesis is based on continuous disappearance of low quality individuals. The experience hypothesis suggests that immature individuals are less effective during reproduction episode, whereas the effort hypothesis is based on age-specific breeding investment. To test validity of existing hypotheses, we analysed age-related differences in breeding performance in mute swan population from central Poland. In years 1996-2016, we gathered information about life history of 150 individuals (590 breeding episodes). After controlling for the random effect of individual identity, we found significant variation in reproductive success among different age classes that was explained by quadratic negative trend. We found that short-term breeders (observed for 1-2 breeding seasons) had significantly lower reproductive success than long-term breeders (observed longer than 3 years as breeders) during the first two breeding attempts. In both groups there was no difference in the reproductive success between the first and the second breeding attempt. After exclusion of short-term breeders from dataset, the positive linear trend of reproductive success with breeding age lost significance. Our findings give support for selection hypothesis acting in mute swan population.

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Shaky balance between temporal patterns of breeding pied flycatchers and their prey in Moscow region

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The ability of insectivorous birds to adjust the terms of provisioning chicks to the period of rich prey abundance is a key problem in the studies devoted to avian food ecology and impacts of global warming. In Moscow region, we studied the relation between temporal patterns of breeding pied flycatchers and caterpillar abundance in birch crowns. Caterpillars and other arthropods inhabiting birch crowns exhibit important food recourse for this migratory hole-nesting species in the study area. We estimated biomass of prey during 14 seasons by Tinbergen & Dietz (1994) method. For each season, the phase of high prey abundance included peak (P2) and interval between two half-peaks (P1-P3) calculated on the base of long-term peak median value. We described breeding temporal curves of pied flycatcher in quartiles. Spring temperatures influenced on start of mass flycatcher breeding, start of the phase of prey abundance (P1) and date of prey peak (P2), which led to correlation between these terms. There was no relation between the dates of completion of mass flycatchers' breeding and finishing the phase of prey abundance. On average, mass hatching date of chicks occurred later than the date of prey peak, and the main fledging period covered the phase of decline of prey abundance (P2-P3). Even late mass portion of broods managed to leave their nests just before the completion of favorable provisioning period (P3). However, the equilibrium appears to be unsteady, and early termination of prey abundant phase resulted in low reproductive success of pied flycatcher population.

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Siberian blue robin (*Larvivora cyane*) as a model species for studying winter ecology of Palaearctic migrants in South-east Asia

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Standardized mist-netting of birds was performed in winter 2017-2018 in Cat Tien National Park (11°25'N, 107°25'E), Dong Nai, Vietnam. A total of 449 individuals of 55 avian species have been captured. Forty-four species (80%) were sedentary birds, six species (10.9%) short-distance migrants, and five species (9.1%) long-distance migrants. The number of captured individuals of sedentary species was 69.5% of the total number, of short-distance migrants 5.3%, of long-distance migrants 25.2%. Trapping figures varied during the winter, number of birds captured in forest habitats was significantly negatively related to capture date. The reason was declining precipitation during the approaching dry season. With drying habitats, abundance of small terrestrial invertebrates declined, decreasing food availability for small insectivorous birds in the lower layer of the tropical forest. Siberian blue robin (SBR) was the most common long-distance Palaearctic visitor; 20% in captures. A total of 28% of captured birds were males, 72% females. Female-biased sex ration suggests that Cat Tien is located in the southern part of the wintering range. SBR show winter site fidelity: of the five birds marked in March 2017, two were recaptured in winter 2018. In winter in the tropical forests of southern Vietnam SBR utilize forest patches that were inundated during the rainy season and are gradually drying during the transition to the dry season. It is not impossible that some first-winter birds can switch their home ranges during winter trying to optimize their habitat use, whereas adults occupy optimal patches right from the start of wintering.

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Long-term abundance and reproduction trends of black stork *Ciconia nigra* in Sobibór Forest, eastern Poland

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The population of black stork *Ciconia nigra* has been increasing in the last 40 years, both in Poland and in most of Europe. In this work, we summarize the results of Black Stork census in the Sobibór Forest (Western Polesie, eastern Poland) from two periods: in 1980-1990 (11 seasons) and 2009-2018 (10 seasons). The aim of our research was to determine population size and reproduction parameters on the 118.3 km² study plot with high percentage of wetland habitats 41.2%. We searched for the nests during the leafless period and we controlled them at least twice during the breeding season in order to record the nest status (occupied or not), clutch size, number of fledglings and breeding success. Over the past 40 years, the local population of the black stork has increased in numbers. In the 1980s, 4 to 10 pairs were breeding (average 6.7), while in recent period (2009-18) from 6 to 11 pairs (average 8.2). In both periods we checked a total of 99 breeding attempts. We found that in 2009-2018 smaller clutches were laid and the probability that they survive until ringing period (chicks 2-3 weeks old) was lower than in 1980s. In consequence, lower productivity is evident in recent years. We discuss the potential reasons for the observed change and its consequences.

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Nest survival of three sympatric *Phylloscopus* warblers in the Swiss Jura

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Nest predation is the primary cause of nest failure among passerines. Ground-nesting songbirds are particularly vulnerable to nest predation, and species are expected to differ in how they adjust their behavior to reduce predation risk. We examined nest site characteristics and nest survival of sympatric wood warblers (*Phylloscopus sibilatrix*), Bonelli's warblers (*P. bonelli*) and chiffchaffs (*P. collybita*) in northern Switzerland in 2018. We assessed if nest survival and vegetation characteristics at nest sites differed between the species, and also examined relationships between nest survival and nest site characteristics. Chiffchaffs had the highest nest survival, with 50% of 12 nests fledging. 41% of 41 Bonelli's nests were successful, while only 29% of 34 Wood Warbler nests fledged. Chiffchaff nests were situated in denser vegetation in forests with few large trees, while Wood Warbler nest sites were generally located in forests with large trees and dense grass cover. Bonelli's warbler nest sites were intermediate to the two. Finally, nest survival had a non-linear relationship to forest composition and structure. Nests of Bonelli's and wood warblers, but not chiffchaffs, were primarily predated by European jay (*Garrulus glandarius*). Mammals were dominant predators of chiffchaff nests. Overall, these results suggest that nest placement affects nest survival and that the three congeneric species suffered from different nest predation in our study system.

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Weather conditions at stopover sites affect survival of reed warblers

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Weather is an important factor affecting many aspects of avian ecology, yet its importance for survival during various periods of the avian annual cycle has received relatively little attention. We studied annual survival of adult Eurasian reed warblers (*Acrocephalus scirpaceus*), long-distance Palaearctic-African migrants in relation to weather conditions experienced by birds during migration and stationary periods. We did not find any affect of weather conditions at breeding and wintering areas on annual survival. However, we found that adult survival was significantly affected by weather conditions during autumn migration, at stopover sites in Spain and Morocco, where reed warblers accumulate most energy reserves before the crossing the Sahara desert. In particular, we found that low precipitation at these crucial stopover sites was associated with decreased survival. We suggest that arid conditions experienced in Spain and Morocco may cause limited food availability, prevent proper refueling and hence result in lower survival. Our findings suggest that marked climatic changes occurring on migratory routes may affect avian survival.

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The degree of phenotypic traits asymmetry of the house sparrow *Passer domesticus* populations

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The fluctuating asymmetry is characterized by random deviations in the correctness of the formation of phenotypic traits of the left and right side of the body in animals with bilateral symmetry. It is most often interpreted as an expression of disturbances of ontogenetic development, and measures of asymmetry are used to assess the impact of environmental factors on the homeostatic mechanisms of organisms in the development process. It was assumed that the degree of asymmetry may be an indicator of the quality (condition) of individuals and the quality of the environment in which individuals develop. The house sparrow populations shows a strong decline in numbers, especially in urban areas. The birds were captured in Olsztyn city (declining numbers) and villages on the edge of the Biebrza river valley (stable population), marked with colorful ring and measurements of selected traits were made. The degree of asymmetry of metric traits was described by three indexes according to Palmer and Strobecek. Birds from the urban environment had a significantly longer tail, a more sharpened wing, lower body mass and lower values of body conditions indexes compared to the population from the rural environment. It was found that the urban population was characterized by a greater number of asymmetric features and degree of asymmetry indexes compared to the rural population. It was found that the asymmetry of features of the urban population was more strongly expressed considering the asymmetry coefficients calculated for many features.

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Food of nuthatch *Sitta europaea* young in a primeval forest: effects of varying food supply and age of nestlings

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Detailed information on nestling diet composition is crucial for understanding the variation in birds breeding seasons both at the ultimate and proximate level. We studied composition of nuthatch nestling food along with variation in availability of its presumed main food resource –folivorous caterpillars –in primeval forest (Białowieża National Park, Poland), in 1998-2004. Nestlings (235 broods) were fed mostly ‘caterpillars’ (53% of visits), ‘winged insects’ (14%), ‘beetles’ (11%) and ‘spiders’ (10%) were also regularly provided. Nuthatches functionally reacted to changes in the ‘caterpillar’ supply at both inter- and within-year scales. Proportion of caterpillars increased with the increasing caterpillar availability (measured by frassfall), reached maximum around the seasonal peak and declined later on. Proportion of caterpillars in the diet was significantly lower on days when frass fall was low (<0.1 g/0.25 m²/day), irrespective of the temporal distance from the frass peak. Above the 0.1 g threshold, the proportion of caterpillars regularly exceeded 50%, reaching 80-90% on individual days. As in majority of years the ‘caterpillars’ remained above the 0.1 g level over relatively long periods, this could account for comparably small interyear variation in the proportion of caterpillars in the diet, despite nearly tenfold differences in caterpillar abundance across years. ‘Caterpillars’ were brought least frequently to the smallest, 5-day old, young (52%), more often (64%) to 10-day old nestlings and most often (71-72%) to the 15 and 20 day old ones. ‘Spiders’ were most often provided to the smallest (5 days) nestlings.

