



PROGRAM & ABSTRACTS

**10th Ecology & Behaviour meeting,
Montpellier, 12-16 May 2014**

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Welcome to the 10th Ecology & Behaviour meeting

The principal aim of the Ecology & Behaviour meetings is to provide young researchers (PhD students and post-doctoral fellows) with the opportunity to present their research at an international conference, in a friendly context. The scientific exchange between the researchers of today and tomorrow is facilitated by the relatively small size of the conference, and because we try to limit the financial cost for students presenting a communication as much as possible, by providing them with housing and lunches, and by applying free registration fees for them (and discounted fees for post-docs).

The 10th Ecology & Behaviour meeting hosts six sessions encompassing ecology, animal behaviour, evolution, and conservation. The organizing team wishes to warmly thank our twelve guest speakers, and our two guests presenting evening events.

Organizing this meeting was a challenge, but also a wonderful experience for our team of PhD students. We sincerely hope that the quality of this meeting will match the energy we put into organising it.

I wish to warmly thank everyone who participated in the organisation of this meeting, and I hope that you will find it a very enjoyable experience.

Louise Riotte-Lambert,
President of the organising committee.

ORGANIZING COMMITTEE



From left to right :

Board : Louise Riotte-Lambert (*president*), Julien Barthes (*vice-president*), Françoise Amélineau (*treasurer*), Claire Dufour (*vice-treasurer*), Sophie Padié (*secretary*).

Active members : Marion Cuif, Noémie Harmand, Alexandra Maufroy, Sophie Monsarrat, Odrade Nougé, Matthieu Paquet, Claire Pernollet, Paul Saunders, Hugo Valls, Marie Vasse

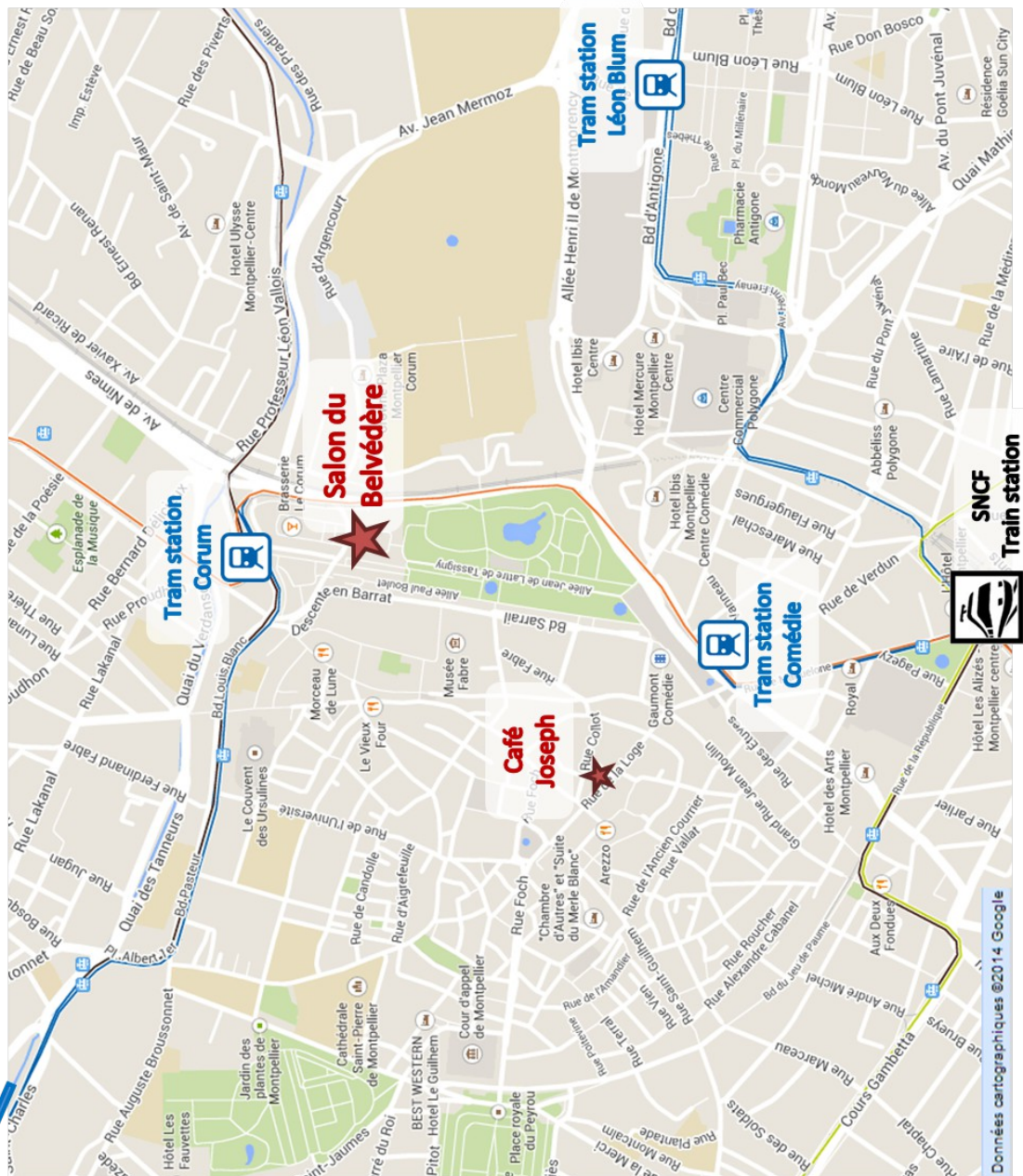
The organizers would like to thank all the people who helped to organize the conference. In particular, we want to thank, Clélia Sirami and Charlotte Faurie who contributed to the scientific committee. We are grateful to Philippe Jarne, Marguerite Platon and the accounting team of the CEFÉ (CNRS), to Stéphane Raïola (University Montpellier II), to Doyle McKey and Pierpaolo Brena for their lecture and documentary, to the "Montpellier Trad Band" for music during the Gala and to Aurélien Miralles for designing our logo. We warmly thank members of organizing committee of Strasbourg (2013) and Montpellier (2007) for their advice!

PROGRAM OVERVIEW

	Monday 12/04	Tuesday 13/04	Wednesday 14/04	Thursday 15/04	Friday 16/04
09:00		Opening		Interspecific interactions	
		Sex	Movement ecology		
10:00		Martine Maan / Patrice David	Rory Wilson / Jacques Gautrais	Erlend B. Nilsen Karen McCoy	Biodiversity patterns and habitats
				Break	
11:00		Break	Break	Interspecific interactions	Carlo Rondinini Ana Rodrigues
		Sex	Movement ecology		Break
12:00		Martine Maan / Patrice David	Rory Wilson / Jacques Gautrais	Erlend B. Nilsen Karen McCoy	Biodiversity patterns and habitats
13:00		Lunch	Lunch	Lunch	Carlo Rondinini Ana Rodrigues
					Ending
14:00		Conservation biology and behaviour		Workshop	Lunch
		Johan Elberg / David Grémillet			
15:00		Break		Intra-specific interactions and sociality	
16:00		Conservation biology and behaviour	Excursion	Mark Van Vugt Michael L. Wilson	
				Break	
17:00	Welcome Of participants	Johan Elberg / David Grémillet		Intra-specific interactions and sociality	
		Posters			
18:00				Mark Van Vugt Michael L. Wilson	
19:00		Diner		Closing gala	
20:00	Diner	Public lecture	Documentary		
22:00		Doyle McKey			

PRACTICAL INFORMATION

Tram to University Halls
(Line 1, direction: Mosson)



Montpellier City Center

Salon du Belvédère

• Welcome of participants

• Everyday sessions

• Public lecture
Tuesday 8:30 PM

• Documentary
Wednesday 8:00 PM

Café Joseph

• Closing Gala
Thursday

6:30 PM to 01:00 AM

Tramway Line 1

Tramway Line 2

Tramway Line 3

Scale:



5 min walk

DETAILED PROGRAM

Monday, May 12, 2014

16:00 - 18:30	Welcome of participants: Speakers registration and welcome of all participants of the Ecology and Behaviour meeting
19:00 - 21:00	Dinner

Tuesday, May 13, 2014

9:00 - 9:15	Opening
9:15- 10:45	Sex - Martine Maan & Patrice David
09:15 - 10:00	› Sexual selection: from individual fitness to reproductive isolation - <i>Martine Maan</i>
10:00 - 10:15	› Asymetric mate choice contributes to reproductive isolation in a pair of co-mimic sister-species of <i>Heliconius</i> . - <i>Claire Mérot</i>
10:15 - 10:30	› Predator exposure leads to a short-term reversal in female mate preferences in green swordtails - <i>Natalie Pilakouta</i>
10:30 - 10:45	› Do Red Deer Stags Use Roar pitch to Assess Rivals? - <i>Maxime Garcia</i>
10:45 - 11:00	Coffee break
11:00 - 12:35	Sex - Martine Maan & Patrice David
11:00 - 11:15	› Dispersal evolution under different mating systems - <i>Thomas Brom</i>
11:15 - 11:30	› Perception of sperm competition risk is altered by the presence of male-derived cuticular hydrocarbons in the broad-horned flour beetle <i>Gnatocerus cornutus</i> - <i>Sarah Lane</i>
11:30 - 11:45	› Local Mate Competition in the red mason bee (<i>Osmia rufa</i> , Megachilidae) - <i>Justyna Kierat</i>
11:45 - 12:00	› Fitness benefits of philopatric males in a social mammal with male-biased dispersal - <i>Eve Davidian</i>
12:00 - 12:15	› A tradeoff between nuptial gifts and mating signals in a bushcricket - <i>Flavia Barbosa</i>
12:15 - 12:35	› Mating systems and sexual selection in hermaphroditic animals - <i>Patrice David</i>
12:35 - 13:45	Lunch
13:45 - 15:15	Conservation biology and behaviour - Johan Elmberg & David Grémillet
13:45 - 14:30	› Conservation biology and behaviour: from frog perspective to a bird's eye view - <i>Johan Elmberg</i>
14:30 - 14:45	› Seal watching in Iceland; Who is watching whom? - <i>Sandra Granquist</i>
14:45 - 15:00	› Modelling bat mortality risk on a railway using acoustic flight path reconstruction - <i>Charlotte Roemer</i>
15:00 - 15:15	› Use of network analysis to evaluate avian community patterns of mortality: Eagle owl as indicator of high electrocution risk areas. - <i>Juan M. Pérez-García</i>

15:15 - 15:30	Coffee break
15:30 - 17:05	Conservation biology and behaviour - Johan Elmberg & David Grémillet
15:30 - 15:45	› Overlap and interaction of wandering albatrosses and pelagic longline fisheries - <i>Sebastián Jiménez</i>
15:45 - 16:00	› Diel behaviour of by-catch and tuna species at drifting fish aggregating devices (DFADs) in the Western Indian Ocean as assessed by fishers' echo-sounder buoys - <i>Jon Lopez</i>
16:00 - 16:15	› The advantages of being social in a globally invasive fish - <i>Morelia Camacho-Cervantes</i>
16:15 - 16:30	› Persistence in time of wolf pack in Scandinavia - <i>Cyril Milleret</i>
16:30 - 16:45	› An attempt to evaluate gorillas exhibits in European zoological garden based on their educational role - <i>Robert Zubkowicz</i>
16:45 - 17:05	› Does conservation biology need behavioural sciences? A plea for exploratory behavioural studies - <i>David Grémillet</i>
17:05 - 18:35	Posters
20:30 - 22:30	Public lecture – « Buttes en terre, bottes en caoutchouc : Ecologie, archéologie et ethnobiologie » by Doyle McKey

Wednesday, May 14, 2014

9:00 - 10:45	Movement ecology – Rory P. Wilson & Jacques Gautrais
09:00 - 09:45	› In search of a new movement framework based on energy. – <i>Rory P. Wilson</i>
09:45 - 10:00	› The puzzlingly rapid evolution of toads' innate orientation in fragmented landscape - <i>Alice Merle</i>
10:00 - 10:15	› Stuck with rigid armour in a jungle of grass and shrubs – how do tortoises manage? - <i>Ana Golubović</i>
10:15 - 10:30	› Predicting population-level differences in the distribution of non-breeding albatrosses - <i>Tommy Clay</i>
10:30 - 10:45	› Testing the impact of habitat-driven swimming movements on the dispersal of juvenile Western Pacific leatherback turtles (<i>Dermochelys coriacea</i>) - <i>Maxime Lalire</i>
10:45 - 11:00	Coffee break
11:00- 12:45	Movement ecology – Rory P. Wilson & Jacques Gautrais
11:00 - 11:15	› Effects of individual heterozygosity at neutral and immunogenetic markers on roe deer natal dispersal - <i>Cécile Vanpé</i>
11:15 - 11:30	› Dispersal behaviour and Lifetime Reproductive Success in a patchy passerine population: investigating possible compensations between reproductive events - <i>Marion Germain</i>
11:30 - 11:45	› General pattern and inter-individual variation of movements and habitat selection of black-tailed deer in a recent predation-free environment - <i>Nadège Bonnot</i>
11:45 - 12:00	› Drifting Fish Aggregating Device (dFAD) ocean trajectories and their consequences for fisher strategies and pelagic ecosystems - <i>Alexandra Maufroy</i>
12:00 - 12:30	› Collective motion in fish: from individual-scale model to collective-scale functional consequences - <i>Jacques Gautrais</i>
12:30 - 13:45	Lunch
13:45- 18:15	Excursion at the “Etang du Méjean”
20:00 - 21:30	Documentary : “ <i>Tanganyika - a tale of fish and men</i> ” Pierpaolo Brena