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Monitoring owl populations in a natural mountainous forest in the Austrian Alps (Duerrenstein Wilderness Area, IUCN Category I, UNESCO World Heritage Site)

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The Duerrenstein Wilderness Area (IUCN Category I, UNESCO World Heritage Site), including Spruce-Fir-Beech Primeval Forest Rothwald, is a natural mountainous forest rich in deadwood. As a result of the deadwood, topography, climate and deep snow cover until May, the area is hardly passable for many months and hardly anything was known about the owl populations in the area. Through targeted surveys from 2015 to 2019, population densities of boreal owl *Aegolius funereus*, Eurasian pygmy owl *Glaucidium passerinum*, tawny owl *Strix aluco* and ural owl *Strix uralensis* have been surveyed. With the eagle owl *Bubo bubo* as foraging guest and the long-eared owl *Asio otus* breeding for the first time in 2017, six owl species occur in the area. Data reveal boreal owls and tawny owls to be the most common species in the study area. In 2016, a beech mast increased the density of small rodents. In the following breeding season boreal owls showed a significant increase in breeding densities from 12.1 to 20.0 territories/10 km². Breeding success was rather high with at least twelve broods with fledglings confirmed. The species breeds exclusively in natural tree cavities, usually provided by black woodpeckers *Dryocopus martius*. Tawny owls showed a slight increase from 12.7 to 13.9 territories/10 km². Pygmy owls showed relatively low densities of 3.0 territories/10 km². Ural owls have been reintroduced to the area (1.2 territories/10 km²). Breeding activity and breeding success of owls were highly dependent on beech mast and small rodent populations.

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Seasonal variation of avian malaria across Europe in house sparrows

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In order to describe the seasonal and geographical variation of avian malaria parasites (*Plasmodium*, *Haemoproteus* and *Leucocytozoon*), we sampled resident populations of house sparrows, *Passer domesticus*, every two months over a year, at four locations across Europe (Spain, Bulgaria, Poland and Sweden). The diversity and prevalence of malaria parasites were assessed with a commonly-used nested PCR method, but also with multiplex PCR and with newly-designed *Plasmodium*-specific primers to capture mixed infections with high resolution. The overall prevalence of avian malaria declined from Spain (79%) to Sweden (21%). The diversity of parasites was similar across countries, although the parasite community varied with both location and sampling time. Only one *Plasmodium* species (*P. relictum* lineage SGS1) was found at all locations. Interestingly, Spain showed the strongest overall seasonality in prevalence, but specific parasite lineages varied from a strong single annual peak to an almost flat pattern at all four locations. This latter finding contrasts with the previously described annual double peak model resulting from relapse infections in spring and novel infections in autumn. To conclude, our results show that studies of avian malaria that aim to compare diversity/prevalence between sites really need to consider time of sampling and give further insights on the variation of seasonality between different malaria lineages and sites.

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Food availability limits avian reproduction in the city: an experimental study on great tits (*Parus major*)

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Reduced avian productivity often found in urban versus more natural areas. Previous work suggests that this is partly driven by low insect availability during the breeding season, but robust experimental evidence that supports this food limitation hypothesis is not yet available. We tested core predictions of the food limitation hypothesis in a controlled experiment by providing high quality supplementary insect food to great tit nestlings in urban and forest habitats. We measured parental provisioning rates, estimated the amount of supplementary food consumed by control and experimental nestlings, and assessed their body size and survival rates. Provisioning rates were similar between groups, but treatment (and not control) broods consumed large quantities of supplementary food. As predicted by the food limitation hypothesis we found that nestlings in urban control broods had smaller body size and nestling survival rates than those in forest control broods, forest treatment and control broods had similar body size and survival rates, urban treatment nestlings had larger body size and survival rates than those in urban control broods, and crucially urban treatment broods had similar body size and survival rates to nestlings in forest control broods. Our results provide rare experimental support for the strong negative effects of food limitation during the nestling rearing period on urban birds' breeding success. Furthermore, the fact that supplementary food almost completely eliminated habitat differences in survival rate and nestling body size suggest that urban stressors other than food shortage contributed relatively little to the reduced avian breeding success in cities.

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Metabarcoding-based diet profiling in insectivorous bird barn swallow and connection of individual-based data on diet and gut microbiota

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Diet composition is considered to be one of main driver of gut microbiota variation. Most studies have been focused on interspecific differences between herbivores, carnivores and omnivores in mammals. On the other hand, there are very few research aimed at the assessment of correlation between gut microbiota and diet among individuals and in non-mammalian taxa. The main aim of our study was to develop a high-throughput sequencing protocol for diet profiling in insectivorous birds, the barn swallow (*Hirundo rustica*) and to test the main factors that influence its diet variation. We also tested if interindividual variation in barn swallow diet predicts its gut microbiota structure. The most abundant insect taxa, were Diptera, Hemiptera, Coleoptera and Hymenoptera. Barn swallow diet greatly varied between breeding colonies and during the course of breeding season. But there were no differences between adults and juveniles. We observed significant correlation between gut microbiota composition and composition of COI profiles using simple bivariate analyzes. However, more complex joint species distribution models showed that this was likely due effect of environmental covariates. Put in other words, we found no evidence for direct effect of diet on barn swallow gut microbiota.

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Local adaptation of incubation rhythms to ambient temperatures

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It is commonly thought that birds could adapt their incubation rhythm to variations in ambient temperatures. Birds would allocate more energy into incubation when exposed to low temperatures, and might need to increase their foraging bouts and clutch rewarming episodes. However, previous studies have shown that incubating birds from different populations do not show consistent behavioural responses to changes in ambient temperatures. Some populations could be more sensitive than others to temperature oscillations, and/or because birds are not always able to modify their behaviour to match temperature changes, the later potentially compromising their self-maintenance and/or allowing the eggs to drop below the physiological zero temperature. In this study, we aimed to determine to which degree ambient temperatures affect incubation rhythms in the Mediterranean region. We monitored three great tit *Parus major* populations experiencing different ambient temperatures during three breeding seasons, recording both egg and ambient temperatures from the first laid egg until the first egg hatched at each nest. Several common features appeared to be shared by every incubating female in each population (e.g. the display of partial incubation, or off-bouts long enough to lower egg temperature below optimal levels (<26°C) during full incubation) although the degree and timing of these behaviours differed. Other behavioural parameters, such as nest attentiveness and frequency and duration of off-bouts, differed between populations and years. We will discuss the role of ambient temperatures in determining the onset of incubation and incubation rhythms, as well as the fitness consequences for the nestlings.

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Effects of urbanization on feather number of great tit (*Parus major*) nestlings

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Thermoregulatory properties of plumage is determined both by the structure and the number of feathers per unit body surface. Given that birds inhabiting colder environments have more feathers and that temperature in cities is higher than in their surroundings, one can expect that urban birds may adapt to the generally warmer urban climate with decreased feather density. To study this, we compared the number of feathers of breeding great tits between two urban and two forest areas that differ in local temperatures. We developed a non-invasive method which is –contrary to former studies –applicable on living birds, and based on counting feather number on close-up photos of the ventral feather tract of 6-9 days-old nestlings. At this age feathers are already emerged from under the skin but their tips are still only slightly opened, so individual feathers can be reliably identified and counted. Our preliminary results indicate that urban nestlings (n=134) have fewer feathers than forest nestlings (n=89). Furthermore, the pattern of observed differences in feather number between study sites is consistent with temperature differences: feather number was highest in the coldest forest site, while it was lowest in the two warmer urban sites. Our results suggests that the lower feather number in urban nestlings might reflect adaptation to local urban climate, but other environmental factors, e.g. reduced availability of high-quality nestling food in urban areas, may also contribute to these observed differences.

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Micro-scale architecture of the blue tit feathers

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According to the Zahavi hypothesis (1975) an ornament can play role of an honest quality indicator if its production and maintenance are physiologically costly or its possession is associated with a certain handicap e.g. increased exposure to predation. Although this hypothesis is central to many studies on signalling, the actual mechanism of colour production was described only for relatively few species. The blue tit (*Cyanistes caeruleus*) is an important model species in evolutionary ecology and a perfect organism for studying colouration, as it expresses colour patches based on structural, carotenoid-based and mixed type mechanisms. The signalling role of those colour patches and factors shaping their expression have been extensively studied in this species. However, only recently the crown feathers of the blue tit have been comprehensively analysed for the relationship between their microstructure and reflectance properties. In this study, we aim to characterize the micro and nano-scale architecture underlying remaining colour patches of the adult blue tits. We focus here on structurally coloured: rectrices, secondary coverts, nape, achromatic patches of cheeks and white dots on coverts, carotenoid-based yellow breast feathers and greenish back feathers with the mixed type of colouration. By using scanning electron microscopy (SEM) and transmission electron microscopy (TEM) we investigate barbs anatomy, and check how it translates into the reflectance properties of the feathers. We propose that rectrices, beside the crown feathers, should be another trait of interest in the search for a link between the internal feather structure, its colouration and the condition of an individual.

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Hindlimb morphology and the foraging ecology of the extinct Haast's eagle (Accipitriformes: *Hieraetus moorei*)

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New Zealand was inhabited by a number of large flightless birds as well as their aerial predators. One of such predators was an impressive Haast's eagle, which extinction coincides with the extinction of the other New Zealand megafauna. As the earlier predictions on the foraging ecology of Haast's eagle were based on the analysis of skeletal elements, I reconstruct muscles and ligaments of the large eagle's hindlimbs to get the further insight into the problem. Although similar to muscles and ligaments of other eagles, hindlimb morphology of *Hieraaetus moorei* shows several adaptations for securing and processing particularly large prey. Powerful retractors of the femur were enlarged, while its pronators *mm. iliotrochanterici* originated across a much broader region of the pelvis in comparison with other species of Accipitridae. Flexor tubercles of the ungual phalanges as well as the tubercles for the insertion of markedly larger *m. abductor digiti 2* and *m. abductor digiti 4* muscles were also enlarged. Well-adapted for hunting large prey Haast's eagle went extinct due to the inability to adapt to a reduction in megafauna availability.

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Investigating differentiation in closely related European nightjar populations using an integrative approach

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The European nightjar (*Caprimulgus europaeus*) is a widespread migratory bird species which encompasses six recognized subspecies. This subspecific taxonomy has been determined based on size, plumage characteristics and geographical distribution but needs reexamination according to the current literature. Here, we will use an integrative approach (i.e. using phenotypic and bioacoustic data as well as data on migration) to characterize closely related European nightjar populations and thoroughly investigate their differentiation. We will describe phenotypic variation of populations distributed across the entire breeding range and assess the validity of four subspecies. Digital photography will be used to analyze plumage color and pattern variation. Furthermore, we will examine wide geographical variation in acoustic characteristics of song as well as migratory behavior. Preliminary results solely based on mensural data showed a lack of diagnosable differences among the four studied subspecies. Overall, these analyses will enable to review subspecies boundaries of the European nightjar.