Thursday, May 15, 2014

9:00 - 10:30	Interspecific interactions - Erlend B. Nilsen & Karen McCoy
09:00 - 09:45	› Lynx – ungulate interactions in South-eastern Norway: predation impact across a gradient in prey density and landscape productivity - <i>Erlend B. Nilsen</i>
09:45 - 10:00	› Genetic variation in host plants influences the mate preferences of a plant-feeding insect - <i>Darren Rebar</i>
10:00 - 10:15	› A General model of Distant Hybridization: a silent threat for species persistence - <i>Claudio Quilodrán</i>
10:15 - 10:30	› Circadian rhythm of activity and niche differentiation in two competing <i>Drosophila</i> species - <i>Christophe Plantamp</i>
10:30 - 10:45	Coffee break
10:45 - 12:20	Interspecific interactions - Erlend B. Nilsen & Karen McCoy
10:45 - 11:00	› Spatial and temporal variations and stability of interaction strengths in a natural multi-trophic network - <i>Coline Jaworski</i>
11:00 - 11:15	› Do predators exert selection on dominance of the wing color pattern locus in a mimetic butterfly? - <i>Mónica Arias</i>
11:15 - 11:30	› Effects of parasites and predators on behavioral strategies in wild Trinidadian guppies - <i>Lisa Jacquin</i>
11:30 - 11:45	› Bats affect moth demography through numerical and functional responses to specific prey density - <i>Yohan Charbonnier</i>
11:45 - 12:00	› Maintaining cooperation in an interspecific cleaning mutualism - <i>Max Gray</i>
12:00 - 12:20	› Cascading ecological specialisation in host-parasite interactions and the importance of spatial scale. - <i>Karen McCoy</i>
12:20 - 13:45	Lunch
13:45 - 15:00	Workshop
15:00 - 16:30	Intra-specific interactions and sociality - Mark Van Vugt & Michael L. Wilson
15:00 - 15:45	› On Faces, Gazes, Votes, and Followers: The Evolutionary Origins and Psychology of Leadership - <i>Mark van Vugt</i>
15:45 - 16:00	› Do not only rely on your mother – Food sharing among offspring of the European earwig (<i>Forficula auricularia</i>) as an unexplored evolutionary driver of family life - <i>Jos Kramer</i>
16:00 - 16:15	› Previous social experience affects risk-taking and leadership but not following in three-spines sticklebacks - <i>Jolle Jolles</i>
16:15 - 16:30	› Throat UV reflectance plays the role of a conventional badge of status during male-male interactions in a lizard - <i>Mélissa Martin</i>
16:30 - 16:45	Coffee break
16:45 - 18:35	Intra-specific interactions and sociality - Mark Van Vugt & Michael L. Wilson
16:45 - 17:00	› How does mating status and food availability influence cannibalism in a fish with male pregnancy? - <i>Mario Cunha</i>
17:00 - 17:15	› Social networks, social information and personality in wild baboons - <i>Alecia Carter</i>
17:15 - 17:30	› Evolutionary determinants and consequences of infanticide by males in mammalian societies - <i>Dieter Lukas</i>

17:30 - 17:45	› Epistasis between adults and larvae underlies caste fate and fitness in a clonal ant - <i>Serafino Teseo</i>
17:45 - 18:00	› The effect of group size and a genetic polymorphism on the use of personal and public information - <i>Anne-Sophie Philippe</i>
18:00 - 18:15	› Impact of queen's mandibular glands on the workers development in honeybee (<i>Apis mellifera</i>) - <i>Karolina Kuszewska</i>
18:15 - 18:35	› Australopiths, baboons, chimpanzees, and speculations about the origin and evolution of war - <i>Michael L. Wilson</i>
20:00 - 23:55	Closing Gala

Friday, May 16, 2014

10:00 - 11:30	Biodiversity patterns and habitats - Carlo Rondinini & Ana Rodrigues
10:00 - 10:45	› Global modelling for mammal conservation, <i>Rondinini Carlo</i>
10:45 - 11:00	› Diversity distribution of aquatic organisms dispersed by migratory waterbirds - <i>Duarte Viana</i>
11:00 - 11:15	› Impacts of green tides on fish abundance and diversity in estuarine and coastal areas - <i>Emilie Le Luherne</i>
11:15 - 11:30	› Study of biodiversity in the by-catch communities of the pelagic ecosystem in the Western Indian Ocean and their relationship with environmental variables. - <i>Nerea Lezama-Ochoa</i>
11:30 - 11:45	Coffee break
11:45 - 13:20	Biodiversity patterns and habitats - Carlo Rondinini & Ana Rodrigues
11:45 - 12:00	› Investigating the effects of periphery vs. core population structure on genetic variation and pathogen prevalence in a natural system: the corncrake - <i>Yoan Fourcade</i>
12:00 - 12:15	› Differential stress tolerance according to genetic variability on populations of herbaceous species at the Southamerican Andes - <i>Natalia Ricote</i>
12:15 - 12:30	› Toward a mechanistic explanation of the global patterns of migratory birds diversity - <i>Marius Somveille</i>
12:30 - 12:45	› Characterizing abundance-occupancy relationships: the influence of using different measures of mean abundance - <i>Maria Grazia Pennino</i>
12:45 - 13:00	› Nature's ecological recorders: stable isotopes in Mycalesine butterflies - <i>Erik van Bergen</i>
13:00 - 13:20	› Spatially-explicit trends in the global conservation status of vertebrates - <i>Ana Rodrigues</i>
13:20 - 13:30	Closing speech
13:30 - 14:30	Lunch

Tuesday 13th of May, 20:30

*Buttes en terre, bottes en caoutchouc : Ecologie, archéologie et ethnobiologie
dans les savanes inondables de l'Amérique du Sud et d'Afrique
(in French)*

By **Doyle McKey**

Résumé: Les savanes saisonnièrement inondées de l'Amérique du Sud et de l'Afrique recèlent une diversité de paysages « à buttes » montrant une hétérogénéité topographique d'une régularité frappante. Ces paysages sont tous très peu étudiés. Certains sont des constructions humaines - des champs surélevés sur lesquels les gens ont pu planter des cultures ne tolérant pas l'inondation. En Amérique du Sud, où l'agriculture sur champs surélevés a largement disparu après la conquête européenne, les vestiges de ces anciens paysages agricoles sont étudiés par les archéologues. En Afrique, l'agriculture sur champs surélevés persiste aujourd'hui, mais elle n'a pas attiré l'attention d'anthropologues. Sur les deux continents il existe aussi des paysages « à buttes » d'origine apparemment naturelle. Malgré les questions fascinantes soulevées par la régularité spectaculaire de ces paysages, ils n'ont guère piqué l'intérêt des écologues et leurs origines restent mystérieuses. Nos études en cours sur les paysages « à buttes » d'origine humaine et naturelle suggèrent des liens entre ingénieurs du sol humains et non-humains, et soulèvent des questions venant des domaines allant de l'écologie à l'ethnoagronomie. Ces paysages demandent pour leur compréhension des apports de plusieurs disciplines : l'écologie théorique, l'archéologie, l'anthropologie et l'agronomie. En plus d'apporter de la lumière sur des questions fondamentales, leur étude peut éclairer des voies vers l'intensification durable de l'agriculture dans un type de milieu qui subira dans les années à venir d'énormes pressions démographiques.

Bibliography

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CONFERENCE GRATUITE



Mardi 13 Mai

20H30

Corum

(Salon du Belvédère)

« Buttes en terre & Bottes en caoutchouc »

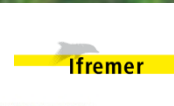
Ecologie, archéologie et ethnobiologie
dans les savanes inondables
d'Amérique du Sud et d'Afrique



Doyle McKey

Professeur à l'Université Montpellier II

<http://eb2014.sciencesconf.org/>



DOCUMENTARY

Wednesday 14th of May, 20:00

Tanganyika - a tale of fish and men

Presented by the director: **Pierpaolo Brena**

Synopsis: Lake Tanganyika is the fish-richest lake in the world, and the second largest one in volume. Its unique ecosystem has been forged by over 10 million years of evolution, but is nowadays threatened by overfishing and habitat destruction. Fish stocks are declining. More than an ecological crisis, the disappearance of this unique resource is likely to bring about the collapse of the fragile human equilibriums that have developed around lake Tanganyika. Scientists from the northern hemisphere, African industrialists and local populations cohabit on the banks of the lake. Each of them maintains a special relation with lake Tanganyika and the halieutic resources that it is home to. Although they come from contrasted cultural and social backgrounds, each of them is affected by the scarcity of the fish. Through their different perspectives on lake Tanganyika and their perception on the decline of the fish stocks, the movie traces the triggering factors of this ecological and human crisis. The sustainable managing of Tanganyika appears to be as much about the scientific approach of its resources as it is about understanding the populations that rely on it.

Place: Salon du Belvédère (Corum)



Tanganyika

A TALE OF FISH AND MEN

REGARDLESS OF OUR CULTURE, BELIEFS OR SOCIAL BACKGROUND
WE ARE ALL EQUAL WHEN FOOD IS GONE



Soirée Documentaire

(VOSTFR)

En présence du réalisateur
Synopsis: tanganyika-doc.com

14 MAI 2014 - 20 H

SALON DU BELVÉDÈRE (CORUM)

ENTRÉE LIBRE eb2014.sciencesconf.org



ABSTRACTS

Sorted alphabetically

Do predators exert selection on dominance of the wing color pattern locus in a mimetic butterfly?

Arias Mónica¹, Thery Marc¹, Llaurens Violaine¹

1 : Muséum national d'histoire naturelle (MNHN), Paris, France

Aposematism is a defense strategy, where conspicuous signals work as warning signals for predators due to their association with toxicity. The success of this strategy relies in the ability of predators to recognize such aposematic signals and avoid this prey. In case of mimicry, several species share the conspicuous signal and the predator-learning cost.

Heliconius numata is a mimetic butterfly with conspicuously colored wings. In this species, a single complex of tightly linked genes, called supergene P, controls the wing color expression. Additionally, *H. numata* is polymorphic, presenting multiple color pattern morphs, distributed throughout Amazonia. Such polymorphism is related to the mimicry with several different toxic species from distant genera. Despite the co-occurrence of several morphs of *H. numata* in certain localities providing the opportunity of mating between butterflies of different morphs, the intermediate color patterns are scarcely observed. This suggests a regulation in the allele expression at the supergene P through genetic dominance, shaped by a strong selection pressure, preventing the establishment of intermediate color patterns.

To understand the effect of the selection pressure exerted on dominance by predation, we performed a predation experiment in two natural populations of *H. numata* in Peru. Using butterfly dummies, we imitated the wing color pattern of two different morphs present in the chosen populations, and their intermediate. An exotic *H. numata* morph and a local cryptic butterfly were used as local experimental controls. As predicted, the two local aposematic morphs suffered less attacks than controls because they exhibit aposematic signals established in these populations. The intermediate morph registered most of the attacks suggesting that the intermediate morphs might be counterselected, and that strong dominance is favored by natural selection.

Coevolution of mate choice and virulence

Ashby Ben¹

1 : University of Oxford, UK

Infectious diseases are predicted to influence the evolution of mating strategies and secondary sex traits. Similarly, host behaviour will shape the evolution of pathogen traits such as virulence, producing ecological feedback that alters selection in the host population. Although these traits are usually modelled in isolation, it would be more appropriate to examine them in a coevolutionary context due to this feedback. In addition, much of the literature on the evolution of virulence has taken this term to be synonymous with host mortality, neglecting alternative disease outcomes such as sterility. This is particularly important in the context of sexually transmitted infections (STIs), which are more likely to reduce host fertility than increase mortality. Here, I explore the coevolution of mate choice and virulence in sterilising STIs, using models based on the following criteria: (i) Pathogens with higher transmission rates cause greater and more conspicuous damage to their hosts; and (ii) individuals preferentially choose mates that do not exhibit signs of infection (mate inspection). I first demonstrate that fixed levels of mate inspection can reduce selection for virulence in sterilising STIs. I then allow the strength of mate inspection (i.e. preference for healthy mates) to coevolve with the pathogen and show that the strength of the trade-off between the transmission rate and virulence can qualitatively affect coevolutionary dynamics. Specifically, extreme trade-offs lead to directional selection for either high virulence and relaxed mate inspection (weak trade-off) or low virulence and strict mate inspection (strong trade-off), but intermediate relationships can produce complex coevolutionary trajectories that are non-monotonic. These findings are consistent with the view that some STIs have evolved to avoid detection by hosts and that pathogen-avoidance traits can play a meaningful role in sexual selection. Furthermore, this study highlights the need to take a coevolutionary approach to understand host-pathogen relationships.

Should we protect small native forest remnants? Effects of habitat fragmentation on plant-bird mutualisms and regeneration of native plants

Aubert Marine¹

1 : University of Canterbury, UK

The long time isolation of Pacific islands in absence of mammalian predators has allowed the native biodiversity to evolve towards high endemism rates, often featuring unique life-history traits. Native fauna is dominated by rich avian communities, and the endemic flora is highly reliant on birds for pollination and seed dispersal. Human colonization of these islands has had major impacts on their natural environments, including lowland habitat destruction, introduction of pests and invasive species. As a consequence, a large number of endemic land bird species were quickly brought to extinction, while a considerable proportion of the remainder have been reduced and currently have restricted distributions, sometimes only remaining as small populations in isolated sanctuaries.

In New Zealand, most lowland native forests are now highly fragmented, only remaining as small isolated patches embedded in predominantly farmed landscapes. In an attempt to avoid further decline in native biodiversity, protecting small forest remnants has become common practice. However, because of the unusually high importance of birds for plant regeneration, the extensive loss of birds may cause native bird-pollinated and fleshy-fruited species to suffer from insufficient bird visits, and subsequent regeneration failure. The conservation of small isolated forest remnants holding high extinction debts as a result of mutualism disruptions may thus prove to fail over time.

My research aims to evaluate the threshold size and isolation level of native forest remnants, allowing for sufficient mutualism with birds and effective plant regeneration. This should quantify sustainable limits in bird and plant populations that may allow for long term species persistence, and should help enhancing current conservation practices.

A tradeoff between nuptial gifts and mating signals in a bushcricket

Barbosa Flavia¹, Rebar Darren¹, Greenfield Michael¹

1 : Institut de recherche sur la biologie de l'insecte (IRBI), Tours, France

In many species, reproduction carries significant costs for males, and individuals may benefit from selectively allocating their resources. Males often produce costly signals to attract females, and may also provide their mates with a nutritional gift. This is the case of the bushcricket *Ephippiger diurnus*: males produce acoustic signals to attract mates, and they also transfer a nuptial gift to females during copulation. These signals vary in syllable number, with females generally preferring signals with more syllables. Acoustic signals are generally energetically expensive, and signals with more syllables can be assumed to be more costly. The nuptial gift of males, which the female consumes after mating, is a spermatophore consisting of a sperm-filled ampulla surrounded by a large nutritious spermatophylax that can be over 30% of a male's body weight. Here we tested the hypothesis that there is a tradeoff between signaling and producing nuptial gifts in *E. diurnus* by recording signals from field-collected individuals and allowing them to mate. We found that there is a negative relationship between signal syllable number and the size of a male's nuptial gift to a female. In other words, males that produce higher syllable signals donate smaller spermatophores (percentage-wise) to their mates. These results suggest that males have different energy allocation strategies. Tradeoffs such as this have important fitness consequences, and it will be interesting to explore the factors that affect which strategy is more advantageous in *E. diurnus*.

Prediction and evolution of response to multispecific competition in a natural population of *Arabidopsis thaliana*

Baron Etienne¹, Lenglet Juliana², Amsellem Laurent², Roux Fabrice¹

1 : Laboratoire des interactions plantes micro-organismes (LIPMO)

CNRS : UMR2594, Institut national de la recherche agronomique (INRA) : UMR441

Castanet-tolosan, France

2 : Génétique et évolution des populations végétales (GEPV)

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Competition is a key process in structuring species coexistence and plant community but has often been studied based on monospecific competition or pairwise interacting species. However, a plant is rarely surrounded by a single species in natura, but rather by several species belonging to the same community. To study response to competition, it seems therefore more realistic to consider an assembly of species, while accounting for intraspecific variability at the population scale. The present work aims to study the response to multispecific competition in a natural population of *Arabidopsis thaliana*, as well as the evolution of this response. We tested the hypothesis that the response to multispecific competition can be described as an additive function of responses to monospecific competition. We also considered the importance of intraspecific variability in competition response and in the deviation from the additive model. We used four species naturally found in the same communities: *A. thaliana* (target plant), *Veronica arvensis*, *Poa annua* et *Stellaria media*. Using combinations of those three species, ten competition treatments were realized, in addition to two control treatments (intraspecific competition, and no competition). Phenological and biomass accumulation related traits have been scored for a total of 4608 target plants. Across the population, the response to multispecific competition can be predicted from responses to monospecific competition. An intraspecific variability was found regarding mono- and multispecific competition response, competitive ability and also the deviation from the additive model. Those results highlight the importance of considering within-population variability in biotic interaction and community assembly studies. Moreover, we demonstrate that response and its prediction of traits linked to growth strategy in *A. thaliana* evolve over a period of 8 years because of changes in community assembly.

Studying social transmission within *Drosophila* group with social network analysis.

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How social information can spread and be maintained within a group has been a central question in behavioral ecology. Studying the relationship between its dynamic and group structure using social network analysis allows identification of social transmission success mechanisms. Recent studies have shown that social transmission of oviposition site preference can occur within *Drosophila melanogaster* groups from demonstrator females to naïve observer ones. In this study, we dissected the interaction phase between demonstrators and observers using video tracking. We found that observers increased their rate of interaction in the presence of demonstrators. Surprisingly, the efficiency of information transfer didn't depend on observers' behavior but on demonstrators' one, with a strong positive correlation between demonstrators interaction rate and observers' oviposition site preference tested straight after. In conclusion, naïve females were sensitive to information presence in social environment but their acquisition was determined by demonstrators. Future investigation will test whether informed individuals control deliberately information transfer of oviposition site preference. This study raises questions concerning the mechanisms underlying social transmission and its ecological adaptive value.

Selfish mothers? An empirical test of parent-offspring conflict over extended parental care.

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Parent-offspring conflict (POC) theory is an interesting conceptual framework for understanding the dynamics of parental care. However, this theory is not easy to test empirically, as exact measures of parental investment in an experimental set-up are difficult to obtain. We have used free-ranging dogs *Canis familiaris* in India, to study POC in the context of extended parental care. We observed females and their pups in their natural habitat for the mother's tendency to share food given by humans with her pups in the weaning and post-weaning stage. Since these dogs are scavengers, and depend largely on human provided food for their sustenance, voluntary sharing of food by the mother with her pups is a good surrogate for extended parental care. Our behavioural observations convincingly demonstrate an increase of conflict and decrease of cooperation by the mother with her offspring over given food within a span of 4-6 weeks. We also demonstrate that the competition among the pups in a litter scales with litter size, an indicator of sib-sib competition.

General pattern and inter-individual variation of movements and habitat selection of black-tailed deer in a recent predation-free environment

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Wildlife populations are subjected to an increasing pressure in term of predation risk, notably due to human activities. However, some wild populations have increased their density and range benefiting from human-modified habitats and the loss of top predators. That is the case of the majority of wild deer population across the world, often resulting in ecological and socio-economical problems due to habitat degradation.

Our study focused on a Sitka black-tailed deer population (*Odocoileus hemionus sitkensis*) living on three islands of the Haida Gwaii archipelago (B.C., Canada) devoid of their main natural predators (wolves and cougars). These islands displayed contrasted levels of resources and predation risk, due to human activities such as hunting, and offer a unique opportunity to better understand how individuals vary in their response to environmental heterogeneity and to variation in the trade-off between resource acquisition and risk avoidance.

Although this deer population is free from natural and human predators in two islands for ca. 100 years, deer seemed to be still sensitive and able to react to the predation risk (e.g. by avoiding human presence, increasing the time spent vigilant in the presence of wolf cues). Because personality traits may cause animals to have different anti-predator responses, and notably to distribute themselves in a non-random way in response to the predation risk and resource levels, we were now interested in how individuals differ in their behavioural tactic (in term of habitat selection, movement and activity patterns) for solving the trade-off between risk avoidance and feeding.

Waterfowl foraging in winter-flooded rice fields: weed control and increased straw decomposition

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Winter flooding of rice fields provides foraging habitat for waterfowl. The waterfowl visiting could provide agronomic benefits to farmers, such as increased residual straw decomposition and weed control. Our study will experimentally test the effect of domestic Mallard ducks (*Anas platyrhynchos*) on the weeds seed bank and on straw decomposition.

The impact will be measured at three waterfowl densities: (1) 5-13 individuals/hectares, the historical density found naturally in Camargue (Pirrot, 1981), (2) 23 individuals/hectares, the density presently found in Camargue (determined by nocturnal surveys), and (3) 300 individuals/hectares commonly used in integrated rice-duck farming systems in Asia.

Enclosures of 9 m² will be established on two winter-flooded rice fields. Ducks will be introduced to each plot, for one hour. Weeds seed bank will be measured in each plot, before and after the introduction of waterfowl, by taking 9 soil cores (10 cm-diameter to 4 cm-depth). Soil samples will be sieved to 300 µm and dried at 70°C; seeds will then be identified and weighed. The pre and post waterfowl straw biomass will be measured by counting standing stubble on ten subplots of 25 cm² in each enclosure, as well as collecting the stubble and the loose straw from five of the ten subplots. Collected straw samples will be dried and weighed to determine change in dry weight. The same method will be used on an exclusion plot which will serve as control. Comparing the enclosures with the control will help determine the impact of dabbling ducks on the two agronomic variables.

This should help considering rice field flooding as a valuable habitat management technique benefiting both farmers and waterfowl.

Dispersal evolution under different mating systems

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Dispersal is a central life history trait of organisms and a key process influencing population genetic structure and dynamic (regulation, persistence, colonization). Evolution of this complex trait depends on many factors such as competition for resources or mates, inbreeding avoidance and kin interactions. Mating system can influence some of these factors. For instance, it can change the effective number of reproducing individuals in a population and the intensity of mating competition. The link between mating system and dispersal has been already approached in theoretical works with different types of models. However, to our knowledge, no study investigated a large range of variation of mating systems in interaction with other demographic and genetic factors.

We studied the evolution of dispersal under different mating systems by building an individual-based model of reproduction and dispersal in a metapopulation. We used an evolutionary stable strategy approach and pooled in this framework both monandry, polyandry, monogamy and harem system. We tested how important are mating systems on dispersal evolution according to gender and how they affect kin-competition and genetic structure. This work also checks the effects of inbreeding avoidance and environmental parameters to assess the relative importance of each one.

Our results show that mating systems can play a great role in the evolution of dispersal and are really important in the evolution of sex-biased dispersal, even in absence of sex-specific competition for resources or dispersal cost bias. Furthermore, kin competition avoidance appears as a key feature that conditions the evolutionary relationships between dispersal and mating strategies.

Influence of endogenous and environmental drivers on small pelagic fish condition in the Gulf of Lions

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Along with important changes in stock biomass and population structure, recent research highlighted long term fluctuations of small pelagic fish body condition in the Gulf of Lions indicating different periods during which anchovy and sardine were in an average (1992-2004), good (2005-2007) or poor (2008-2013) condition. Body condition is defined as the quantity of nutrient reserves and widely used in ecological studies to determine the nutritional or physiological state of an individual and give information about its future performances. In order to better understand the fluctuations observed in these two species, a detailed analysis was conducted to determine endogenous or environmental drivers of body condition. Research surveys and fishermen sampling allowed to establish a dataset including morphometric (i.e length and weight; used to calculate the Le Cren condition index) and physiological (e.g sex, age) characteristics of more than 30000 individuals (anchovy, sardine, sprat) from 1971 to 2013.

Males and females were in similar condition regardless of the period (1992-2004, 2005-2007, 2008-2013). On the other hand, we found a significant interaction between age and period. Age-0 sardines were in much better condition during the last period than before, supporting recent observations of high recruitment levels. Further, condition decreased sharply with increasing age in the last period, offering potential causes to the observed disappearance of larger and older sardines. For all species, body condition exhibited both a clear seasonal pattern, peaking at the beginning of summer and interannual fluctuations. While both seasonal and interannual fluctuations were positively correlated respectively with the Western Mediterranean Oscillation (integrative indicator of river runoff, temperature and wind mixing) and the Rhone runoff in anchovies, they were mainly explained by temperature and chlorophyll a in sardines. These results show how body condition can offer insights into potential mechanisms driving population dynamics and its link with the environment.

The advantages of being social in a globally invasive fish

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Invasive species represent one of the greatest threats to biodiversity. Invasions typically begin with the arrival of small numbers of individuals to an unfamiliar environment. Social behaviour may play a crucial role enabling them to form a viable population. By associating with individuals of native species that are similar in appearance, invading individuals could enjoy the advantages of a large group.

In a series of experiments, I investigated if invasive fish associate with native species and, by doing so, they become more efficient exploring an unknown habitat and finding food. Guppies (*Poecilia reticulata*) are tropical fish that have invaded freshwater ecosystems in every continent. My research focuses on the Mexican Central Plateau where guppies are responsible for the declines of several endemic fish (many of them are highly threatened). I found that when guppies associate with native fish they are more efficient finding food and exploring a novel habitat than when they are in smaller groups of guppies only. Interestingly, guppies are more willing to associate with certain species, those with which they find food faster. These results reveal a mechanism that could be the key for survival during the critical initial stages of invasion. Social invasive species integrate better.

Social networks, social information and personality in wild baboons

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Sociality can have important fitness consequences for individuals and much research has been dedicated to understanding the costs and benefits of group living. The recent advent of social network analysis has allowed researchers to concurrently investigate direct and indirect associations between individuals and thus individuals' access to social information. Social information can play a critical role in the reproduction and survival of social animals, however little consideration has been given thus far to understanding individual differences in access to social information and the propensity for individuals to use social information. In this study, we investigate whether individual differences in social network position, task solving and social information use is related to personality in wild baboons *Papio ursinus* through the use of detailed social network observations over 4 years and two field experiments to assess social information use. In those cases in which personality predicted spatial associations in baboon networks, shy individuals were more likely to be found in close proximity to other shy individuals, whereas bold baboons had few strong associations with others. However, bold baboons were more likely to solve a novel foraging task, and were also more likely to use social information to solve a task. We suggest that personality constrains both an individual's access to social information because of the patterning of social relationships between task solvers and non-solvers and its use of social information, thus limiting the flow of information in the social group.

Female reproductive investment in response to the behaviour of a sick partner

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A lot of studies have shown that female birds can adjust their reproductive investment to environmental cues by modifying transfer of biological compounds (hormones, antioxidants, antibodies and lysozyme) to the eggs and producing a different number of daughters and sons. They can also differentially allocate resources according to the sex of the offspring. Females can also modify their maternal investment in response to male sexual traits (long tails, bright colors and songs) that signal mate genetic quality and health. However, no studies have directly investigated the ability of females to perceive sickness of a partner and how they response to it. The aim of our study was to investigate if female zebra finches change their investment into the eggs in response to a sickness behavior of their partner due to an immunization with a novel antigen, Lipopolysaccharide. Firstly, we carried out a behavioral experiment to investigate if males injected with LPS showed a sickness behavior and if females were able to detect male sickness. Secondly, we studied if females mated with males injected with LPS changed their investment into the eggs in terms of antibody and lysozyme deposition and sex allocation. A female mated with a sick male might perceive the risk for her offspring of contracting a disease and consequently she may provide the eggs with macromolecules that can protect them or she may favor the more vulnerable sex. The treatment induced short-term sickness behavior and long-term body mass loss in males but we were not able to detect female avoidance of sick partners. Females did not modify their investment into the eggs. It may be explained by the short effect of the immunization on male behavior or by the short time the females had to change their investment, although it would have been beneficial for offspring fitness.

Bats affect moth demography through numerical and functional responses to specific prey density

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Global change is expected to modify the frequency and magnitude of defoliating insect outbreaks in forest ecosystems. Bats are increasingly acknowledged as effective biocontrol agents for pest insect populations. However, a better understanding is required of whether and how bat communities contribute to the resilience of forests to man- and climate-driven biotic disturbances. We studied the responses of forest insectivorous bats to a major pine defoliator, the pine processionary moth *Thaumetopoea pityocampa*, which is currently expanding its range in response to global warming. We used pheromone traps and ultrasound bat recorders to estimate the abundance and activity of moths and predatory bats along the edge of infested pine stands. We also used pheromone lures to cause artificial aggregates of mating male moths and test their effects on bat foraging activity, controlling for prey density. We also evaluated the top-down regulation of moth population by estimating *T. pityocampa* larval nest abundance on the same edges the following winter. We observed a close spatio-temporal matching between emergent moths and foraging bats, with bat activity significantly increasing with moth abundance. The foraging activity of some bat species was significantly higher near pheromone lures, i.e., in the close vicinity to prey aggregates. Furthermore the moth fertility significantly decreased with increasing bat activity during the flight period of adult moths.

These findings suggest that bats deploy numerical and functional responses to a specific and abundant prey, which can ultimately result in an effective top-down regulation of the population of the prey. These observations are consistent with bats being useful agents for the biocontrol of insect pest populations in plantation forests.