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Ordering of song and responses to playback of conspecific song: a study of three sympatric species of *Seicercus (Phylloscopus) burkii* complex

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It is well known that transitions between different song types in a song sequence are non-random in many species, but the signaling significance of non-random vocal streams is poorly understood. Here, we firstly

analyzed the song sequencing rules in spontaneous singing and then simulated territorial intrusion by broadcasting conspecific songs in territories of three closely-related sympatric and morphologically extremely similar species: Martens's warbler (MW: *S. omeiensis*, n=8 males), grey-crowned warbler (GW: *S. tephrocephalus*, n=10) and Bianchi's warbler (BW: *S. valentini*, n=11). The study was conducted in April-June 2016 in Hupingshan National Nature Reserve (Hunan province, China). Males of all species had a repertoire of 13–64 song types. While singing spontaneously, MW and GW produced song types according to fixed sequences. By contrast, the ordering of song of BW looks like a more random process which was revealed by information theory approach. A comparison of spontaneous singing with that elicited by playback showed that the transitions between different song types of BW in a song sequence were determined more by specific factors and predictable and thus more non-random. By contrast, the song sequences rules of MW and GW did not differ between spontaneous singing and singing in response to playback. Our results are thus consistent with the idea that nonrandom vocal structures could play a role in male–male competition but the pattern was hidden in species with extremely nonrandom spontaneous singing (i.e. MW and GW). The study was supported by the Russian Foundation for Basic Research (project 17-04-00903-a).

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Blue tits change when they build their nest in response to environmental temperature

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There is considerable variation in the design of nests that birds build, observed even within species. For example, different populations, of the same species, may use more or less material in their nests. It is generally assumed that this is because individual birds respond to the local temperature when constructing their nest. To test this assumption, we investigated the response to ambient temperature of blue tits (*Cyanistes caeruleus*) building nests in nestboxes in St Andrews, Fife, UK during the breeding seasons of 2016 to 2018. In 2017 when the months of March and April were warmer than they were in 2016 and 2018, the birds started to build and to lay eggs earlier than had birds in 2016 and 2018. However, there were no difference in the materials they used. As these blue tits responded to the increase in temperature by advancing when they built their nests and not by modifying the materials in their nests, the explanation for population variation in material use may not always be local temperatures, at least at time of building.

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Protective nesting association between red-backed shrike and barred warbler: the importance of the anti-predatory behaviour

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Protection of broods from predators using aggressive behaviour of other species is one of the most unusual strategies used by birds to evade predation. One such strategy is the creation of protective nesting association in which one or more species relate and directly benefit from nesting within the protective umbrella created by other species. In the world of animals such species interactions have been described primarily among birds, but they have also been observed between birds and social insects, and even reptiles. I evaluate whether nesting associations of two species influence nest defence intensity. A model system in the study are the barred warbler *Sylvia nisoria* and the red-backed shrike *Lanius collurio*. Both species are not closely related, but belong to the

same order Passeriformes. Both passerines nest in the farmland of Europe and Asia, and spend the winter in southern and eastern Africa. Warblers and shrikes showed considerable variation in their defensive response. No differences between the sexes in anti-predator behaviour in both species were found. Barred warblers nesting within shrike breeding territories strongly defended their nests. Shrikes not nesting together with warblers were significantly more aggressive than those breeding in the protective nesting association. This study suggests that positive interactions within the heterospecific network of relations in ecosystems may be one of the factors responsible for diversifying the intensity of avian nest defence.

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Eggshell colour pattern as female fingerprints in black-headed gulls

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Black-headed gulls (*Chroicocephalus ridibundus*) breed in large colonies at the Northeastern coast of Germany. Each breeding pair invests great energy in their offspring by long parental care. The colouration of their eggshells is highly variable as known for many bird species. Since they breed close to each other, they would benefit from recognising their own eggs, especially when exposed to intraspecific brood parasitism. We investigated the intraspecific colour pattern variation of the eggshells by photographing 534 eggs of 189 clutches that were laid during the breeding seasons from 2015 to 2018 and analysing them with the computer program ESPANA. To confirm the maternity we compared the extracted maternal DNA from eggshells and feathers. In addition we conducted a clutch exchange experiment. The results showed a greater similarity within one clutch of a female than between females, also over the years, indicating a female specific eggshell colour pattern. The maternity test revealed a 12% rate of intraspecific brood parasitism but the eggshell colour variation within clutches did not correlate with parasitized clutches. Furthermore the gulls continue egg incubation within minutes after exchanging neighbouring clutches. It seems that the pattern is determined by factors other than egg recognition, such as female quality, nutrition or age. The gulls may be using other cues to identify their clutches, such as nest surrounding characteristics or neighbouring gulls.

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Innovative foraging behaviours and success on problem-solving tasks: urban vs. forest performance in Barcelona (Spain)

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Adaptation to urban habitats has been found to require changes in cognitive, behavioural, and life history traits enabling individuals to exploit new resources. It is predicted that reduced neophobia and enhanced problem solving might characterize urban birds compared with their rural conspecifics. Also, it has been previously shown that more brightly ornamented individuals may be more efficient when foraging in novel situations. However, explanations that attribute cognitive mechanisms to individual variation in problem-solving performance have revealed conflicting results. We studied the individual consistency in problem-solving performance in wild urban and forest great tits, *Parus major*, by means of four novel tasks of food acquisition, and the relation of individual performance with relevant colour ornaments. We found that subjects' latencies to approach each test apparatus (neophobia), time to solve the tasks and their attempts to access the reward were not consistent across trials. Both latency to approach the feeder and number of trials were higher for individuals from the forest plots in two

of the tasks. Adults were more persistent in their attempts to solve the tasks than young individuals. Only for one of the tasks, successful individuals had higher values of hue in the yellow belly feathers than unsuccessful individuals. Our findings therefore suggest that individual differences in problem-solving success can arise from inherent non-cognitive motivational or state differences alone, such as age or body condition, and hence be achieved without inferring more complex cognitive processes.

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Movement and parental care characteristics during the nesting season of the little swift (*Apus affinis*)

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One of the open questions in the study of bird movement ecology is the relationship between movement properties and the characteristics of parental care during the breeding season. It is known that between-sexes morphological difference is associated with a difference in parental investment in providing food for the young, such that in monomorphic species the division of roles between the sexes is similar between the sexes while in species with distinct dimorphism between males and females, females invest much more in parental care than males. However, some studies have shown that there are still differences between the sexes in the properties of parental care even in monomorphic species. In this study, I examined the characteristics of the movement of the little swift (*Apus affinis*), a monomorphic species, in relation to parent sex and the nesting stage during day and night using an advanced tracking system that allows a detailed examination of bird movement in the Hula-Valley of Northeastern Israel. We found that during the night females spent more time in the nest than males, nest visit rates during the day were higher in females, but male visit rates were higher during the night. In addition, we found that the range and extent of movement during the day are higher in females. The results of this study advance our understanding of the breeding ecology of little swifts and the parental roles of the two sexes in a monomorphic social species.

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Does shared paternal care affect the growth of brood parasite nestlings? A study on cuckoos in polygynous great reed warblers

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Sibling competition is an important driving force responsible for the variation in growth patterns of individual nestlings. This, however, does not hold for evictor brood parasites that typically eliminate any competitor soon after hatching. Yet, there are cases when even the evictor parasite naturally grows up in mixed broods alongside host nestlings. This happens either when the host nestlings are larger than the parasite, or when the nest architecture prevents eviction. Forced co-habitation with host nestlings may then have detrimental impact on parasite growth and survival. Nevertheless, the evictor parasite can also share parental care with other nestlings (either host or parasite) when it is reared by a polygynous male that attends two or more simultaneous broods. Here, we capitalized on such a natural situation in cuckoos (*Cuculus canorus*) parasitizing polygynous great reed warblers (*Acrocephalus arundinaceus*). Previously, we found that polygynous males supplied their own nestlings with more food when they were reared simultaneously with a cuckoo than when the nestlings were reared simultaneously with another brood of own nestlings. What effect such male favouritism towards own

nestlings may have for cuckoo growth is the subject of this poster presentation. *Funded by the Czech Science Foundation (grant no. 17-12262S).*

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Geolocators reveal variation and sex-specific differences in the migratory strategy of a long-distance migrant

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Significant gaps in our understanding of the migratory behaviour and nonbreeding ecology of migratory songbirds impedes efforts to identify the mechanisms underpinning global population declines. By deploying light-level geolocators on a British breeding population of pied flycatchers *Ficedula hypoleuca* we describe their migratory behaviour across an entire annual cycle. We identify a previously unknown stop-over location in the Iberian Peninsula and differential migration between the sexes relating to differences in timing and nonbreeding location. Females wintered north and west of males and spent longer at the wintering grounds, crossing the Sahara desert later in spring than males. There was variation in migratory strategy, with half making an additional stopover after making the Sahara crossing. We also report abnormal Sahara crossing behaviours including grounding and retreat migration: the first such examples documented from a small passerine. This study demonstrates that songbird migration is more complex than initially considered, and the high degree of variation we found suggests individuals can use make adjustments to their more typical migratory strategies.

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PAMLR: a package for analysing pressure, activity, magnetic and light data in R

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Light-level geolocators have revolutionised the study of bird migration. However, lacking precision, they cannot be used to infer behaviour beyond large-scale movements. Here, we introduce newly developed multisensor geolocator tags, with sensors for measuring atmospheric pressure, activity, magnetism, temperature and light on migrating birds. We then present our newly developed R package and some of the utilities it presents for analysing such data to classify behavioural states in birds including migration, soar gliding and flapping. Furthermore, we highlight how such data can then be used to increase the precision of geolocation estimates.

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Right-side neck-resting preference of the barnacle goose *Branta leucopsis*: the evidence for lateralization of vigilance?

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Many behavioural reactions of animals including motor ones are asymmetric and are associated with unequal input of the left and right hemispheres of the brain to the analysis of incoming information. Motor asymmetries are widespread among vertebrate and invertebrate animals. Forelimb preferences have been studied in many vertebrate species. The movements of unpaired appendages become the subjects of an investigation of the functional asymmetries less often. Here we performed a preliminary estimation of one-side population bias of neck-resting position of the barnacle goose *Branta leucopsis*. The study was conducted in the four districts located along the coastline and on the islands in the centre of Helsinki city in Finland. On the walking routes, the asymmetrical neck-resting position under the left or right wing was recorded for resting and sleeping birds once for each individual. A total of 15 routes were taken and the neck-resting position of 874 individuals was analyzed. Right-side neck-resting preference was observed in all samples. As a possible cause of such a neck-resting preference, it is assumed that during the rest when the bird's head is under the wing the opposite eye can be used to monitor the surroundings and promptly react in the case of the appearance of predators or humans. In this case, the revealed one-side population bias demonstrates lateralization of vigilance and implies the left-eye (right-hemisphere) control of the responses to potential threats. This work was supported by RSF grant (no.19-14-00119).