Predicting population-level differences in the distribution of non-breeding albatrosses

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Advances in tracking methods have greatly improved our knowledge of seabird movements, yet we still know relatively little about the key drivers of non-breeding distributions of birds from different populations. We tracked 66 grey-headed albatrosses *Thalassarche chrysostoma* with archival geolocator tags for a mean of 426 days from two major breeding colonies in different ocean basins; in the south-west Atlantic Ocean (Bird Island, South Georgia, n=41) and in the south-west Indian Ocean (Marion Island, Prince Edward Islands, n=25). The non-breeding distributions of birds from the two populations showed limited overlap; South Georgia birds foraged mainly within 1500 km of the colony or around the Falklands, and to a lesser extent around Marion Island, whereas individuals from Marion Island foraged around their colony, to the east of the Kerguelen Plateau and to a lesser extent in the Drake Passage. Grey-headed albatrosses are biennial breeders and spatial segregation was much more pronounced during the non-breeding summer than the first or second winter away from the colonies, suggesting that non-breeding birds avoid waters near other grey-headed albatross colonies due to potential competition with breeding birds. I will present results from models that determine quantitatively whether the differences in distribution between the two populations are the result of environmental, geographical and/or density-dependent processes.

Passive acoustic descriptor of benthic populations

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Considerable effort has been devoted to understanding the structure and functioning of marine ecosystems with the goal of better managing marine heritage and sustainably exploiting marine resources. Maerl beds are biogenic substrates, which has been the subject of increasing attention in recent decades. These biosedimentary formations can host a wide range of organisms (up to 200 species / m²). The bay of Brest is an ideal place to study maerl beds since they cover 30% of its total area. However, current methods of monitoring this habitat are intrusive and destructive (e.g. dredging and trawling).

Many marine invertebrates produce sounds voluntarily mainly for communication or involuntarily when moving, responding to threats or eating. Studies on scallops, sea urchins and snapping shrimps among others, suggest that passive acoustic methods are transferable to other marine invertebrates.

In this PhD work, we propose to develop new descriptors of benthic habitats using modern techniques of passive acoustics that have the advantage of being (1) non-intrusive, (2) directly linked to the behavior of organisms and (3) applicable continuously over long periods. These descriptors likely provide access to the soniferous biodiversity of the environment and to the activities of organisms (rhythms and behaviors). We will also study the impact of dredging through comparisons of the different acoustic scenes.

This project begins with a laboratory calibration. The first step is to highlight soniferous species present in the maerl. Then, we will introduce an analysis of noise quantization with the goal of making the link between sounds and abundance, and between sounds and diversity. A third laboratory experiment will study the acoustic differences between samples from a maerl site strongly impacted by fishing and a second site less impacted by fishing. The second part of the PhD work is the in situ application of experiments developed in the laboratory.

How does mating status and food availability influence cannibalism in a fish with male pregnancy?

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Cannibalism, the act of killing and at least partially eating a conspecific, is a widespread behavior in the animal kingdom. Despite being deemed as a bizarre behaviour, the cannibal gains direct benefits like energy and reduced intraspecific competition. Nevertheless, cannibalism may also have costs if directed to offspring or other relatives, thus reducing the cannibals' fitness.

Species of the family Syngnathidae (seahorses, seadragons and pipefish) are generally known for male pregnancy where nutrient provisioning to the embryos increases paternal investment in reproduction. So, we hypothesized that filial cannibalism by a male should probably be a rare or absent occurrence. However, cannibalism from females and non-pregnant males might be more prevalent as, apart from energetic advantages, it would decrease the fitness of their competitors. Thus, we aimed to investigate whether intercohort post-hatching cannibalism in *Syngnathus abaster* occurs in both sexes and how it might be affected by reproductive status and nutritional state. We used 96 individuals, separated into 4 groups: pregnant males, post-pregnancy males (0h to 96h after birth), non-pregnant males and females. All groups were tested either in normal- or food-restricted conditions. Moreover, post-pregnancy males were tested with related and non-related juveniles, to check for kin discrimination.

We found that pregnant males and post-pregnancy males do not cannibalize related or unrelated juveniles unless when deprived from food. However, females and non-pregnant males cannibalized juveniles in all experimental conditions. Our results show that mating status and sex do affect the occurrence of cannibalism. Furthermore, results suggest that despite energy investment in the brood, if not properly fed, males adopt a cannibal strategy.

Dynamics of an aquatic parasite in a semi-terrestrial host

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Individuals often vary in the ability to resist parasitic infections, and the resulting asymmetries in infection influence how parasites are transmitted and persist among host populations. The fungal parasite, *Batrachochytrium dendrobatidis* (Bd), presents a notable case of how infection can widely vary within and among host species, yet the sources of this pronounced variation remain enigmatic. Whereas Bd has a fully aquatic life cycle many amphibians that this parasite infects spend a substantial amount of time in terrestrial habitat. Owing to this discrepancy in the life histories, terrestrial activity may reduce the risk and severity of infections from Bd, and heterogeneities in host behaviour among aquatic and terrestrial habitat may produce variation in infection from this parasite. We designed a controlled experiment to test the effect of terrestrial activity on Bd infection in a semi-terrestrial host species, Alpine Newts (*Mesotriton alpestris*). This experiment confirmed that the prevalence, accumulation and persistence of Bd infections differ according to the type of habitat that hosts occupy. This experiment also revealed that terrestrial activity by hosts may serve as a behavioural mechanism for reducing infection. I will present the design and detailed results of this experiment as well as discuss the implications of our findings for both the dynamics of Bd and general theory on host-parasite interactions.

Fitness benefits of philopatric males in a social mammal with male-biased dispersal

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A major objective in evolutionary biology is to understand processes by which alternative phenotypes are created and maintained within populations. In many social species, most members of one sex leave the natal group to reproduce whereas a smaller proportion of individuals remains at home. We currently do not fully understand why dispersal and philopatry exist in the same sex in populations of the same species. Here we examine the dispersal of 238 individually known spotted hyena males in the Ngorongoro Crater, Tanzania, and compare the fitness costs and benefits associated with male philopatry and dispersal using long-term behavioural observations and large-scale paternity analyses. Spotted hyenas live in female-dominated social groups («clans») with male-biased dispersal. We previously showed that male dispersal is driven by female mate-choice rules, and that males that select clans with the highest number of young females have higher long-term reproductive success than other males. We now show that staying at home may not be the best choice in terms of long-term fitness prospects expressed as the number of offspring produced. However, philopatric males start to reproduce earlier and sire offspring with higher quality females than immigrant males. Our study suggests that philopatric males may benefit from advantages associated with their natal status such as their higher social status and better familiarity with the habitat and other clan members than immigrant males. Male philopatry in a species with male-biased dispersal may therefore be adaptive.

How do co-occurring sister species deal with reproductive, spatial and dietary overlap?

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The evolution of species could be driven by selection (natural or sexual) via, for example, divergence in habitat selection and mate recognition systems. When sister species share the same environmental niche in allopatry, their co-occurrence in sympatry may result in at least one species showing character displacement. We test this hypothesis in the African striped mouse, endemic to southern Africa. The genus *Rhabdomys* composed of 5 mitochondrial clades that radiated around 4.3 Ma years ago. The species status of these clades is unresolved. However, two taxa, *R. bechuanae* and *R. dilectus*, have a consistently high mitochondrial and nuclear divergence, suggesting that they are distinct species. Interestingly, these species are parapatric and occur in areas characterized by distinct precipitation, temperature and vegetation gradients, although several contact zones were recently found where the two sister species occur in environments with similar characteristics. Such ecological and geographical settings provide a natural context in which to assess the plasticity of the environmental niches of the two species and the impact of their potential interaction in sympatry on this niche. We first did a spatial analysis to investigate habitat overlap at a micro-geographical scale, using radio-tracking data and analysis of home range size and overlaps between and within each species in sympatry and allopatry, and under different environmental conditions. In order to test sexual discrimination between the two species, we performed sexual preference tests and dyadic encounters of individuals. We also evaluated resource holding potential using intra-sex behavioral dyadic encounters between and within the species presenting the two interacting mice with their favorite food after slight deprivation. Finally, we assessed diet variation across habitat types and species using $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ isotopic analyses of the fur of free-living striped-mice. These results suggest that potential for competition and character displacement may exist.

Conservation biology and behaviour: from frog perspective to a bird's eye view

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My plenary will explore the historical and ecological roots of the subdisciplines «conservation biology» and «behavioural ecology», which together make up the backbone of this session. Based on arguments about moral and factual necessities to halt biodiversity loss, I will discuss why, how and to what extent conservation biology and behavioural ecology have come to merge. I will highlight how this has affected conservation efforts in a variety of contexts and geographic settings. In doing so, most of my examples of successful integration between these research fields concern amphibians, reptiles and birds, spanning a wide range of spatial and temporal scales. My emphasis will be more on the conceptual cross-fertilization between the research fields than on the technical development permitting it. Rapid deterioration and reduction of natural habitats crucial for upholding biodiversity provides a backdrop for an analysis of research needs and a horizon scan of further integration of conservation and the study of animal behavior.

Investigating the effects of periphery vs. core population structure on genetic variation and pathogen prevalence in a natural system: the corncrake

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Pathogens are crucial in the evolution, ecology and demography of wild populations. Inbreeding and reduced genetic diversity are known to affect the capacity of an individual to resist pathogen infection so that a negative relationship between pathogen prevalence and heterozygosity is expected. An expected consequence is that pathogens may shorten extinction time in populations with low genetic diversity. Peripheral populations tend to be smaller and more isolated than core populations and are, accordingly, more prone to incur the costs of reduced genetic diversity. Elevated extinction risk in peripheral populations is of particular concern for species with unfavourable conservation status. However, predictions may not hold if population census size does not reflect effective population size.

We addressed this issue in a migratory and short-lived bird, the Corncrake *Crex crex*, largely distributed across the Palearctic. Its decline over the past decades in Western Europe triggered many conservation programs while Eastern populations remained large or increased. We analysed the relationship between genetic diversity, gene flow and avian malaria prevalence across a large part of the species range including European and Russian populations. We found a very low level of population structure and no evidence of reduced diversity in peripheral populations. Despite the fact that we recovered the known local demographic dynamics using genetic methods, effective population size remained high across the whole of Europe. Furthermore, malaria prevalence was 10 times as high in core as in peripheral populations. Contrary to usual predictions, our results clearly show that two strong decouplings may occur in periphery-core systems, one between census and effective population size and one between genetic diversity and pathogen prevalence. Species dispersal characteristics and the ecology of pathogen community are likely to strongly affect the relationship between population size and pathogen prevalence precluding the reliable forecasting of a population fate.

Do Red Deer Stags Use Roar pitch to Assess Rivals?

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It is well established that in humans, male voices are disproportionately lower pitched than female voices, and recent studies suggest that this dimorphism in fundamental frequency (F0) results from both intrasexual (male competition) and intersexual (female mate choice) selection for lower pitched voices in men. However, comparative investigations indicate that sexual dimorphism in F0 is not universal in terrestrial mammals. In the highly polygynous and sexually dimorphic Scottish red deer *Cervus elaphus scoticus*, more successful males give sexually-selected calls (roars) with higher minimum F0s, suggesting that high, rather than low F0s advertise quality in this subspecies. While playback experiments demonstrated that oestrous females prefer higher pitched roars, the potential role of roar F0 in male competition remains untested. Here we examined the response of rutting red deer stags to playbacks of re-synthesized male roars with different median F0s. Our results show that stags' responses (latencies and durations of attention, vocal and approach responses) were not affected by the F0 of the roar. This suggests that intrasexual selection is unlikely to strongly influence the evolution of roar F0 in Scottish red deer stags, and illustrates how the F0 of terrestrial mammal vocal sexual signals may be subject to different selection pressures across species. Further investigations on species characterized by different F0 profiles are needed to provide a comparative background for evolutionary interpretations of sex differences in mammalian vocalizations.

Collective motion in fish: from individual-scale model to collective-scale functional consequences

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Collective motion is a widespread feature in animals and is fully relevant in population dispersal studies and movement ecology. In fish, many species travel in schools, some of which comprise millions of individuals.

At the landscape scale, schools can be regarded as the functional unit, and be analyzed as such (trajectories, fission/fusion, sizes distributions, fisheries and conservation concerns...).

At the behavioral scale, individuals have to coordinate their moving decisions, and they must do so in reaction to the few neighbours they can perceive.

At the collective scale, the school shape and trajectory results from the non linear cumulation over space and time of these numerous local coordinations.

The behavioural rules followed by individuals of a given species could then be crucial in understanding the evolution of collective motion and the associated functional benefits (doi:10.1098/rsfs.2012.0033).

My work partake in the concerted effort to understand how the three scales interact, namely how the self-organized internal dynamics of schools couple with ecological factors.

I will first present a behavioral model of schooling behavior which has been designed and parametrized from a set of small school records in lab conditions (doi:10.1371/journal.pcbi.1002678). I will then illustrate some functional predictions for large schools in open space.

Dispersal behaviour and Lifetime Reproductive Success in a patchy passerine population: investigating possible compensations between reproductive events

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Dispersal is a key process with broad ecological and evolutionary consequences in natural populations. However, these consequences depend on dispersal success in terms of individual fitness. Most theoretical models of dispersal evolution make assumptions on the relative fitness components of dispersing and non-dispersing individuals. Consequently, many studies have investigated possible fitness consequences of dispersal by comparing a few traits linked to fitness between non-dispersing and dispersing individuals. Importantly, because dispersing and non-dispersing individuals may adopt different lifetime strategies and compensations may occur between fitness components, comparisons of separate fitness traits may be misleading. Furthermore, because fitness compensations between fecundity and survival have been reported, accurate measures of fitness should include analysis of both annual fertility rates and annual survival. Here, we compared (1) lifetime number of recruits and (2) annual number of recruits and annual survival between individuals according to their dispersal history in a wild population of a small migratory hole-nesting passerine bird, the collared flycatcher (*Ficedula albicollis*), on the island of Gotland, Sweden. The probability of recruiting at least one young over lifetime is correlated to the proportion of lifetime dispersal events, but differently between sexes. In males, this probability decreases with the proportion of lifetime dispersal while in females, no relation was found. This result is in line with the classical prediction of a higher benefit of philopatry for males in term of reproductive success. I will therefore present the results concerning annual measures of fecundity and survival. Altogether, these results will help us to understand the evolutionary pressures acting on dispersal in natural populations.

Do "pictorial" flower meadows provide valuable foraging habitat for insect pollinators?

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Flower-visiting insects provide an important pollination service; however, many species of pollinators are in decline due to multiple, interacting pressures and processes. Although urbanisation contributes to the fragmentation and loss of pollinator habitats, urban green spaces can provide florally-rich oases that support a high diversity of pollinator species. The long-term maintenance and enrichment of this diversity requires a network of suitable habitat throughout urban areas, which parks and green space managers are increasingly eager to contribute to using flower meadow seed mixes. However, due to inherent budgetary and aesthetic constraints associated with managing civic spaces, «pictorial» flower seed mixes are often used as they provide a reliable and low-cost method of enhancing the visual amenity and biodiversity value of urban parks. Although these new mixes are designed to provide a seasonal succession of flowers at a high density, they incorporate morphologically altered cultivars and non-European species to enhance their appeal for humans, rather than biodiversity. Their value as foraging habitat for pollinating insects remains unexamined. In this study, we compare patterns of insect visitation and pollen and nectar provision over a season in two popular annual «pictorial» flower seed mixes and a commonly-used cornfield annual control.