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Home range patterns of dispersing juvenile golden eagles (*Aquila chrysaetos*)

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Since golden eagles (*Aquila chrysaetos*) became protected in 1953 in Switzerland, its population has grown considerably and attained comparably high breeding pair densities. Approximately 350 breeding territories are recorded in Switzerland thus covering almost the entire suitable habitat by territorial resident pairs, leaving little space for dispersing juveniles. This results in frequent intraspecific interactions with potentially fatal outcomes and raises questions about the optimal movement behaviour of juvenile golden eagles in such a saturated population. In order to investigate natal dispersal of golden eagles, we equipped 13 nestlings with solar-powered GPS and accelerometer tags and evaluated their movement patterns. First results revealed that the timing of departure, distances of exploratory movements, and activity levels after departure varied greatly between individuals. Within individuals, we identified two distinctive types of movements: stationary and mobile movement phases. Dispersing juveniles showed clear distinctions between i) long, exploratory movements, and ii) temporary settlements characterised by short movements within restricted areas. Surprisingly, the temporary settlement phases were not located in the same areas consistently, but individuals changed the settlement areas repeatedly throughout the year. In addition, temporary settlement areas were situated at large distances from the borders of known occupied breeding territories. These results suggest that dispersing juvenile golden eagles show a preference for areas in which they can avoid frequent territorial interactions with resident pairs. On-going investigations will allow further conclusions about the factors driving different movement behaviours and space use beyond density-dependence.

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Bird anti-mosquito defensive behaviour in relation to avian malaria

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Host behaviour has been considered as the first line of defence against vectors and the parasites they are transmitting. Individual differences in anti-mosquito host behaviour have been detected, with lower mosquito feeding rate on more defensive hosts. However, the role of avian anti-vector behaviour in relation to haemosporidian prevalence in host populations is poorly studied. The current work is a preliminary investigation of whether among-individual variation in avian defensive behaviour reduces mosquito feeding rate and thus reducing host exposure to avian malaria (*Plasmodium* spp.). Sixteen great reed warblers (*Acrocephalus arundinaceus*), exposed to 50 wild-caught mosquitoes each, were video-recorded and their defensive behaviour was evaluated in relation to mosquitoes' feeding success and birds' infection status. Despite among-individual variation, the overall defensive behaviour rate of the great reed warblers was high, resulting in only single blood-fed mosquitoes, which predicted low parasite prevalence. However, seven birds (44%) were identified as naturally infected with *Plasmodium* spp. Our preliminary estimate did not provide evidence that between-individual differences in anti-mosquito behaviour of great reed warblers are associated with risk of malaria infections. Nonetheless, we cannot rule out the possibility that intraspecific behavioural variation plays an important role in host competence and parasite transmission dynamics. Final results derived from a larger sample size would allow us to make firm conclusions.

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Role of waterbirds in phosphorus cycle in the Curonian lagoon

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Waterbirds are import vectors of nutrients in ecosystems where phosphorus usually limits growth of primary producers. In this study we present the significance of waterbirds to phosphorus cycle in a hyper-autotrophic coastal lagoon. The Curonian lagoon in the southeastern Baltic Sea has been designated as IBA and Natura 2000 territory. Two large colonies of cormorants are present in Lithuanian part of the lagoon (norther part, 1/3 of the whole area). The lagoon has been highly used by molting and/or migratory herbivorous and omnivorous birds. Two main methods were used to evaluate abundance of waterbirds and feeding behavior of great cormorants. Monthly bird surveys from March to November 2018 from a vessel were performed to evaluate dynamics of bird species composition, abundance and distribution. Ten breeding great cormorants were tagged by GPS/GSM transmitters in order to evaluate time budgets and differences in behavior of birds which breed in separate colonies. The study showed that piscivorous birds were the most abundant among all other groups of birds (up to 23300 ind.), while omnivorous birds were the second most abundant group (up to 12800 ind.). Herbivorous birds were less abundant – up to 2500 ind. and mute swans were dominated among them. Telemetry data showed that great cormorants spent in/over the lagoon and inland waters averaging 42% of their day budget. These data are important to calculate the amounts of phosphorus coming from waterbirds to the ecosystem. This project has received funding from the Research Council of Lithuania, agreement No S-MIP-17-11.

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Nest location, incubation behaviour and personality in the Kentish plover *Charadrius alexandrinus*

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Nest location is a crucial fitness determinant in birds but this may be variable among and within species. Although the choice of nest location is often influenced by predation risk and thermo-regulatory costs, it may also be shaped by the personality of the parents. We tested whether nest cover and incubation effort is influenced by individual personality in the breeding population of Kentish plover. In the coastal salt pans of Samouco (Southwest, Portugal), this species shows variation in vegetation cover of the nest. Individual Flight Initiation Distance (FID) tests were carried out as a proxy of individual boldness. We predicted that bold individuals (with shorter FIDs) will select vegetated nest location while shy individuals (with longer FIDs) will select nest location devoid of vegetation. We also expect individuals with longer FIDs to spend more time incubating because of higher ambient temperature caused by lack of vegetation cover. Our results show that FID may be a good measure of personality as it was highly repeatable. FID was unrelated to nest cover however, it was correlated to the time parents spent incubating. We conclude that individual's FID does not explain variation in the choice of nest location but the personality of the parent may influence incubation behaviour.

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The use of large non-excavated holes by tawny owls and other forest vertebrates in oak forest

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Prevailing model of forest management in Europe leads to decreasing number of cavity-bearing trees. Medium-sized hole-nesters are more affected by shortage of holes because they use only non-excavated cavities in older trees which need more time to form. The commonest bird species of this type in Europe is a tawny owl (*Strix aluco*). Which hole types does it use for roosting and breeding? How abundant these holes are in different forest age classes? Are there any seasonal differences in patterns of hole use? Are there any signs of competition between tawny owl and other vertebrates for big cavities? I addressed these questions in the study performed in Oak forest in the north-eastern Ukraine. Up to 130 holes were controlled since 2009. Data on the usage of tree holes were obtained from seasonal checks of all known cavities and one-year camera trap study of five holes. I found that birds used two different subsets of holes. Roosting holes were more numerous, found in relatively young and well-decayed trees. Owls used them mostly since late autumn to spring. Nesting holes were much scarcer, located in bigger, older trees and had stricter range of cavity dimensions. Tawny Owls were main inhabitants of both hole types, other vertebrates either were much less abundant or avoided owls. Pine marten was the main predator, preventing nesting of small birds and reducing nesting success of tawny owl. Nevertheless, big tree holes attracted several bird species as potential feeding sites or places of social interactions.

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Evolution of the Satchinez Marshland avifauna in the past two decades and a half (1990-2018)

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At 25 km northwest of Timisoara, between the localities of Satchinez and Bărateaz, lies the protected area “The Satchinez Marshland”. Declared protected area by the ornithologist Dionisie Lintia, ever since 1942, with the aim of protecting the great white egret colonies established here, the ornithological reservation was under the protection of almost a century of existence under the administration of several institutions: local council, museum, academy, ministry, environment protection agency, depending on the evolution of historical times. Our work, titled “Evolution of the Satchinez Marshland avifauna in the past two decades and a half (1990-2018)”, is an insight into the phenomena that cause qualitative and quantitative changes in the avifauna spectrum, trying to justify the phenomenon through the transformations in time at ecosystem habitat level, in direct correlation with the evolution and pressure of social interests. On the ground, the numerical data were obtained by fixed observation as well as by the route method. The information was processed on the computer, discussing four variables: the kilometric abundance index, the participative frequency of the species –by its number of individuals –relative to the total number of individuals of the identified species, biomass and the metabolic index or the area of energy loss at individual level, thus achieving a more accurate classification of the degree of dominance ($p < 0.05$).

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Great spotted woodpecker indicates bat diversity in naturally disturbed pine forest

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Woodpeckers' diversity is regarded as a good indicator of forest biodiversity. However, human and natural disturbances may alter species associations and thus the utility of woodpeckers as indicators. Here, we examine the usefulness of one species, the great spotted woodpecker, in predicting species richness and abundance of bats in Polish pine forests under different disturbance regimes. In 2011 we conducted woodpecker and bat surveys at 63 point-count sites in three forest habitats: (1) undisturbed managed forest, (2) salvaged windthrow (i.e. when fallen trees are taken away) and (3) natural windthrow (i.e. without intervention). From 0 to 5 great spotted woodpeckers at a point-count site were recorded and the activity of bats (i.e. the total duration of the echolocation calls during a 10-minute visit) varied from 0 to 542 seconds. The local abundance of the woodpecker was positively correlated with bats in natural windthrows (both in terms of species richness and activity), salvaged windthrow (only activity) and undisturbed managed forest (only species richness). We suggest that the observed correlations can be driven by similar roosting habitats (e.g. woodpeckers can provide breeding cavities for bats) or by associated invertebrate food resources of woodpeckers and bats. Clearly, the abundance of great spotted woodpecker seems to be a good positive indicator of bat species richness and activity across a range of forest habitats, thus adding a group of relatively cryptic forest species that are indicated by the presence of woodpeckers.

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Species co-occurrence patterns in a Mediterranean urban bird community

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Anthropogenic disturbances such as urbanization often cause alterations in species distribution patterns and interspecific associations. Some species are more tolerant to or benefit from urban environments, while others are negatively affected. Species co-occurrence patterns may thus reveal common species responses or

varying tolerance to the modified environmental conditions or alternatively, interactions with heterospecifics. In the current study, we investigated bird co-occurrence patterns along an urbanization gradient in a densely built medium sized Mediterranean city (Patras). Breeding and wintering bird communities were surveyed twice each season in 90 randomly selected sites using the point count method. A total of 33 and 42 species (excluding raptors and seabirds) was recorded in spring and winter, respectively. Bird pairwise co-occurrences were analyzed following the probabilistic null modelling approach, in order to investigate whether and which species co-occurrences deviate from a random pattern and show positive or negative species interactions. Overall, non-random species interactions were detected at approximately 10% of the analyzed species pairs. Positive interactions were more common than negative ones and that was more prominent in winter, possibly indicating higher competition or resource partitioning among heterospecifics during the breeding season. Negative interactions were mostly observed within certain taxonomic groups (e.g. Columbiforms). These patterns in an otherwise largely randomly assembled community are currently further investigated by integrating species traits, such as feeding or nesting specialization, and the effect of environmental factors.