Stuck with rigid armour in a jungle of grass and shrubs ? how do tortoises manage?

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Hermann's tortoises cover long distances in their mosaic habitats. Movements often take place through dense vegetation, from grasslands to spiny bushes (e.g. in macchia). While pushing their way through, protuberant parts of tortoise's shells sometimes get stuck on vegetation. In that specific situation tortoises have to release themselves to be able to move further in a preferred direction. Furthermore, when disabled to move, tortoises can succumb from predation, overheating, starvation or dehydration. For testing of behavioural patterns involved in releasing from vegetation we used dynamometer attached to unstretchable rope with a loop on the end. This loop was fitted between protuberant front part of the plastron and front legs of examinees. During three minute long test we measured maximal muscular strength and noted all direction changes. We tested 452 adult tortoises (216 females and 236 males) at six localities in the central Balkans.

Tortoises used two different tactics in releasing from the experimental setup. Group of tortoises which inhabit herbaceous habitats pulled persistently and forcibly in one direction. Others, living in Mediterranean macchia, changed directions swiftly, with weak occasional yanking of the apparatus. «Mediterranean» strategy was the efficient one in our experimental design. Reverse movements were highly useful for releasing. Vegetation cover present in the habitat probably imposes specific behavioural responses. In herbaceous habitats, tortoises live in dense meadows thus mostly stuck on grass. Tearing grass blades is probably more efficient releasing technique comparing to time consuming directions changing. Oppositely, in macchia, tortoises stuck on a branch of a spiny shrub resilient to tearing, can overcome it only by changing the direction until the obstacle fall out. Females and males generally showed similar behavioural patterns, although females used slightly more force in releasing trials. Probably experiential learning has the major role in shaping of this important behavioural response.

Genetic signatures of a recent anthropogenic regression in an avian top predator during the last century: bottlenecks and expansions of the Eagle Owl (*Bubo bubo*) in Iberian Peninsula.

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Loss of genetic variation may affect the population ability of species to deal with rapid environmental changes or selection pressures. In this work we explore the genetic consequences of the recent bottleneck and posterior recovery of the Eurasian Eagle Owl (*Bubo bubo*) in the Iberian Peninsula. During the last century, the species suffered a sharp decline by the direct persecution of hunters and the mortality by electrocution in power lines. The legal protection of raptors since the 1970s and the correction of power lines since the 1990s, allowed for the recovery of the populations of this owl. However, it remains unknown if these population contractions and expansions could have influenced the current species' pattern of genetic diversity.

We genotyped 235 eagle owl from ten subpopulations in the Iberian Peninsula using eight microsatellite markers. Genetic data revealed the existence of three genetic clusters grouping separately central, south-western and south-eastern samples. We found moderate levels of differentiation among subpopulations, following a pattern of isolation by distance. Moreover, significant signatures of recent bottleneck events were detected for the

three analysed clusters. Both results show that the genetic signatures might reflect recent demographic changes in spite of the relatively high dispersal rates of the owls.

Seal watching in Iceland; Who is watching whom?

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Wildlife tourism is a fast growing industry and since disturbance of wildlife due to tourism frequently has been documented, it is of importance to develop management strategies for targeted animal species and areas. In this study, we investigated the effect of land-based seal watching on the haul-out behaviour of harbour seals (*Phoca vitulina*) between June and August of 2008-2010 on Vatnsnes, NW Iceland. The results showed that the behaviour and spatial haul-out pattern of seals was affected by the tourists. We found that the seals were more vigilant in the presence of tourists in the area and vigilance increased when tourists behaved in an active way. During the peak of the tourist season, seals preferred to haul out further away from land compared to other periods of the summer. Single tourists and couples behaved more passively compared to families and tourist groups of more than two adults. However, all tourist group types were significantly more active in an approaching zone than in the seal watching zone. Education of tourists, for example through a code of conduct built on these results, is advisable to minimise disturbance of seals in the area.

Maintaining cooperation in an interspecific cleaning mutualism

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Cooperation fundamentally requires both parties involved to derive a benefit from the relationship. When cheating occurs one party incurs a cost and if an individual is cheated too frequently there will be no net benefit to the relationship. Therefore cheating above a certain threshold will destabilise a cooperative system, possibly to the point where cooperation may no longer occur at all. *Labroides bicolor* is an obligate cleaner feeding exclusively off other fish. By removing ectoparasites («cleaning») from many other species of reef fish the cleaner benefits by nourishment and decreased predation risk. However, *Labroides bicolor* also cheats by consuming client mucus or healthy tissue, to the cost of their so-called clients. *Labroides bicolor* cheats significantly more frequently than other congeneric cleaners, involved in cleaning mutualisms with very similar reef communities. So how does this species remain in a functional mutualism at a higher cheating frequency than its closely related species? I present evidence that in a minority of cases the mutualism has in fact destabilised. Also using data from manipulative aquarium experiments supported by non-invasive field observations, I discuss several key behavioural mechanisms and aspects of movement ecology that limit cheating in interactions with the majority of client species.

AnaEE-France infrastructure facilities for behavioural ecology studies

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AnaEE-France (www.anaee-s.fr) is a national infrastructure dedicated to the biological study of continental ecosystems (aquatic and terrestrial) and their biodiversity. This Infrastructure brings together an integrated network of the French major experimental, analytical and modeling platforms dedicated to the study of ecosystems and biodiversity. The proposed Infrastructure gathers open-access to experimental facilities and associated biological resources and data. Among those facilities, several of them enable behavioural ecology studies by providing experimental and/or observational facilities in controlled, semi-natural or natural environments:

- the two Ecotrons that provide means to manipulate ecosystems ex natura in a replicated way and with process measurements;
- four semi-natural experimental platforms to manipulate terrestrial and aquatic ecosystems: the Metatron, an experimental system to study dispersal and metaecosystems for terrestrial organisms; PLANQUA, an experimental aquatic platform gathering aquatic mesocosms, analytical tools and animal housing facilities; PEARL, another aquatic platform with experimental and analytical facilities such as lentic mesocosms, ponds, lotic channels, spawning channels, olfactometers...; lake mesocosms;
- three sites equipped for long-term in natura experiments in major biomes (forests, grasslands and lakes): the Nouragues station in French Guiana for the study of tropical forests functioning and biodiversity; the SAJF enabling to study alpine organisms in their living environment; the SOERE GLACPE dedicated to the long term observation of peri-Alpine lake ecology and in situ experiments.

AnaEE-France is funded by the ANR (French National Research Agency) under the «Investments for the future» programme for the period September 2012 to December 2019. This funding aims at developing or creating facilities that have been selected for their originality, their interest for a large scientific community, their accessibility to the European research community and their focus on continental ecosystems (aquatic and terrestrial) and their biodiversity.

Does conservation biology need behavioural sciences? A plea for exploratory behavioural studies

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Conservation biology aims at maintaining and restoring biodiversity. This requires intimate knowledge of ecological processes, and interdisciplinary research. Due to the current biodiversity crisis, conservation biology is also 'a science with a deadline', and limited resources (time and funding) have to be allocated strategically. In this context, one may argue that behavioural sciences are only of peripheral interest, because of their narrow hypothetico-deductive framework and their focus on already well-known species and habitats. There is thus a need for exploratory behavioural sciences, seeking novel information valuable to conservation schemes. This is specifically the case for spatial ecology, as conservation biology is largely focused on the movement, dispersal, and distributions of individuals, species and communities in time and space. Fortunately, the biodiversity crisis is concomitant with the rapid improvement of biotelemetry technology enabling stunning progresses in movement ecology. As I will illustrate along this talk with examples drawn from around the world, there is much added value to exploratory tracking studies focused on poorly known species and habitats. Such recent studies have unraveled previously unknown migratory movements, habitat uses, and interactions with human activities, which have led to specific conservation actions such as the identification of irreplaceable areas and conservation hotspots, and the design of conservation units such as marine protected areas.

Love marriages vs arranged marriages - the effect of partners' compatibility on fitness

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Mate choice can bring direct or indirect fitness benefits. Both types of benefits may either arise from the quality of the chosen partner or from the compatibility between both partners. In species with bi-parental care, the phenotypic complementarity could bring essential direct benefits to the chooser if rearing success depends on behavioural compatibility of the partners. The zebra finch is a life-long monogamous species that breeds opportunistically, shows high rates of embryo mortality and exhibits bi-parental care. Moreover, females show strong preferences but little consensus regarding male attractiveness. In such a species, mate choice is expected to be crucial and based on partners' compatibilities.

In this experiment, we allowed females to choose a partner in a flock of twenty males and to breed either with her preferred one (P) or with another female's preferred male (non-preferred, NP) ? pair bonds were enforced by setting up pairs in cages for several months. After a first breeding season, 75% of the females were again allowed to choose a partner and to breed under one or the other treatment (with P or NP) while 25% could prolong their relationship with their first breeding partner (P or NP).

In communal breeding aviaries, we monitored over two breeding season of three months the breeding of pairs resulting from free mate choice (n=49) or from force-pairing (n=51) to determine at which stage, from egg fertilisation to independence of juveniles, the expected reduction of fitness of non-preferred pairs could occur.

Moreover, the behavioural compatibility of each pair in terms of distance, synchrony, affiliative and sexual behaviours, was quantified (8457 focal-pair watches, and 4923 videotaped courtships analysed) to see whether behavioural traits predict pair fitness. We also test whether behavioural complementarity increase with mate familiarity.

This experiment was designed to pinpoint the expected fitness benefits of preferred pairs.

Effects of parasites and predators on behavioral strategies in wild Trinidadian guppies

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Besides predators, parasites are now recognized as major drivers of evolution in natural populations but we have still little information about their influence on the evolution of behavioral processes. Here we aimed at comparing the evolutionary effects of parasites and predators on behavioral strategies (i.e. suites of interrelated consistent behaviors that vary among individuals) by comparing the activity, shoaling tendency and boldness between populations of wild-caught Trinidadian guppies (*Poecilia reticulata*) having evolved under contrasted parasitism and predation regimes in two replicate independent rivers. Parallel behavioral differences between regimes were found between the two rivers suggesting that that parasites promote shy and social behavioral tendencies. Interestingly, the strength of correlations between behavioral traits was different between populations, with more social individuals being less active, but only in sites without predators, whatever the parasitism regime. In addition, shyer individuals were more social and less active than bold individuals, but only in the control sites without parasite nor predator. Although these behavioral differences can either stem from genetic or plastic differences, they outline that parasites have the potential to decouple links between behaviors and to affect the evolution of behavioral syndromes in natural populations.

Spatial and temporal variations and stability of interaction strengths in a natural multi-trophic network

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Environmental change may destabilize species interaction networks. The importance of preserving the integrity of these species interactions has fuelled an abundant literature, but an empirical understanding of the spatial and temporal underpinnings of these interactions remain rare. Here we focus on a network comprised of one flowering plant, *Antirrhinum majus*, its cohort of pollinators, a specific seed-predator and its parasitoid. This network is commonly encountered in the wild in the eastern Pyrenees. We show that, by following a large number of wild populations it is possible to detect the actual events of interaction among these partners by censusing the spike of the old inflorescence. We found both spatial and temporal variations between populations in pollination rate, parasitism rate and hyper-parasitism rate. We then used a modelling approach to study the conditions for this multi-trophic network to remain stable. We showed that a simple model extended from Lodka and Volterra's theory does not allow the persistence of the third trophic level (parasitoid) if this latter is considered to depend on the inferior trophic levels only. In the natural conditions, this species may benefit from an alternative resource to persist. The very simple method proposed here provides a useful population-scale approach to measure directly metrics related to the population's fitness and interaction strengths. This should help to detect changes in the structure of the *Antirrhinum majus* biotic network, may environmental conditions change into the 21st century.

Overlap and interaction of wandering albatrosses and pelagic longline fisheries

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The population of wandering albatross (*Diomedea exulans*) from South Georgia is showing a dramatic decrease, suspected to result at least partly from bycatch in pelagic longline fisheries. The survival rate of adult females was lower than that of males until at least the early 1990s. Although there has been no more recent reappraisal, lower female survival is consistent with the adult female-biased bycatch reported for fisheries operating in the area of the Brazil-Malvinas Confluence (BMC). The greatest concentration of longline fishing effort in the southwest Atlantic south of 25°S occurs in the BMC, which may overlap more extensively with the preferred foraging areas of adult females rather than males. In this paper, we use extensive tracking data (1990-2012) from breeding wandering albatrosses at Bird Island, South Georgia, to investigate their overlap with longline fishing effort reported to the International Commission for the Conservation of Atlantic Tunas (ICCAT). We calculated an overlap index which accounts for the proportion of time spent by each sex in a given breeding stage (incubation, brood or post-brood), and the potential number of hooks which may be encountered, in a given cell (5x5 degrees). Wandering albatross distribution showed negligible overlap with pelagic longline fisheries during brooding. However, male and female wandering albatrosses overlapped with pelagic longline effort during incubation and, particularly, during post-brood (mid to end chick-rearing). The overlap of females during post-brood was higher than that of males, and consistent among years, indicating they are at most risk. The analysis also confirmed that the highest female overlap with pelagic longline fishing effort occurred in the BMC area. This study reinforces recent bycatch assessments, which indicate that greater mitigation efforts should be made during the post-brood period (May to November) and over an extensive area used by several longline fleets.

Previous social experience affects risk-taking and leadership but not following in three-spines sticklebacks

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The emergence of leaders and followers is a key factor in facilitating group cohesion in both human and non-human animals. Individual group members have been shown to respond to each other's behaviour, thereby strongly affecting the emergence and maintenance of these social roles. However, it is not known how long previous social interactions might affect an individual's leading and following tendencies. Here, by pairing three-spined sticklebacks (*Gasterosteus aculeatus*) with two different consecutive partners, we show a carry-over effect of a previous partner's personality on later risk-taking and leadership behaviour of focal individuals when paired with a new partner. The effect of previous interactions depended on the relative boldness of the focal individual. Relatively bold but not shy fish spent less time out of cover and led their current partner less if they had previously been paired with a bolder partner. By contrast, following behaviour was mainly influenced by the personality of the current partner. In addition, we found individuals were consistent in the time spent near their partner's lane and this sociability to be negatively related to focal's own personality but not that of their partner. These findings emphasize how the history of previous social interactions can play a role in the emergence and maintenance of social roles within groups and give insight into the mechanism and dynamics behind responsiveness and sociability.