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The effect of urbanization on bird functional traits

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Urbanization is one of the most significant global change process which endangers biodiversity. In order to study the urbanization effects on bird communities, we conducted a systematic review. The publications were extracted from the Web of Science database. Searching resulted in a total of 3214 publications (search terms: bird OR avian AND (urban OR suburban OR rural)). The title filtering resulted in 605 publications. A total of 148 publications relevant to the topic were analysed by the review of the abstract. The last step was the full filtering, 31 publications included relevant data. We considered only the songbirds (Passeriformes) in Europe. We examined the functional characteristics of the birds (foraging techniques, diet, nesting site, migration status and body weight). In order to get to know the effects of urbanization on birds, we set up the following hypotheses: (1) the most negatively influenced species on the basis of foraging techniques are the ground prober and ground gleaners; (2) in terms of diet, insectivorous species will decline the most; (3) along the gradient, nesting habits change at the expense of species nesting on the ground; (4) species with different migratory characteristics is changing, long-range migrants are disadvantaged; (5) birds of larger body weight dominate in higher urbanization level areas; (6) In general, we expect that strongly urbanized areas are characterised by opportunistic species. Data extraction is still ongoing, our aim is to perform a hierarchical meta-analysis considering phylogenetic relatedness.

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Anthropogenic material in bird nests

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Birds globally incorporate anthropogenic materials (debris) in nest structure. Production and management of waste is a global challenge now, and plastic pollution is listed as one of the major threats to wildlife. We analyzed study reports from 55 bird populations, involving 24 species, and checked 10,790 nests. Incorporation of debris was correlated with increasing human influence on the environment, measured by the Human Footprint Index. The probability of debris incorporation is greater in terrestrial than in marine species. In a more detailed study

on a population of white stork *Ciconia ciconia* in Western Poland, conducted during eight years we showed that almost 50% of nests contained debris. More debris was found in nests located in territories with a higher number of anthropogenic material in the surrounding environment. The number of debris pieces in the nest was related to the age of female. In 2018 we conducted the study in Spain, in four different populations of the white stork, nesting in distinct environments. Again in more pressured environments, the probability of debris incorporation was higher. Concluding, there is a general pattern that the incorporation of debris in the nest is a birds response towards human pressure. Undeniably, the factors which influence debris incorporation by birds, the scale of this behavior, and particular forms of use of debris in bird nests are aspects which require continuing standardized research.

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Political borders disrupt associations between land cover and resource availability

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By linking species of conservation concern to their abiotic and biotic requirements, habitat suitability models (HSM) can assist targeted conservation measures. Yet, despite laborious conservation actions, suitable areas often remain unoccupied. This is because HSM are typically based on land-cover data but not on resource information *per se*. While land cover may correlate with crucial resources in the area of calibration, it does not necessarily represent a ubiquitously valid proxy for resource availability. Political boundaries can for example abruptly change the association between proxies and resources. We compared two neighbouring, but politically separated areas (i.e. south-eastern Germany and northern Switzerland) of the highest habitat suitability for little owls (*Athene noctua*) in terms of land cover, land-use intensity and resource availability. Land cover and land-use richness did not differ between Germany and Switzerland, yet there were large differences in terms of land-use intensity (meadow intensity, grazing, cutting regimes and small structural elements) and the availability of resources (roosting sites, tree cavities and small rodents). Land-use intensity was significantly higher and resource availability lower in Switzerland compared to Germany. This confirms that, while accounting well for land cover, HSM may fail to predict land-use intensity and resources across borders. The difference in resources is likely the reason why the study area in Germany still supports a vital little owl population, whereas little owls have become rare in Switzerland. We demonstrate an important limitation of HSM and emphasise the need for fine-scale resource assessments complementing landscape-scale suitability models for designing effective conservation measures.

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Present habitat suitability of the historical breeding area of the European roller in Hungary

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Decline of farmlands and grasslands' biodiversity is one the major conservation concerns nowadays. The European roller is a secondary cavity nester species inhabiting typically grasslands and farmlands. It has suffered large declines both in size and range of the population since the 1960s, but applying direct conservation actions, this negative trend has been reversed in several countries. In this study, we aimed to evaluate the current habitat

suitability of the historical breeding area of the species in Hungary to promote the enlargement of the breeding range in the Carpathian basin and evaluate potential significance of the Natura 2000 network in this process. We applied species distribution modelling (SDM) to map potential areas for nest-box supplementation. Grasslands, broad-lived forests, agriculture sites with significant areas of natural vegetation were found as the most important predictors. The majority (71%) of the predicted area was without current nest-box occupancy data. Significantly larger proportion of grid cells with archive data still preserve suitable land cover composition for rollers than cells where the former breeding wasn't confirmed, and only small proportion of former breeding area has become completely unsuitable for the species. Our results indicate large overlaps between Natura 2000 network and the predicted area, especially 48.6% with Special Area of Conservation (SAC/SCI) sites. Our study provides a useful tool for direct conservation planning for the species. Our results also suggest that coordinated network of protected areas such as Natura 2000 can potentially serve as core areas in the recolonization processes.

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Integrating nesting habitat restoration with at-sea individual-based biomonitoring of the endangered seabird *Pterodroma cahow* endemic to Bermuda

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The *Pterodroma* or gadfly petrels are pelagic seabirds of increasing conservation concern (IUCN 2014). Most of them are endemic to oceanic islands where they might be susceptible to different anthropogenic alterations. The *Pterodroma cahow*, a North Atlantic gadfly petrel endemic to the Bermuda Island, has experienced a catastrophic decline in the early 1600s, to the point that it has been considered extinct and was rediscovered in 1950 with only 18 pairs. Since then, a long-term conservation and recovery-programme has been addressing the most relevant threats to breeding-sites resulting in a consistent increase of the population to 124 breeding-pairs (2018). However, the Bermuda petrel is a highly mobile marine predator able to range across the whole North Atlantic Ocean. The unknown location of Bermuda Petrel's foraging areas and its high trophic position makes the species potentially vulnerable to unperceived threats in high sea as exposure to environmental contamination or anthropogenic activities. With the present project we aim to i) map the movements and location of Bermuda petrel foraging areas with the purpose of monitoring spatial variability of nutrients and pollutants in relation to individual space use and oceanic regions; ii) identify the causes of the increased percentage of failed eggs observed in the last decade in relation to exposure to contaminants integrated and bio-accumulated along food-chains. Finally, we aim at developing educational activities to engage the public in more active conservation programme of Bermudian's National Bird. We present here our first achievements of a two year project started in January 2019.

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Sex and spatial variation in metal content of kentish plover (*Charadrius alexandrinus*) feathers along the coast of the Iberian Peninsula

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Inorganic contaminants such as metals are major pollutants, due to their natural and anthropogenic origins. Birds play an important role as bioindicators, indicating specific environmental change such as contamination with chemicals or marine pollution. Bird's feathers are useful non-invasive indicators of metal contamination. The kentish plover inhabits coasts and inland wetlands in Eurasia and North Africa, with the breeding distribution in Europe being predominantly coastal. This wader has demonstrated a marked decline in most breeding populations in Europe since the early twentieth century; this has mainly been attributed to human activities. We performed Al, As, Cd, Cr, Cu, Hg, Mn, Pb, Se and Zn measurements on feathers of 50 kentish plover adults (16 males and 34 females) breeding along the Spanish Mediterranean coast (18 birds), Andalusian (9 birds) and the Galician and Portuguese Atlantic coast (23 birds). Plovers were captured at nest using a funnel-trap. The concentrations of metals in the feathers of the kentish plovers were in the decreasing order: Al > Zn > Cu > Mn > Pb > Cr > Hg > Se > As > Cd. Andalusian plovers showed significantly higher values of Al, Mn, Cu, Zn, As, Cd and Pb than those of the Mediterranean and of the Galician and Portuguese Atlantic coast. Mn values were significantly higher on the Mediterranean and Andalusian coast than on the Galician and Portuguese Atlantic coast. Manganese and aluminum values in males were significantly higher than in females. We discuss the possible anthropogenic sources of pollution on the Iberian coast.

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Taxonomic revision of the genus *Gracula* in the island of Sumatra and the southwest located islands

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Taxonomy of Hill mynas *Gracula* has always been a disputable topic due to the lack of comprehensive data on many of its taxa. This research was conducted in a strip of islands off the west coast of Sumatra (Barusan islands) where the highest diversity of the genus' taxa occurs. Morphometrical and genome wide single nucleotide polymorphism (SNP) data of Myna taxa were collected in six islands and compared with the nominate *Gracula religiosa*. Both the nuclear and morphometrical data support the existence of a distinct Hill Myna taxon complex in the Barusan Islands with at least two distinct lineages: the Nias Hill Myna *Gracula (r.) robusta* whose range is now known to extend into the island of Simuk, and the Simeulue Hill Myna *Gracula (r.) miotera* constituting a lineage as distinct as that of the former. The combination of traditional morphometrical methods with modern genetic analyses provided complex results clarifying the real situation of Hill Mynas classification in the Sumatran region.

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“Ornithopolis”: Outreach activities and educational program to promote citizen awareness and engagement in scientific research for urban bird diversity

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Urbanization has been shown to have detrimental effects on biotic communities, with significant loss of green areas especially in southern European cities. At the same time, in countries with challenging socio-economic

conditions, active participation of citizens in nature conservation is very limited and children's alienation from nature is remarkable. "Ornithopolis" is a citizen science project aiming to enhance knowledge about avifauna in the Greek city of Patras, and to promote citizen awareness towards biodiversity conservation and engagement in scientific research. Various outreach activities were performed towards these aims. Furthermore, since education within a museum as informal learning setting can increase pupils' awareness, knowledge and attitudes, a museum educational program for 8-11-year-old pupils was organized using the collections and dioramas of the Zoological Museum of the University of Patras. Activities were based on the theory of constructivism and socio-cultural theories for learning. Pre- and post- program questionnaires were used to evaluate pupils' initial knowledge and perceptions about birds and consequent learning and development, respectively. After the completion of the program most children could identify common urban birds and their attitude towards birds changed positively (i.e. asking their teachers to go outside for bird watching or make bird nests). The findings highlight that multiple benefits can be derived from engagement in environmental activities, such as strengthening children's experience with nature in urban settings and promoting biodiversity conservation. However, the results also show that Greece has an underdeveloped culture for civil engagement with nature conservation; therefore, citizen science programs require special strategies.