Local Mate Competition in the red mason bee (*Osmia rufa*, Megachilidae)

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According to Fisher (1930), in large, panmictic populations parents should on average invest equally into production of daughters and sons. Therefore, when cost of the production of male and female offspring is similar, the sex ratio of offspring produced in such population should approximate 1:1. However, in case of Local Mate Competition, ie. when related members of one sex compete for access to mates, the population-wide sex ratio should be biased towards the other sex.

The red mason bee is a solitary, gregarious species. Females prefer to nest in large aggregations but can also nest in less numerous ones, or even alone. Mating usually takes place in the vicinity of the natal nest. In large aggregations, many non-related males from different nests compete for females from the same aggregation. In very small aggregations consisting of a few nests, the competition for mates occurs largely between brothers from the same nest, creating conditions of Local Mate Competition.

We created large and small nesting aggregations of red mason bees and checked the sex ratio produced in each aggregation. In line with our predictions, females in small aggregations tended to bias their offspring sex ratio towards daughters.

Do not only rely on your mother ? Food sharing among offspring of the European earwig (*Forficula auricularia*) as an unexplored evolutionary driver of family life

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In species with facultative family life, in which offspring can survive independently of their parents and are capable of early dispersal, group-living can only persist as long as the benefits accruing to offspring outweigh the costs associated with family life. Parent-offspring interactions are well known to often provide benefits to offspring through parental care. While sibling interactions are usually considered to reflect costly competition, they can also reflect cooperation and could thus complement the influence of parental care on family life. Nymphs of the European earwig, an insect with facultative maternal care, have recently been shown to be not only provisioned by their mother, but also by their siblings. In this study, we investigated (1) whether maternal food provisioning and sibling food sharing are independent or compensatory processes during family life and (2) whether their expression depends on clutch size, a factor commonly affecting sibling competition. By measuring food provisioning and food sharing successively at an interval of four days in the same clutches, our preliminary results revealed an increase of sibling food sharing with clutch size, whereas maternal food provisioning followed the opposite pattern. This suggests that sibling food sharing could have been promoted in large clutches to compensate for the low level of maternal food provisioning. Moreover, we found that tending clutches with higher levels of sibling food sharing than predicted by clutch size did not benefit mothers through an increase in second clutch size. Hence, females do not seem to opportunistically reallocate resources from offspring provisioning to future reproduction, a result in line with independent effects of sibling food sharing and female food provisioning on family interactions. Overall, our results reveal that the evolution of family life may not solely rely on benefits mediated by parental care, but may also involve benefits mediated by sibling cooperation.

Impact of queen's mandibular glands on the workers development in honeybee (*Apis mellifera*)

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In honeybees, it is a rule that workers are sterile in the presence of the queen but start laying male-determined eggs in a queenless colony. A recent study showed that the workers can switch from their typical altruistic role to a more selfish behaviour (rebel workers) even in queenright colonies if at their larval stage they develop in the absence of the queen in the colony. However, there is still an unresolved question how information about presence or absence of the queen is transferred to larvae. In our study we tested whether the information about the queen's presence can be transferred to larvae by products of queen mandibular glands. The experiment has been conducted on honeybee colonies in which the workers as larvae were reared in five different conditions: (1) queenright condition, a non-handled reference group, (2) queenright condition additionally fed distilled water, control group (3) queenless condition, a nonhandled reference group, (4) queenless condition additionally fed distilled water, control group, (5) queenless condition additionally fed distilled water with macerated mandibular glands, experimental group. All newly emerged workers from all five groups were dissected to check the number of ovarioles, development of hypopharyngeal, mandibular and Dufourt glands. Our results showed that workers reared in queenright condition (groups 1 and 2) and queenless condition additionally fed distilled water with macerated mandibular glands (group 5) have less ovarioles in their ovaries ($P < 0.001$), bigger hypopharyngeal glands ($P < 0.001$), smaller mandibular glands ($P < 0.001$) and smaller Dufour gland ($P < 0.001$) compared to the workers reared in queenless condition (group 3) and queenless workers additionally fed distilled water (group 4). The results showed that queen mandibular gland can produce a substance informing larvae about the presence of the queen in the colony.

Testing the impact of habitat-driven swimming movements on the dispersal of juvenile Western Pacific leatherback turtles (*Dermochelys coriacea*)

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The implementation of targeted conservation measures for threatened species requires an accurate knowledge of the spatial distribution at all life stages. For the leatherback turtle (*Dermochelys coriacea*), a vulnerable species (IUCN, 2013), satellite-tracking provides adequate data on the migration routes and distribution of adults, but observations of newborns and juveniles are largely missing. In an attempt to solve this problem, several authors have hypothesized that leatherback hatchlings drift almost passively with the oceanic currents so that their distribution at sea can be deduced from numerical simulations of the dispersal of Lagrangian (i.e. passive) particles drifting with simulated ocean currents.

While the passive drift hypothesis certainly holds for the very first months of life, it becomes less and less valid as individuals grow and become more powerful swimmers. The results of passive drift simulations are thus questionable for individuals older than 1 year or so. As an example, Gaspar et al (2012) showed that, assuming a purely passive drift, 5- to 6-year old juvenile leatherbacks from New Guinea rookeries should reach the eastern part of the North Pacific (east of 150°W), a prediction in contradiction with bycatch and sighting data which indicate that only large individuals, certainly older than six, are present in this area

In this paper we present a simple model of the swimming activity of leatherback turtles in which we only assume that (1) swimming is directed towards more favorable habitats (in terms of food concentration and water temperature) and (2) swimming speed increases with age (and thus size). We show that adding such a simply-modeled swimming activity to current-induced drift, significantly reduces the eastward movement of simulated New Guinea-born leatherback juveniles headed towards California. As a consequence, the simulated size/age spectrum of individuals approaching the Hawaiian archipelago and then California better matches observations.

Perception of sperm competition risk is altered by the presence of male-derived cuticular hydrocarbons in the broad-horned flour beetle *Gnatocerus cornutus*

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Males can gather information on the risk of sperm competition from their socio-sexual environment and recent studies have implicated chemosensory cues, specifically cuticular hydrocarbons (CHCs) as a key source of this information. Here, using the broad-horned flour beetle (*Gnatocerus cornutus*) we investigated the relative importance of two modes of CHC transfer in shaping male perception of sperm competition risk: those transferred through substrate and those transferred via contact. We experimentally perfumed virgin females with male CHCs in two ways, either through their rearing substrate or via direct contact with males. GC-MS analysis verified that both treatments engendered significant changes to female CHC profiles. However, our measurement of male ejaculate investment showed that males only responded to changes in female CHC profile caused by direct contact with males, allocating significantly more sperm to females manipulated by contact with rival males than to control virgins. Our study implicates the transfer of male-derived CHCs as an important information source in this species and demonstrates the ability of males to detect and respond to subtle chemical changes in their socio-sexual environment in order to make adaptive sperm allocation decisions.

Where to sleep in a rural landscape? A comparative study of resting sites pattern in two syntopic *Martes* species

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The niche-complementarity hypothesis predicts that two sympatric species must differ in their requirements for one of the three main ecological dimensions, i.e. habitat use, diet and activity time, to coexist. European pine marten (*Martes martes*) and stone marten (*Martes foina*) are two sympatric medium-sized mustelids, with very similar morphologies and ecology suggesting interspecific competition. We first used diurnal telemetry data to identify resident individuals, namely spatially stable individuals over time, in a fragmented forested area in France where both species live in syntopy. We then investigated whether they differed in their resting sites pattern. We compared between species the resting sites numbers, the surface covered by resting sites and the habitat used to establish resting sites. Stone marten used in averaged less resting sites, distributed over a smaller surface than pine marten. The resting sites for stone marten were mostly located in open habitat in the proximity of human habitations whereas pine martens rested almost exclusively in forest. Sex, season and age, depending or not on the species, also modulated the resting site pattern. In both species, males used more resting sites which were spread over a greater surface than females, and, the number of resting sites was higher in spring, especially for subadult individuals. Such a sex- and age-specific pattern was expected given the intra-sexual territoriality of both species and their reproductive cycle. Finally, the probability to rest in forest was higher in subadult stone martens than in adults. Such a finding might be interpreted such an as failed settlement in forest for subadult stone marten and, we discussed about its implications in the context of interspecific competition between both species.

Impacts of green tides on fish abundance and diversity in estuarine and coastal areas

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In the North-West of France, numerous bays and estuarine systems are facing proliferations of green macroalgae of the genus *Ulva* spp., called green tides. Since their first records in the 1970s, these massive blooms of opportunistic green macroalgae have increased in occurrence, abundance and duration. Green tides occur during Spring and Summer in nutrient enriched estuarine and coastal areas, being one of the most viewable signs of eutrophication related to anthropogenic activities. Areas of concern are also known to be highly productive and to shelter important fish nursery grounds. As green tides proliferate at the same period as juvenile fish settlement in these systems, their impact on ichthyofauna, unexpectedly not analysed previously, could be important; this potential impact is questioned in the present study.

In order to evaluate the effects of green tides on ichthyofauna, especially at juvenile stage, abundance, diversity and age structure of fish community was analysed over the Spring-Autumn productive season among coastal and estuarine systems, under contrasted levels of *Ulva* spp. proliferation. This analysis focused on the two main different kinds of areas facing green tides, sandy beach and estuarine mudflat, both known as essential fish habitats. In each kind of system, both control and impacted sites, sharing the same characteristics in term of sediment structure, seasonal hydrologic cycle and larval supply, were compared. In order to analyse the contrast in fish communities before and during the proliferation period, a Before-After Control-Impacted method was used. This analysis pointed out that before green tide arrival, species richness and density were similar in both control and impacted sites. Since macroalgae proliferation, in late Spring, differences in fish biomass and diversity started to show up, increasing rapidly with *Ulva* biomass. Control and impacted sites also differed in terms of ichthyofaunal communities, composition and functional diversity.

Evolution of specialisation in the generalist tick *Ixodes ricinus*

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The degree of host specialization in parasites can greatly modify the nature and outcome of interspecific interactions. When parasites are also vectors, their ability to adapt to new hosts and their response to changes in host communities will have important consequences for both their population dynamics and evolution, but may also cascade down to the microparasites they transmit. Although vector-borne diseases frequently involve vectors that can exploit several host species (i.e., generalists), little is known about their potential to specialize on locally available hosts and even less on the impact of specialization for pathogen transmission. A first step to better apprehend the importance of this phenomenon for the evolution, ecology and epidemiology of vector-borne disease systems is to study patterns of host-associated genetic divergence across diverse vector populations.

We used this approach to study the host-vector-pathogen system involving the European tick *Ixodes ricinus*, its various vertebrate hosts and the bacteria responsible for Lyme disease (*Borrelia burgdorferi sensu lato*). Significant levels of genetic structure among ticks of different host individuals and host types were found, but only within certain host communities. We predicted that longer established and more stable host communities would show stronger patterns of host specialisation than more recently colonised or perturbed communities. We tested this prediction by combining field samples from a European-wide transect that includes both the historical range of the tick species and its newly colonized zones. Our results reveal a complex pattern of parasite adaptation across this European landscape.

Gorillas European Endangered Species Programme: Castration and socialization.

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The western lowland gorilla (*Gorilla gorilla gorilla*) is an anthropoid primate which reproduces well in captivity. With a social life in harem, the management of male overpopulation begins to be a problem, which is why the European Endangered species Plan (EEP) is considering castration as a possible solution to manage the breeding of the species. In order to observe whether castration does or does not affect the socialization of young gorillas, this study compares nine juveniles in 3 family groups housed in three different parks. Despite the small size and different biases imposed in this study, the data collected on the negative social behavior, the positive social behavior at proximity and play behavior, confirm the poor data which already exists in literature. Furthermore, a subjective assessment of the temperament of each individual complements the results and shows that the castrated individual has a similar process of socialization to an uncastrated male of the same age, thereby supporting the comparisons between them. However, different indices show that this socialization seems to be slower for the castrated individual; hence why long-term monitoring is necessary: to understand the effects of castration on the social ontogeny of the young gorilla, by focusing on the dynamics of their social network and their cognitive capacity into adulthood.

Study of biodiversity in the by-catch communities of the pelagic ecosystem in the Western Indian Ocean and their relationship with environmental variables.

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Most of those biodiversity studies have been focused on terrestrial and freshwater ecosystems; however, few studies have been conducted to understand the biodiversity in marine ecosystem. With the aim to describe and analyze diversity patterns of the pelagic by-catch communities in the tropical tuna purse seiner fishery in the Indian Ocean, data from observer programs carried out between 2003 until 2010 on UE purse seiner fleets was analyzed.

Alpha diversity (rarefaction curves and log abundance curves), beta diversity (differences in species composition) and heterogeneity index, such as Simpson dominance index and Shannon diversity index, were analyzed by areas. GAMs (generalized additive models) were also carried out to investigate the relationship between environmental variables and the distribution of Shannon diversity between 2006 and 2010.

Results showed that Somali area and Mozambique Channel were the areas with higher diversity. Species richness, evenness, differences in species composition and diversity index were explained by sampling effort and fishing strategy. GAMs showed that Shannon diversity distribution was better explained (54%) by geographical and environmental factors (sea level anomaly) in Free School fishing mode than in FAD fishing mode (10%). The special climatology of the Indian Ocean predominated by seasonal monsoons determined the changes carried out in the winds and ocean circulation affecting the diversity patterns. These results could be considered as a first step for the future implementation of the EAFM (Ecosystem Approach Fisheries Management) to manage the pelagic ecosystem in a holistic manner, leaving behind the idea of the management of single species with the aim to focus the biodiversity studies towards integration in the ecosystem. However, some progress like the increase of percentage of coverage, better identification taxa level and new environment factors included in the models could improve the results and the quality of data.