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Evaluating the created wetlands for waterbird diversity and reproductive success

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Since the last century wetland destruction, inflicted by urbanisation and agricultural drainage, is estimated to be about 70 % and has led to wetland-related biodiversity loss. Luckily, many countries have been and are promoting restorations and creations of wetlands in order to provide water habitat and increase biodiversity. However, evaluations of such interventions for birds are largely lacking. We explored whether bird community in created wetlands, Sweden, relates to habitat features of the wetlands (such as size or vegetation structure), their adjacent surroundings (e.g. flooded area, forest), and their landscape setting (in terms of forest, urban areas, and neighboring wetlands). We investigated which wetland and landscape features were associated with habitat selection (reflecting site attractiveness for birds), and which were associated with reproductive success. We also considered whether bird functional groups responded differently to local and landscape characteristics. We discuss the results in terms of how to improve the biodiversity outcome when creating new wetlands in different landscape settings.

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The effectiveness of the use nest boxes on buildings in urban avifauna protection after building modernization

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One of the limiting factors for birds nesting on buildings is front renovation works leading to removal or limitation a potential breeding sites. The shortage of nesting sites, due to man-made reasons, can be compensated for by providing suitable nest boxes. Effectiveness of colonization of new nest boxes by birds species was tested, depending on the type of nest boxes and time after the buildings modernization. In block housing estate of Olsztyn city (NE Poland) an inventory of breeding avifauna was carried out, before the thermal modernization of buildings - on the house estate breeds the house sparrow, common starling, swift, Eurasian jackdaw, gray wagtail

and black redstart. Renovation works of the buildings front were completed with the suspension of 5 types of nest boxes (HS - for a sparrow, CS - starling, EJ - jackdaw, S - swift, HO –half-open nest boxes). After 5 years since the end of modernization the population of sparrows, starlings and jackdaws has reached almost half of the number as compared to the housing-estate before modernization, and the swift about 25%. In the first year house sparrow used nesting boxes more often (type HS, CS, S), but from the second year after modernization, the number of broods on buildings outside the nest-boxes increased. The starling nested almost always in nest-boxes (type CS and S), similarly a jackdaw (type EJ). The sparrow and starling most often used the boxes for swifts (type S). Within 5 years after the modernization, the birds no inhabited the half-open nest boxes (HO).

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The Sarolga: Genetic evidence for the hybridization of brolga and Australian sarus crane

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Presumptive wild hybrids between the brolga (*Antigone rubicunda*) and the Australian sarus crane (*Antigone antigone gillae*) were first noted in the 1970s. In order to confirm hybridization and investigate its extent, we analysed the genetic diversity of 389 feathers collected in breeding and winter flocking areas in North Queensland based on 10 microsatellite loci. Fifteen samples from birds of known identity served as controls. Bayesian clustering identified indeed nine admixed individuals confirming that the Australian crane species do hybridize in the wild. Four individuals were backcrosses indicating that hybrids are fertile. The genetic analyses identified 10 times more cases of hybridization than accompanying visual field observations. For the time being, hybridization appears to be a rare event. Therefore, it is difficult to predict potential consequences at this stage. For this, investigations have to be extended including the number of genetic loci. However, there is probably no practical possibility to prevent hybridization.

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Forest management along riverbanks –which structures for bird conservation?

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In central Europe, major rivers have been dammed in the middle of the 19th century, with its concomitant negative consequences on biodiversity. Species were lost within the aquatic and alluvial habitats but also due to a loss of riparian forests and early pioneer stages along riverbanks. In Switzerland, the Rhône River has undergone major ‘corrections’ in the 60ies with the removal of almost all natural habitats. The management of the river dams focuses mainly on security issues and less on biodiversity aspects. However, the Rhône River still remains a very important ecological corridor running from the source in mountainous habitats through agricultural areas in the lowlands. Its importance as a breeding and staging site for local and migratory species stays however unclear. Here we aimed at understanding habitat preference patterns of priority bird species along the intensively managed riverbanks in order to provide realistic species-specific management recommendations. Using a very high resolution LiDAR approach, we mapped the vegetation structure along the river and conducted bird monitorings recording resident and migratory birds. Our results demonstrate the importance of biodiversity-friendly management for priority species (e.g. nightingale) and indicate guild- and species-specific habitat

selection patterns. These results have important implications for management recommendations and require a paradigm shift away from security issues only towards coexistence of biodiversity and safety aspects.

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Owl conservation and education in South Africa –Successes of 20 years Owlproject.org & EcoSolutions.co.za

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Traditional medicine or „muthi“ is a billion Rand Southern African industry. The apartheid era placed restrictions and censure on this industry which forced most traditional healers and sangomas to operate in secrecy (Suppression of Witchcraft Act of 1957). The post-apartheid era has allowed traditional healers and the use of traditional medicine to venture into the light. Traditional medicine markets or “muthi” markets are now found in all major cities and throughout rural villages. As in many cultures globally, owls have featured prominently in South African folklore and mythology. Through site visits to “muthi” markets and the participation of traditional healers in a simple questionnaire, the uses associated with owls and their body parts have emerged. In Southern African “muthi” owls are distinct as they are used for both traditional cures as well as for spiritual curses and “witchcraft”. The conclusion of this discussion will explore possible mitigation including the potential for wildlife rehabilitation centers and zoological gardens, who routinely receive owls which require euthanasia, to contribute to this market in a way that reduces the exploitation associated with the wild harvesting of owl species by traditional healers. In 1998, owlproject.org was founded and has been working with 74 schools and about 200.000 children so far. Owlproject.org is making a significant difference socially, in society and for owl conservation. Owlproject.org enjoys international recognition, has international collaboration partners (*e.g.* the Duerrenstein Wilderness Area, Austria) and is part of the worldwide study "Owls in Myth and Culture" of the Global Owl Project GLOW.

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Reproductive success of European turtle doves (*Streptopelia turtur*) in Spain in relation to nest site characteristics

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The European turtle dove (*Streptopelia turtur*), is a seed-eating trans-Saharan migratory species, holding in Spain the most important part of the western European breeding population. Turtle doves have declined strongly in recent decades (including in Spain). Factors leading to decline include reduced survival and productivity due to degradation of key feeding and nesting habitats. There is, however, insufficient data on reproductive parameters and habitats in Spain, where the primary breeding habitat is a mixture of wooded areas and scrubland close to grassland or farmland areas. Based on data collected in 2018 and 2019 (including 32 nests in 2018), we present breeding success of turtle doves in two Spanish regions (Castilla la Mancha and Catalonia), and how this varies in relation to characteristics of the nesting habitat. We found nests to occur in both *Pinus* and *Quercus* trees. Breeding success increased with height from the ground to the nest, and also with distance from the nest to the main trunk in *Quercus* trees, but not in *Pinus* trees (which are, in general higher). We discuss implications for designing measures to improve productivity of this vulnerable species.

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Behavioural responses to human disturbance in an alpine bird

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Mountain habitats are threatened by several factors, including human activities at high elevation, although the negative impacts can sometimes be balanced by positive effects related to human presence. However, knowledge of such interactions is limited in alpine ecosystems. Here we assessed the extent of behavioural responses of the alpine chough *Pyrrhocorax graculus* to different levels of human disturbance in two alpine sites, a very popular ski resort area ('disturbed site'), and a natural park with little human activity ('undisturbed area'). As the accessibility and distribution of food is a potential factor affecting bird behaviour, we focused on the availability of food types to discriminate between the effect of food and direct disturbance. We found that human presence was negatively associated with intake rates and amount of time spent in a foraging patch ('stay time'). Moreover, vigilance and flushing distances were shorter in the disturbed site than in the undisturbed area. However, intake rates were highest and stay times were shortest in the site where anthropogenic food was available. The abundance of grasshoppers (a key prey), changed significantly over space and time and was lower in the ski area, probably due to the presence of ski pistes. In conclusion, the study highlighted that human disturbance potentially affects foraging behaviour in alpine choughs, but the effects could be both positive and negative. Further investigations are needed to better disentangle the effects induced by direct and indirect disturbance and, more generally, to evaluate the potential benefits and negative effects of anthropization on mountain biodiversity.

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Number and distribution avian dangerous species on the territory of Omsk Airport in current period

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The maximum total abundance of birds at Omsk Airport in 2017 was noted in the second half of May on the territory of the airfield of local airline, which is explained by the preference of this territory by forest-steppe species. Rook (81 individuals/km²) and euroasian skylark (87) are dominants. We found that in the second half of summer and autumn of 2017 the rock dove (42 individuals/km² - 21%), Caspian gull (37 individuals/km² - 19%) and the black-headed gull (27 individuals/km² - 14%) are dominant. In the second half of July rock dove (133 individuals/km² - 76%) dominates. In the second half of August, rook (24 individuals/km² - 96%) dominates. October is the most dangerous period for planes at the Omsk Airport. During this period, a gray partridge concentrates on the areas of the weed vegetation of the territory of Omsk Airport. We found five flocks of gray partridge numbering from 12 to 25 birds. In October is this species dominant. In the first half of November field sparrow is dominant (10 individuals/km² - 32%). In the second half of November, the gray dove dominates (25 individuals/km² - 50%). Thus, during the research period on the territory of Omsk Airport, we found that the abundance is dominated by Euroasian skylark, rook, the black-headed gull, and western yellow wagtail. Potentially dangerous birds for aviation on the territory of the Omsk Airport marked 8 species: gray partridge, rock dove, gray pigeon, carrion crow, rook, common magpie, black-headed gull, Caspian gull and common kestrel.

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Linking breeding ecology and migration: light-level geolocation and monitoring of an Alpine population of Northern wheatear *Oenanthe oenanthe*

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No study to date has focussed specifically on migratory tracking of a mountain population of the Northern wheatear. Our study will determine phenology and wintering locations of a population breeding in the Piedmontese Alps, and importantly will link this information to data on breeding demography and nesting habitat. The wheatear is a long-distance migrant, and many populations of this species breed in open habitats at high elevations. Mountainous open habitats are threatened due to climate change, and the consequent upward treeline shift is likely to impact negatively on the distribution and total area of suitable habitat for species living above the treeline in the Italian Alps. Indeed, evidence already exists that Alpine breeding wheatears have undergone a range shift towards higher elevations. Climate change will also affect the demography and phenology of upland and mountain bird species. An additional potential threat to this species is its seasonal migration, as especially long-distance migrants tend to have negative population trends. We will present demographic data (population size, nest productivity and survival) from a colour-ringed population breeding in the Piedmontese Alps collected in 2019. To describe details of migration, such as dates of departure, stop-over sites, location of the wintering range and arrival dates at high elevation breeding grounds, we will attach for the first time light-level geolocators to breeding wheatears in this region. In this way, we will obtain a complete picture of the species' life cycle.

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Habitat selection by the European serin in heterogeneous Mediterranean habitats. Does the edge matter?

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The European serin (*Serinus serinus* Linnaeus, 1766) is a passerine species commonly associated to forest borders that usually occurs fruit tree crops. Nonetheless, the information referring the use of these ecotones by this species is still scarce in some areas of its distributional range. In this work we aim to evaluate if the European serin maintains its predisposition to use the ecotones between natural and cultivated habitats, and if its response varies according to the different types of edges produced by human interaction (different types of crops) and between cultivated and forest areas. The study was carried out in different locations of Eastern Spain (Valencia, Alicante and Zaragoza) during the breeding season of two different non-consecutive years by using the method of listening points. The sampling points were systematically located in different routes, separated from each other 250 meters and with a duration of 5 minutes, in which the number of singing males present in the area was recorded. In all cases we found a lower presence of males within the forests whereas a higher density was observed towards the edges. However, this negative trend was not always observed in the crop areas studied. We propose a model in which the edge effect depends on the characteristics of the environment adjacent to the forest: If it is an open environment, the abundances of European serin increase at the edge, whereas if it is a wooded crop, the abundances at the edge are similar to those of the crop.

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Is the ‘great speciator’ genus *Zosterops* also great in climatic niche evolution?

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Whether climatic niches are conserved or more plastic has important implications under prospected climate change. In particular, a high degree of climatic niche conservatism could limit the adaptive potential of species, resulting in a high extinction risk in the wake of climate warming. Here, we studied the climatic niche evolution in the bird genus *Zosterops* (White-eyes). The extraordinarily high diversification rate in *Zosterops* constitutes a highly appropriate model to study climatic niche evolution and assess sensitivity to prospected climate change. For this, we generated the – to date – most comprehensive genus-wide phylogeny including around 50% of extant species. In addition, we performed a systematic climate change assessment for the majority (i.e. >90%) of extant *Zosterops* species, with a special emphasis on novel climate conditions at the upper thermal limit of the genus’ physiological tolerance. We found that climatic niche axes slightly differ in their evolution. While precipitation related axes were dominated by ecological speciation and niche divergence, thermal niche axes showed a high amount of conservatism in the early stages of the radiation. In the later stage, however, several sister species show a remarkable contrast in thermal niche conditions, especially when considering upper thermal limits. This is of particular importance since future climate change assessment indicate that large regions across the genus’ distribution face novel climatic conditions that are largely dominated by higher temperatures. Hence, our results shed light into the genus’ resilience to climate change given the amount of climate-related evolutionary innovation accumulated during the radiation.

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Romanian Breeding Bird Atlas –methodology and results

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Romanian Breeding Bird Atlas is a joint project of the “Milvus Group” Association and the Romanian Ornithological Society. It covers a period of 12 years (2006-2017) and will be published in 2019. In order to enhance the data from the period 2006-2015 an Atlas Method, has been implemented in 2016-2017. The sampling for this method has been developed to fill the gaps by taking into account the distribution of the data from the monitoring schemes in order to obtain national representativity of the distribution of data. During 2016-2017 the scheme has been implemented in 300 10x10 km squares. Dedicated expeditions were also made in 2017 in order to reveal the distribution of some data deficient species in certain regions of Romania, or to clarify the distribution of species pairs, which are easily confused by observers. All the available data have been validated via an online database. For every species, an occurrence-based distribution map has been made, and, where possible, the presence and/or abundance of the species was modeled using ecological niche models. In the period covered by the atlas work (2006 - 2017), 251 species were recorded as breeders, including first proved breeding record for four species for Romania (*Larus canus*, *Larus ichthyaetus*, *Apus pallidus* and *Ficedula semitorquata*). For Romania, the present atlas is notable, because every breeding claim is traceable, based on an open-source database or bibliographical records and it also is the first national attempt at using modelling techniques to refine species distributions and assess relative abundances.

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Comparative life history traits of temperate and tropical wrens

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Life history traits vary in a slow-fast continuum. The animals in the slow end have slow development, low reproductive rate and long lifespan whereas it is the opposite in the fast end. Life history traits vary across latitudes and tropical songbirds often have longer developmental periods and smaller clutch sizes than temperate species. We tested this hypothesis in Troglodytidae that has a wide range in Nearctic, Neotropical and Palearctic regions. We searched the literature for clutch size, incubation period and nestling period of wren species. We compared data from 9 temperate and 17 tropical wren species. We used our 7year study results for one of the tropical wrens, Grey-breasted Wood Wren (*Henicorhina leucophrys*). Average clutch size was smaller for tropical than north temperate species (2.97 ± 0.19 [n=17] vs. 5.3 ± 0.3 [n=9]). Tropical species exhibited longer incubation period on average compared with temperate species (17.97 ± 0.52 [n=14] vs. 15.17 ± 0.35 [n=9]). Finally, average nestling period lengths did not differ statistically between tropical and temperate regions (16.29 ± 0.40 [n=12] vs. 15.49 ± 0.81 [n=9]). The results showed that tropical wren species have slower life history with smaller clutch size and slower development in terms of long incubation period than their relatives in temperate region.

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Within-individual integration of plastic physiological and behavioral responses

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Correlations among physiological and behavioral responses are well established within the POLS framework: individuals consistently differ along a shy-bold *continuum*. Individual coping styles or syndromes are, however, mostly derived from single time-point measures and their relevance has thus to be interpreted with caution. On the other hand, studying individual plasticity can lead to a better understanding of individual's ability to adapt to new environmental conditions. Indeed, plasticity of behavioral traits like parental care or aggressiveness differs among individuals and links to fitness, that is, can be targeted by selection. Nonetheless, studies where plasticity of several traits has been assessed repeatedly within the same individual over similar gradients are missing. Using captive great tits (*Parus major*) I have tested whether the same individual shows an equal degree of plasticity in both physiological and behavioral traits. For the former ones I measured baseline Corticosterone levels, mitochondrial functionality, Haematocrit and whole-organism Metabolic Rate while dropping the ambient temperature below thermoneutrality. For the latter I measured aggressiveness and take-off speed along an increased flying costs' gradient. Within-individual correlations among physiological and behavioral responses suggest the existence of integration of plasticity but, interestingly, might lead to alternative scenarios, differing from the unidirectional integration originally expected.

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Remarkably low malaria prevalence in a wetland specialist passerine

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Avian malaria parasites are widespread in nature and may seriously affect the health of their bird hosts. Therefore these parasites have long been in the focus of bird-parasite studies. However, the species richness and diversity of protozoan species causing avian malaria have only been revealed since the use of molecular techniques. Diversity and prevalence of these parasites among different host species and even between populations of a species show large variation. Here, we investigated malaria prevalence in two distant populations of a non-migratory wetland specialist passerine, the bearded reedling (*Panurus biarmicus*). While previous studies have shown that reed-dwelling bird species often carry various malaria lineages and the presence of malaria vectors have been confirmed from our study area, both prevalence and diversity of malaria parasites were remarkably low in our populations. This may either suggest that bearded reedlings avoid or quickly clear malaria infections, or malaria causes high mortality in this species. The extremely low prevalence of malaria infection detected in our study populations is consistent with earlier studies conducted on bearded reedlings and makes this species a potential model organism for investigating the genetic or behavioural adaptations of parasite resistance.

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Density dynamics in flocks of foraging dunlin (*Calidris alpina*)

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Group foraging is a feature of many shorebird species. An important property of a foraging group is its density, which affects feeding rates, incidence and intensity of aggressive interactions, and level of vigilance. I examined whether the number of nearby foragers and distance to the nearest neighbour change at short intervals of time in a fast-moving forager, dunlin (*Calidris alpina*), while at spring stopover in Delaware Bay, USA. In 96 focal individuals, both the number of nearby foragers and distance to the nearest neighbour were recorded in 5-s intervals for 60 seconds. For each focal individual, measured values were compared with those recorded at the beginning and the end of observations, with the mean of values recorded in the beginning, middle and the end of observations, and with the mean of values recorded for all 13 points throughout the 60-s observation period. In over 60% of focal individuals, both the number of nearby foragers and distance to the nearest neighbour significantly differed compared to a single measurement point, either at the beginning or the end of focal observations (binomial test: $p < 0.01$). However, when measures of density were compared to the mean of three values recorded throughout the 60-s observation period, significant differences in the number of nearby foragers and distance to the nearest neighbour were recorded in less than 20% of focal individuals (binomial test: $p < 0.01$). These results indicate that a single-point, static estimates of foragers' density, may not be appropriate in fast-moving foragers such as sandpipers.

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Unnoticed sexual domorphism in Western Bonelli's warblers *Phylloscopus bonelli* and its potential applications.

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Warblers of the *Phylloscopus* genus have sexes that are phenotypically indistinguishable and for this reason sexual selection processes have been traditionally neglected in this group. However, monomorphism is just apparent, as small but measurable sexual dimorphism in biometry has been described in several species of this genus. In the Western Bonelli's warbler, males and females are considered equals, but there is no formal assessment of this claim yet. We used biometric measures for almost 400 individuals trapped during the pre-breeding migration in Isla Grosa (SE Spain) to demonstrate that males are significantly larger than females. On average, males have wings c. 4.5 mm and tarsi 0.4 mm longer than females. Even if these sexual differences were smaller than in related European species, they were enough to sex ³/₄ of individuals by multivariate probability discriminant analyses based just on these two measures regularly recorded in ringing activities. Thanks to the sexual identity of individuals, we discovered that males pass throughout our ringing station 10 days before than females in spring. This marked proterandry would suggest that sexual selection processes can be strong in monomorphic species too.