Diel behaviour of by-catch and tuna species at drifting fish aggregating devices (DFADs) in the Western Indian Ocean as assessed by fishers' echo-sounder buoys

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Several tuna and non-tuna species are known to associate with floating objects drifting in the surface of the ocean. Taking advantage of this associative behaviour, tropical tuna purse seines deploy thousands of man-made fish aggregating devices (also called FADs) to facilitate the catch of tuna. Although the exploitation level of target species is really high through this fishing technique (today almost half of the world tuna catch is taken on FADs) little is known on the reasons driving this associative behaviour, the impacts of these floating structures on the ecology of fish, or the species-specific behaviour when associated. Because FADs are temporary in time and space, they are difficultly studied by conventional scientific means. In the present study, we use fishers' instrumented buoys (i.e. satellite linked GPS buoys equipped with echo-sounders) to continuously collect acoustic samples around remote FADs and investigate the diel cyclical behaviour patterns of FAD associated fauna (i.e. non-tuna species, small tuna and large tuna). For that purpose, we modelled fish biomass during a 24 hour period using GAMs (generalized additive models), which was relative to social factors such as the presence or the amount of conspecifics or allospecifics. Results showed a strong correlation between the presence of non-tuna species and tuna species, and between small tuna and larger individuals, suggesting a likely domino/call effect. In addition, diel biomass dynamics were variable and species/area-specific, implying adaptive behaviour patterns, which allow scientists looking for biological conservation measures such as reducing the non-tuna/tuna catch ratio or minimizing small tuna catch. In fact, the time of the day in which the maximum biomass was recorded varied for each fish group. Comparisons between results observed through echo-sounder buoys and conventional acoustic tags are offered as well.

Evolutionary determinants and consequences of infanticide by males in mammalian societies

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Infanticide by males has long been proposed to represent a driving force in the evolution of mammalian societies, potentially explaining social monogamy or sexual promiscuity. However, the role of infanticide in social evolution remains highly controversial and recent tests have generated conflicting results. For this presentation, we rely on a comparative sample based on the detailed study of natural populations of more than 250 mammalian species to investigate whether the evolution of male infanticide is a consequence or a cause of contrasts in mammalian social organization and mating systems. Our results indicate that infanticide is a derived trait that does not affect variation in social organization, but contributes to enhance female sexual promiscuity and sperm competition in polygynandrous societies. The taxonomic distribution of male infanticide is well-predicted by female breeding intervals and high levels of male mating competition.

Sexual selection: from individual fitness to reproductive isolation

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Sexual selection not only generates intraspecific variation in mating success, but may also affect the evolution and maintenance of reproductive isolation between species. This implies that the mechanisms that underlie the development and evolution of individual mate preferences may have macro-evolutionary consequences.

In my contribution to the conference, I will talk about the role of visual communication in the evolution and divergence of African cichlids. These fish inhabit diverse visual environments and show correlated variation in both visual perception and sexual coloration. Exploring the causal relationships between these correlations identifies the mechanisms by which ecological heterogeneity can influence sexual communication, and thereby the origin and maintenance of species boundaries.

Is the cessation of parental care under parental or larval control in the burying beetle *Nicrophorus vespilloides*?

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According to life history theory, behaviours such as parental care, are moulded by natural selection to maximise the fitness of the parent. Since parental care is costly, but the benefits to the offspring increase in an additional manner, parents and offspring often end up having differing optima for the timing of the cessation of care. Previous studies have shown that the parents usually control this event. The burying beetle, *Nicrophorus vespilloides*, provides elaborate parental care, including provisioning food for the offspring. The larvae solicit food from their parents with conspicuous begging displays. Previous studies have shown that larvae beg less as they become more proficient in feeding themselves, whereas the parent's response to begging does not change over time. Larval begging peaks 24 hours after hatching, after which they start begging less, until the behaviour ceases all together 72 hours after hatching. Thus the age of the larvae importantly affects the intensity of begging in a brood. I will be presenting data from an experiment where I manipulated the age of the larvae the parents were caring for, for a given amount of time, subjecting the parents to larvae that were constantly older or younger than their natural brood. By comparing the differences between the realised parental provisioning and the larval need based on begging rate, I will be able to determine whether the larvae or the parents have more control over the cessation of provisioning. Results show that the parents provision more than expected when they are subjected to brood with higher intensity of begging. Thus, the larvae have more influence on the cessation of provisioning than previously suggested.

Throat UV reflectance plays the role of a conventional badge of status during male-male interactions in a lizard

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Coloration and vision in the ultraviolet (UV) range are widespread in non-mammalian vertebrates. However, our knowledge of the capacity of animals to perceive UV light and to use UV cues in intraspecific communication remains unclear and limited. In particular, the role of UV signals in conflict resolution remains unclear relative to prior resident and familiarity effects and the reliability of such signals is still controversial. During behavioural displays, males common lizards *Zootoca vivipara* exhibit a UV colour patch on their throat that is strongly variable in UV reflectance among individuals and brighter than in females, suggesting a role in sexual signalling. During the mating season, we manipulated UV colours of both resident and intruder males and staged repeated conflicts in the laboratory. We further tested whether UV reflectance was related to body size, body condition, PHA skin swelling response, plasma testosterone levels and blood parasite infection. In the absence of prior encounter, UV signals acted as a badge of status: intruders were dominated when they were UV-reduced, or they were punished by UV-reduced resident. During the subsequent encounters, when opponents were familiar, UV signals were unexpectedly involved in the process of mutual assessment of males in line with predictions of the sequential assessment model: fighting was more aggressive when opponents were similar in UV signal. We also found that the expression of UV colours is not condition-dependent. These results suggest that UV signalling is strongly involved in male-male competition in common lizards and that UV signals act as a conventional badge of status whose effects persist between familiar opponents.

Drifting Fish Aggregating Device (dFAD) ocean trajectories and their consequences for fisher strategies and pelagic ecosystems

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Since the mid 1990s, drifting Fish Aggregating Devices (dFADs), bamboo rafts tracked with GPS buoys have become increasingly important for concentrating and catching tropical tunas. The massive use of dFADs has raised serious concerns regarding the high levels of bycatch of tuna juveniles and non-target species (Fonteneau et al. 2000, Dagorn et al. 2013) and dFAD potential role as an ecological trap (Fréon and Dagorn 2000; Hallier and Gaertner 2008). However, relatively little is known on the modalities of dFAD use by fishing vessels which renders difficult the evaluation of this fishing practice impacts difficult. For the first time, the three French fishing companies operating in the Atlantic and Indian Oceans have made accessible to scientists the GPS buoy tracks from their dFADs. Besides, since the beginning of the 2000s, through a decision of the European Commission, fishing vessel were equipped with Vessel Monitoring Systems (VMS, a GPS positioning system). Here, we combine the movement data of fishers and their fishing gears with multiple other sources of information: declarative data from the fishery, on board observations as well as interviews with the fishing masters. This allows us to separate the useful 'at sea' dFAD trajectories from 'on board' sections, to describe the strategies in dFAD use by French fishing vessels, to extrapolate the total number of dFADs based on spatialized raising factors as well as to examine some of the impacts of dFAD use on marine ecosystems. The results we obtain provide a first overview of dFAD use in the Atlantic and Indian Oceans that is key for sustainable exploitation and conservation of pelagic ecosystems.

Cascading ecological specialisation in host-parasite interactions and the importance of spatial scale.

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In this talk, I will first briefly review the notion of ecological specialization as applied to host-parasite systems. I will then present recent results on vector-borne pathogen systems that emphasize how ecological specialization in the vector evolves and changes over different spatial scales. Finally, I will discuss how this diversification in the vector can, in turn, alter the ecological and evolutionary trajectories of the microparasites that they transmit and ultimately affect disease epidemiology and exposure risk.

Parasite resistance is costly in a plant pathogenic bacterium

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Bacteria and the viruses they are infected by (phages) are increasingly being used to test macroecological hypotheses and evolutionary theory. Such a tractable host-parasite system allows observable evolutionary changes to take place in real time as a result of large population sizes and short generation times. Our system utilizes a model organism: the plant pathogen *Pseudomonas syringae* and phages isolated from the natural environment. We assessed the trade-offs between bacterial virulence in the plant, and resistance to phages. To do this we experimentally evolved phage-resistant lines of bacteria. After measuring bacterial densities attained in both typical laboratory media and a natural plant host (tomato) we only found a cost of resistance in the plant environment. To complement this observed phenotypic effect we then conducted next generation sequencing to determine the mutational basis of these costs. The observed cost of resistance underscores the importance of parasite-mediated selection on host life history traits, and demonstrates the complexity of tri-trophic ecological interactions.

Preliminary richness and habitat relationships of avian zeen oak in the northeastern Algerian (Forest of Boumezzrane, Souk-Ahras)

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Boumezzrane's forest is a significant center for biodiversity. It located in northeastern Algerian about 40 km east of Souk-Ahras province, and within the Northeastern Ain Zana Commune . In this last year is suffering a big destruction and degradation. Although it is recognized as an important area for avian diversity, it has never received ornithological attention.

Birds are ideal bio-indicators and they are used to support the execution of effective management strategies for wildlife conservation.

Many studies have been conducted on the relationships of birds with habitat features and have revealed strong correlations between them, especially vegetation structure. But their associations are not completely understood. Hence, we need information on the relationship between occurrences of birds and structural components of zeen oak habitats.

We examined relative bird abundance by using the IPA method and relationship to environmental descriptors. We used data from 34 point count during the breeding season. A total of 68 visits of 39 species of bird were recorded in the zeen oak stands. Avian species richness at each point-count ranged between four and 14 species (09.88 ± 0.49 ; mean $\pm$ S.E).

The most dominant families in number of pairs are Paridae, Turdidae, Sylviidae, Picidae, and Fringillidae. They occupy more than 70% of the total abundance of the entire community. Using principal component analysis and canonical correspondence analysis methods, we determined that the first factor of differentiation of the Boumezzrane forest avifauna is the size of tree (total basal area and height of tree stratum), those variables most influencing bird species. Followed by the volume of tree stratum (density of tree stratum and diameter of the largest timber). These results indicate that the opening of habitat is an important criterion for differentiation of the avifauna of Boumezzrane. The second criterion is the gradients shrub.

Latitudinal variation of habitat woody floristic composition of an endangered African tree species *Afzelia africana* Sm. ex Pers. (Caesalpiniaceae) in West Africa

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A clear knowledge of the habitat species composition of an endangered species has important implications for its conservation and restoration. Moreover, the distribution of habitat is often regulated by the influence of environmental factors. Thus, this study aims to assess the woody floristic composition of *Afzelia africana* Sm. habitats across latitudinal gradient in West Africa. Data were collected from 201 sample units set across four climatic zones in West Africa: the Guinean, the Sudano-Guinean, the Sudanian and the Sahelo-Sudanian zones. A Non Metric Multidimensional Scaling was performed on presence-absence data matrix to explore the patterns of habitat species composition. The observed patterns were correlated with environmental variables (temperature, precipitations, altitude, etc.) through a Canonical Correspondence Analysis. Importance Value Index (IVI) was computed for each species to bring out the most important species of each climatic zone. A total of 165 woody tree-species were recorded with 31 species in the Guinean zone, 44 in the Sudano-Guinean zone, 27 in the Sudanian zone and 110 species in the Sahelo-Sudanian zone. A pronounced separation of Guinean zone and Sahelo-Sudanian samples from those of Sudanian and Sudano-Guinean zones was observed. This discrimination in the habitat of *A. africana* has the support of evidence of controlling influences of climatic variables such as temperature and precipitation of warmest quarter. Some co-occurring species were particularly important for each habitat, regarding their IVI values. These woody species could thus take advantage from *A. africana* habitat management and conservation.

The puzzlingly rapid evolution of toads' innate orientation in fragmented landscape

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In short distance migratory species, the disconnection between habitats (habitat-split), makes habitat cues out of range for first-time migrants which travel alone. Such phenomenon should lead to the selection of an innate compass orientation (i.e. vector orientation) based on celestial or magnetic cues. We studied four toads' populations located in a fragmented landscape and evidenced that first-migrants' orientation observed in indoor experiments fit the orientation of the forest remnants around the parental pond. This vector navigation is inherited from both parents and relies on the magnetic field. As vector orientation was found to evolve in less than two generations, we propose a non-random colonisation hypothesis to explain such rapid evolution. Therefore, vector navigation could enable organisms to cope with rapid lands use changes. Nevertheless, vector navigation was disrupted by pollutant exposure; hence synergic effects of anthropogenic factor could hinder such adaptative response in the wild.

Asymmetric mate choice contributes to reproductive isolation in a pair of co-mimic sister-species of *Heliconius*.

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When speciation occurs in sympatry due to natural selection and the accumulation of divergent ecological traits, maintaining isolation in the face of gene flow implies the evolution of strong reproductive barriers. *Heliconius* butterflies exhibit bright colourful wing patterns which have been called «multiple-effect traits» because they are involved both in mate recognition and in divergent selection for predator avoidance and mimicry. This kind of trait can facilitate speciation and the maintenance of isolation. However, what would happen when sister-species of *Heliconius* are sympatric and converge on or keep the same colour pattern? We predict that wing pattern similarity due to mimicry should interfere with assortative mating and the speciation process. Here, we address this question examining reproductive isolation between two closely-related species: *Heliconius timareta* and its co-mimic *H. melpomene*. Molecular data from wild individuals show a low level of hybridization in natural conditions, but behavioural experiments revealed a more complex pattern. No-choice experiments in greenhouses demonstrated assortative mating between the species despite occasional mating. To investigate which cue can be used for mate choice, we conducted experiments with wing models and real females. Males show no preference based on wing pattern but asymmetric preference towards virgin females. *H. melpomene* court both species equally whereas *H. timareta* approach but do not court, suggesting proximal cues such as pheromones may play an important role in recognition. This asymmetry in isolation is also found in the fertility of the F1 generation. Such asymmetry might be associated with the geographical distribution of the two species and their relative abundance.

Persistence in time of wolf pack in Scandinavia

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The basic social unit of a wolf population is the pack. It usually includes a pair of two reproducing individuals located within a specific territory. Despite its fundamental role in the dynamic of wolf population, persistence and structure of wolf packs are overlooked. The use of presence-absence field data of packs have been used to create habitat occupancy models, to estimate population size and predict future trends in distribution range and numeric estimation of wolf population. But longitudinal studies based on the dynamic of recognizable wolf packs have been little studied, especially because of the lack of complete and long-term data. Here we used intensive and ongoing long-term field data collected by the Scandinavian wolf project to highlight the factors affecting the structure and persistence in time of more than 130 different wolf pairs and packs in Scandinavia. The Scandinavian wolf population is a well suited model because it is an isolated population, and its colonization and expansion of population range are well known. Our results investigate whether the intra-packs characteristics (i.e inbreeding coefficient, reproductive success, age of the breeding individuals) or landscape characteristics (i.e prey density, human activities) influence the persistence in time of wolf packs in a human-modified landscape. Furthermore because of high additive mortality rate caused by poaching in Scandinavia, we expect a high turn-over of reproducing individuals and a therefore a low persistence in time of packs. Our results will help conservation policies, and look beyond numbers to highlight importance of the social dynamics of wolf pack.