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Flexibility in time schedules of pied flycatchers wintering in Ivory Coast: the role of age, year and local ecological conditions in West-Africa for spring migration and breeding schedules

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Experience and local ecological conditions are likely important to migrate safe and breed at the right time in spring. Miniaturization of geolocators revolutionized our knowledge of migration trajectories and time schedules in small songbirds, yet the need to recapture birds requires reasonable return rates and the accuracy of positioning is generally low. This often hampers our ability to infer how departure decisions are shaped by fine-scale ecological conditions, particularly in first-time migrants. To infer age effects and the role of local ecological conditions on spring migration and breeding schedules, we deployed in total 72 geolocators in 2017 and 2018 on pied flycatchers *Ficedula hypoleuca* at a wintering site in Ivory Coast. Moreover, we measured weather and insect availability over the course of the spring fuelling period in winter. Using the recurrence and recaptures of geolocator birds (21 IDs and 25 tracks: n=9 2018, n=16 2019), I will show how local and year differences in weather, insect availability and age influenced spring migration schedules and the chance that females start breeding. I discuss my findings against the background of earlier tracking in this species, and what this indicates for the flexibility of migration schedules.

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Differences in stopover duration of two warbler species at a refuelling site in the Russian Far East

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Most migratory birds are not able to fly directly in a single nonstop bout from their breeding site to their wintering grounds. Instead, migration is characterized by several flight bouts with intermittent stopover periods. The aim of this study was to estimate the minimum stopover length and body mass change during stopover of thick-billed warbler *Arundinax aedon* and yellow-browed Warbler *Phylloscopus inornatus* based on data of 5808 ringed birds trapped during spring and autumn seasons in the Russian Far East. The minimum stopover length was on average 2.15 days in autumn and 2.83 days in spring for Thick-billed Warblers and 3.34 days in autumn and 2.52 days in spring for Yellow-browed Warblers. Thick-billed warblers trapped later during the autumn season spent significantly less time in the area, while no change in stopover duration during the course of the spring season was found. The opposite pattern was found for the yellow-browed warbler. Our hypothesis, that yellow-browed warblers either have a longer stopover duration and have a higher refuelling rate to reach higher fuel loads to complete a longer flight range compared to thick-billed warblers, was true. The shorter minimum stopover duration of yellow-browed warblers in spring indicate a faster migration than in autumn, which is in line the fact, that birds complete their migration routes faster to reach the breeding grounds as fast as possible. However, the opposite situation in thick-billed warblers may indicate the impact of local populations. Based on our results, the area is an important refuelling place for both species.

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Flight behaviour across the Sahara Desert in migratory songbirds

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Crossing barriers is a fundamental aspect of animal migration and long-distance migratory birds face crossings of formidable barriers such as the Sahara Desert or the Himalaya Mountains twice a year. Most migratory songbirds are nocturnal migrants and accomplish their migrations by intermittent flights during the nights and stopovers for resting and refuelling during the days. Yet, it is not clear how these nocturnally migrating songbirds schedule their flight over inhospitable areas where they have an opportunity to land but not refuel (e.g. the Sahara desert). Previous results have indicated both direct non-stop flights as well as sustained nocturnal flight schedules across the entire barrier. However, these studies have used indirect methods and have not tracked the activity of the birds directly. By the use of activity loggers we can now explore migratory behavior during the entire annual cycle in full detail. I will use accelerometer and barometric data to discuss migratory schedules, flight altitudes and timing of flights across barriers in long-distance migratory songbirds.

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Light level geolocation to reveal new migration route of Central European common terns

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The majority of European common terns migrate south along the western coast of Europe and Africa. Scarce recovery data of ringed birds suggest breeding terns of eastern regions of Europe cross the Mediterranean Sea from east to west to join them at the West African wintering grounds or migrate along the eastern coast of Africa.

In this study, we used light level geolocators to reveal the migration route of inland common tern populations of Croatia and Hungary. We have found that beside the well-known western route an east African migration route is also used by European common terns. We also identified a feasibly important stopover site along the southern coast of Red Sea beside a wintering area at the eastern coast of Africa. These results indicate that migration pattern of the species might be more complex within the European population than ringing data available to date suggested.

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Migration, African non-breeding grounds and migratory connectivity in pied flycatchers from central European breeding sites

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Pied flycatchers are declining in many breeding areas and we lack full annual cycle data for many populations for a thorough assessment of potential spatiotemporal risks. With the use of light-level geolocators we tracked eight flycatchers from two longitudinally separated Czech populations, one with rapidly declining breeding numbers and second with relatively stable population. Individuals from both populations followed the NW migration route via Iberia and Western Africa. Autumn migration was by 13 days longer and timing of Sahara crossing by non-stop flights was three weeks later than that reported for Dutch birds. At the W African non-breeding grounds birds of both populations showed high mixing, suggesting low migratory connectivity. High spatial overlap was also found with birds of Dutch and British breeding origins.

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Migration ecology of the Indo-European flyway: a case study on common rosefinch

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Most long-distance migrants breeding in Europe spend the non-breeding period in sub-Saharan Africa, while only a handful of species travel southeast to the Indian subcontinent along the Indo-European flyway. Historically, this route has received little attention in migration ecology research, and only recently a few tracking studies have shed new knowledge on this little studied flyway. Yet, the exact migration routes and schedules, key stopover areas, and precise non-breeding sites of the species and populations traveling along the Indo-European flyway remain obscure. Here, we show individual migration routes and strategies of common rosefinches

from five locations across Europe, stretching a latitudinal range from Bulgaria to Finland. Furthermore, we use simulation approaches to investigate how wind conditions and resource availability along the flyway may shape bird migration strategies between Europe and India. We show, that common rosefinch population across Europe have both mutual and distinct migration patterns and that we can explain these with our environmental investigations. This research provides a deeper understanding of this so far understudied flyway.

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Estimation of permanent environmental effects for timing in pied flycatcher

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In the era of climate change, it is crucial for birds to match their life-history stages with the changing phenology of their food to maximize reproductive success. Migratory birds have been suggested to have more difficulty in adapting their timing as a consequence of a lack of information while at the wintering grounds. Understanding the sources of variance in timing among individuals is essential to predict adaptive capacities. Timing has been proven to be repeatable and heritable in several migratory bird species (barn swallow, collared flycatcher, etc.). However, most studies did not take the permanent environmental effect into consideration although ontogenetic effects could play an important role in the individual variance of timing. We show for our pied flycatcher population in Drenthe (NL) a modest heritability of timing (ca 0.11), but also a prominent permanent environment effect for timing. Using data of more than 900 recruits from 11 years, we estimated the permanent environment effect using animal models for two vital timing traits of pied flycatcher life history: the spring arrival date at the breeding site, and the time when female birds lay their first egg. The permanent environmental effects were further explored to be related to traits at the individual level (e.g. growth), the brood level (e.g. hatch date), and the cohort year level (e.g. mismatch). The results will shed light on the non-genetic determinants of variation in timing between pied flycatcher individuals to help us understand the process of how migratory bird adapt to climate change.

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More than migration –year-round movement patterns of birds in the airspace

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The airspace is a habitat used by huge numbers of birds. Billions of birds migrate towards their non-breeding sites in autumn, and back to their breeding grounds in spring. Furthermore, the airspace can host huge numbers of local movements of foraging and dispersing birds, more or less overlapping with migratory movements. However, these birds are threatened by increasing number of tall human-made structures (e.g. wind turbines, tall buildings). To reduce the collision risk of birds with such structures, mitigation actions, such as temporal shutdown of wind turbines or turning off lights during peak migration, have been proposed. The effectiveness of such actions requires in-depth knowledge on the spatiotemporal abundance of bird movements. However, little is known about the temporal and spatial abundance of year-round bird movements, except for the peak migration periods. We used three years of data from continuous radar monitoring in Sempach, Switzerland, to determine the periods of intensive movements at day and night, the frequency of pulses of high movement intensity, and the flight altitude of these birds. Because both migratory and local movements are registered by the radar, we used the concentration in flight directions to disentangle the intensity of migratory vs. local movements. Assuming a direct relation between movement intensity and collision rates, these results can be used to predict e.g. the

shutdown duration necessary to halve the collision risk with wind turbines, or the other way around, how a limited operating time budget can be optimised to reduce the collision risk.

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Strange results of the parasitological study on population of the wood pigeon, *Columba palumbus*, migrating through central Italy

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Because of strong formal limitations in collecting of material for studies on internal parasites, working on the species permitted for hunting is an attractive option for parasitologists. The study on intestinal parasites of the wood pigeons migrating in autumn through middle Italy (Emilia Romagna, Marche on the eastern coast and Tuscany, Umbria on the western coast of the area) was organized by the Bird Migration Research Foundation and University of Szczecin, Poland in collaboration with Club Italiano de Colombaccio, Italy. During the migration periods 2017 and 2018 number of corpses of pigeons hunted at traditional hunting posts was collected (in 2017 –123, while in 2018 –79 individuals). Hunters extracted pituitary tract from hunted individuals, labeled and frozen them separately in household deep freezer compartments. Usual parasitological extraction procedure with applying of decantation was performed once per season by two qualified scientists. In both seasons numbers of studied individuals per eastern and western regions were roughly balanced (in 2017 –66 ind. from the East and 57 from the West, while in 2018 accordingly 41 and 38 ind.). Altogether 23% of wood pigeons were infected by helminths (2017 –22.7%, 2018 –24.1%). Average prevalence of Digenea was 2.5%, Cestoda –16.3% and Nematoda –11.4%. Intensity of infection was usually low (1-7), but single stronger invasions were found (20 and 200). The most surprising was that prevalence of parasites in pigeons shot in the eastern regions was significantly higher than in western ones (30% against 16%). That's problem to be solved in the future.

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Stopover territoriality in the subalpine warbler during a trans-Saharan crossing

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Territoriality during migratory stopover is rare or poorly understood. This behavior is somewhat non-intuitive because territories require much time and energy to obtain and maintain; which may be better allocated towards continued migration and subsequent arrival at breeding sites. Alternatively, it may allow for increased fuel deposition during stopover and prepare individuals for breeding site competitiveness. I studied subalpine warblers (*Sylvia cantillans*) at a spring stopover site in Saharan Morocco. I assessed condition, mapped home ranges of color-ringed individuals daily and conducted playback experiments. In both years, small defined stopover areas were used especially by males. Territorial males made prolonged stopovers of up to three weeks. Playback experiments confirmed that behavioral shifts occurred consistent with territorial defense, similar to territoriality observed at breeding sites. Therefore, male subalpine warblers obtain, advertise and aggressively defend territories during spring stopover. The benefit of this behavior may be increased refueling rates and elevated testosterone concentrations prior to arrival at breeding sites.



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