Fawn early survival: Is it better to have a fearful mother?

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The inter-individual variability in behavioral traits may have important ecological and evolutionary implications such as for dispersal or the trade-off between 'food acquisition vs. risk'. However, only a handful of studies have focused on the effect of behavioral traits on fitness. In particular, we need empirical studies in the wild to study the link between behavioral traits of mothers and their reproductive success through the effect on juvenile survival of their offspring. The aim of this study was to test the impact of inter-individual variation in the behavioral responses of females' roe deer on the early survival of their fawns. Income breeders as roe deer are interesting study model since they have to satisfy their energetic needs by foraging in highly nutritious areas while minimizing the risk of predation of their offspring. We assumed that fearful females (the most reactive females to a stress event) respond more quickly to a risk of predation. Consequently, they could better defend or protect their fawns than fearless females taking more risk and would increase their fawns' survival. We also supposed that the spatial behavior of mothers and the fawns' choice concerning their bed-site would affect the early fawns' survival. It seemed to appear two different tactics to improve the early survival depending on the fearlessness of the mothers and the birth habitat of the fawns. Fawns' survival in closed habitats was higher when they had a fearless mother whereas fawns living in open habitats had a higher survival rate with a fearful mother.

These results marked another step in the understanding of the impact of mother's behavioral traits in the fitness but we need further studies to relate inter-individual variability in behavior in the wild to fitness in order to better understand the population dynamic in a behavioral point of view.

GPS tracking reveals migratory movements and connectivity of Mediterranean osprey populations.

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The study of migration and dispersal behaviour is a key component of conservation-related research on any animal species. That's especially true for populations living in fragmented habitats that are isolated or too small to be self-sustainable. In this framework, of notable interest is the case of the Osprey *Pandion haliaetus* in the Mediterranean basin. Despite its favourable conservation status at world scale, in the Mediterranean the osprey is present with 20 Mediterranean ospreys (both adults and juveniles) were tracked with GPS/GSM tags. Data showed that Mediterranean ospreys do not perform a complete migration through sub-Saharan wintering ground, as northern European ospreys commonly do. At the same time, tracking revealed that connectivity between populations is potentially possible and can take place via both adults and dispersing juveniles. Individuals from Corsica have been tracked through Balearics, Spain, Morocco and Sardinia. These new insights would improve basic knowledge about adult migration and postnatal osprey dispersal and will help implementing adequate management actions and planning common and coordinated conservation measures.

How much do landscape-scale vegetation patterns affect local grazing impacts?

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Understanding how the vegetation mosaic influences herbivore behaviour is of great importance to planning conservation management with herbivores. We used natural variation in vegetation mosaics on the Isle of Rum, Scotland, to quantify the impact of red deer (*Cervus elaphus*) management on vegetation communities of conservation significance, and how this might be modified by proximity to preferred grassland communities. Red deer are the main herbivore on the island. We tested the effects of local deer density and the area of preferentially grazed grassland communities within 250 m, 250-500 m and 500-1000 m on sward height, *Calluna* utilisation and litter depth, and a grazing impact index combining several measurements between 2001 and 2008, on *Nardus* grassland. Grazing impacts were lower in 2008 than in earlier years. Sward height and the grazing impact index indicated lower grazing on grassland locally isolated from other preferred grasslands, but this effect varies with local deer density. The depth of the litter layer on *Nardus* grassland was negatively correlated with the area of preferred grassland within 250 m. We found that local deer density had some effect on small scale grazing impacts. Deer density appeared in some cases to mediate the relationship between herbivory and community configuration and topographic variables. Community configuration at the scale of 100s of metres influenced patterns of impacts on the preferred community in a mosaic. Previous studies have demonstrated similar effects for less preferred communities. This should be considered when managing a mix of communities with different grazing requirements: grazing management with free-ranging herbivores may always result in conservation targets for some areas being compromised.

Social perception of ecosystem services provided by scavengers

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In the current context of global change, the study of ecosystem functioning and the capacity to provide ecosystem services is a major goal for ecologist and society. Scavengers provide some important ecosystem services; for example, by removing dead animals, scavengers may help regulate nutrient cycling, infectious diseases and mesopredator abundance. Human activities and scavengers have been closely related since the origin of first hominins, and many current scavenger populations largely rely on domesticated ungulates. However, obligate scavengers (i. e., vultures) are a globally threatened functional group and their populations have been decimated and even extirpated in many areas of the world. The long-term preservation of scavengers might benefit from a wider social recognition of the different ecosystem services they provide.

Our aim was to evaluate how cattle farmers perceive the ecosystem services provided by scavengers through carcass removal. To do so, we a) performed surveys among cattle farmers in Murcia (SE Spain), an area of extensive cattle of sheep and goats, and b) monitored the consumption of ungulate carcasses by means of camera traps. Cattle farmers had a fine perception of the main scavengers in the study area, as they correctly identified both obligate and facultative scavenger species and the relative frequency of each species at carcasses. The valuation of carrion consumers was very positive for obligate scavengers such as griffon vultures (*Gyps fulvus*), but neutral or negative for facultative scavengers such as foxes (*Vulpes vulpes*), ravens (*Corvus corax*) or wild boars (*Sus scrofa*). The negative valuation of some facultative scavengers seems to be related to their role as predators, and might have adverse effects on the conservation strategies of obligate scavengers.

When functional diversity rather than biotic diversity drives new emerging infections

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Emerging infectious diseases are of great concern to our expanding human population, and it's important to understand how these could transfer into humans if we are to avoid future outbreaks. Whilst taxonomic diversity has previously been thought to influence the spread of infection in the environment, generalist pathogens (e.g. bacteria) are unlikely to be easily linked to changing community structure if we rely purely on biotic indices of diversity. We explored the potential for functional diversity to be used as a means of identifying the ecological niche of the generalist bacterium *Mycobacterium ulcerans*, the causative agent of the disabling tropical infection Buruli ulcer. Specifically, relating changes in functional groups and functional diversity of freshwater invertebrates to levels of *M. ulcerans* across water-bodies in Ghana, western Africa. We identified functional groups common to both lentic and lotic habitats which correlated with environmental levels of *M. ulcerans* DNA, and are involved in the breakdown and consumption of organic matter, predominantly in the benthic layer. This information has potentially identified a previously little explored niche for the bacteria which could help in predicting how the disease is likely to spread in the future, in addition it paves the way for similar techniques to be applied to other emerging pathogens.

A forensic approach to the spatial ecology of the serotine bat *Eptesicus serotinus*

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The common serotine bat *Eptesicus serotinus* is widespread in continental Europe where it is the main reservoir for the European Bat Lyssavirus 1 (EBLV1). In contrast, it is restricted to south of England and so far live EBLV1 has not been identified in the British Isles. The winter ecology of this bat species is not known and they could move between the UK and continental Europe. Clearly bat movement could facilitate the import and spread of EBLV1 in the UK. Using a genetic approach we have shown limited gene movement within England, resulting in more structured and isolated communities, whilst continental populations are connected on a much larger scale despite obvious geographical barriers. This does not mean that UK bats are sedentary however, only that they tend to mate more locally than their continental counterparts. We therefore investigated variation in $\delta^2\text{H}$, $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ isotopes in samples taken from the wing and fur of live wild bats, in order to examine the movements and organisation of this species over different time scales. This enabled us to determine the extent of isotopic segregation between bat populations during the summer, and to assess the persistence of this species' social organisation over the winter. These results have important implications for the risk assessment of disease transmission in a protected species.

Lynx / ungulate interactions in South-eastern Norway: predation impact across a gradient in prey density and landscape productivity

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Lynx / ungulate interactions have been studied in south-eastern Norway for close to 20 years across a broad gradient in prey density and landscape productivity. In general, the northern parts of the study area consists of forested areas with low to very low densities of the main prey ? roe deer. This is in contrast to the southern parts, where the landscape is a mosaic of agricultural land and forests, and where the prey density is substantially higher. By following radio collared lynx and roe deer, we have examined many aspects of lynx and roe deer space use patterns, demography, life history and population dynamics. In this talk, I will synthesis some of the main lessons we have learned about the interactions between a medium-sized felid predator and its main ungulate prey species.

Male sexual behaviour adjustment in the presence of a rival

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Behaviour allows individuals to rapidly adjust to present conditions. In the context of sexual selection, research in guppies indicates that male sexual activity increases in the presence of rival males. However, how mating behaviour is actually adjusted when a rival male is present, and how much of the adjustment depends on the morphological traits of the competitor male are still incompletely understood.

In order to address this question, 36 males were observed in a non-competitive and in a competitive context. In the first, the focal male was placed in a tank with two females, and, in the second, a competitor male was added to the group. The order of trials was randomised and sexual displays and sneaking attempts were recorded for 15 minutes. After the observations, males' standard length, number and body area with colour spots were measured.

In general, sneaking attempts increased in the presence of a competitor male; this behavioural adjustment was related with rival males' morphological traits, being more frequent in the presence of rivals with less black spots than the focal male, and, when rivals had more orange spots, the focal male invested more on sexual displays. Finally, rivals' standard length was not relevant, contrary to our prediction, which may be due to the fact that the studied population originate from a stream with high-predation risk.

Modeling the collective movements of wild horses

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Gregarious animals like wild horses need to make collective decisions in order to keep cohesiveness during movements. Two modeling approaches will be presented for the collective motion of a herd consisting of harems.

In the first, the decision making process is investigated through a simple model, where a hierarchical leadership network emerges based on self-organization. Individuals living in a changing environment try to find a good direction of motion and leader-follower relationships evolve between them, since they try to follow those who are thought to have a better ability to find the best estimate of the optimal direction. The presence of two types of individuals (males and females) having different interests and roles introduce cohesive forces which enable the forming of a hierarchy of harems similar to those observed in the herd of wild horses.

In the second model, the collective motion of groups is simulated by a self-propelled particle approach, where the balance of attractive and repulsive forces between the individuals ensures the coordinated movements. The two individual types have different preferences and interaction ranges giving rise to a herd consisting of collectively moving groups.

Multi-scale responses of roe deer to risk: strategies for using risky habitats in a fragmented landscape with hunting activity

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Recent work has highlighted the potentially dramatic influence of the non-lethal effects of predation on individual fitness and population dynamics of prey species. Over all types of predation and predators, hunting by humans is very specific as it is highly variable through time (season, time of day) and space (accessibility, reserves). One of the most common behavioral response of preys to predation risk is a shift in space use: either at home-range scale, or between or within-habitats. We are however not aware of any study having assessed their simultaneous occurrence in a single population.

Here we do so in the context of roe deer (*Capreolus capreolus*), in a fragmented landscape, responding to a sudden increase in predation risk with the opening of general hunting season. Roe deer are highly sedentary, and do not significantly shift their home range after this opening. They instead increase their use of refuge areas when risk level increases (general hunting season, daytime). Furthermore, during high risk periods and when using risky open areas, they remain closer to refuge edges. These responses are highly modulated by the individual's experience, and possibly by the amount of refuges present in its home range.

Mating systems and sexual selection in hermaphroditic animals

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The study of sexual selection has been for a long time entirely concerned with organisms that have separate sexes – the reasons are related to the fact that Darwin himself invented the sexual selection concept mostly with the aim of explaining sexual dimorphism (which cannot exist in hermaphrodites) and he also thought that hermaphroditic animals had too “limited senses” compared to birds or insects. Hermaphrodites have therefore been neglected for a long time in the study of sexual selection. Yet, recently, it has become clear that the operation of sexual selection doesn't always need strong sexual dimorphism nor big brains; sexual selection operates basically whenever one or the two sexes can alter their fitness through a change in their mating behavior, or in their investment per mating. In this talk I will try to demonstrate both on the basis of theoretical and empirical arguments that sexual selection applies to hermaphroditic animals, and to highlight how it may differ from traditional views based on the study of organisms with separate sexes

Characterizing abundance-occupancy relationships: the influence of using different measures of mean abundance

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It has been observed that the abundance and occupancy of species tend to be positively correlated, such that species with low abundance within sites (i.e. average numbers or densities of individuals) also tend to occupy few sites (i.e. the area or range of a species at a national or continental scale). There are exceptions to this general rule and in theory, it is possible to explain a positive, negative or indeed no relationship between abundance and range size/occupancy. Despite interest in the relationship between occupancy and abundance, there have been few demonstrations of when or why such patterns occur and when one can infer the distribution of abundance from that of occupancy. Moreover, recent contributions, state that abundance-occupancy relationships are critically dependent on the method used to calculate average abundance. This is of particular concern in marine ecology in which there is no consensus on how compute Catch per Unit Effort (CPUE) and if this measure can be used as a index of species abundance. Here we use several measures of CPUE from data of North Pacific Right Whale (*Eubalaena japonica*) catch from 19th century American whaling voyages, to investigate the influence of choice of CPUE measure and to examine its implications for the abundance-occupancy relationship. Given the short exploitation period (<20 years, implying little natural replenishment) and the nearly total species extinction, it is an excellent test case for examining this relationship, as both occupancy and abundance can be accurately estimated. We found that probability of presence provides a reasonable – but far from perfect – approximation to abundance, suggesting that these two patterns are driven by different processes. Furthermore, we also show how different measures of abundance may influence this relationship.

Use of network analysis to evaluate avian community patterns of mortality: Eagle owl as indicator of high electrocution risk areas.

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Electrocution is a serious conservation problem worldwide for a large number of bird species. Some effective measures to correct the problem are isolating and retrofitting the dangerous pylons. However, determining high risk areas is difficult and there is a need to develop measures to optimize their identification. One possible approach can be to identify species to be used as indicators of high risk. Nestedness analysis evaluates if the species composition of small assemblages is an ordered subset of the community composition. Hence if the community of electrocuted birds is nested, the species which appear on more pylons can be used as predictors of the mortality of the rest of the community. We used this approach to evaluate the performance of the eagle owl (*Bubo bubo*) as an indicator species of mortality by electrocution in a bird community. For this purpose, we tested whether community mortality patterns are habitat-structured and nested, and also, whether eagle owl satisfied the following criteria for indicator species: a) high abundance and sensibility to electrocution and b) high co-occurrence with other species in the community. We studied bird electrocuted between 1996 and 2013 in a Special Protected Area located in South-eastern Spain. In this period 335 mortality records of 19 species were collected. Community of electrocuted birds studied did not show a significant relationship with habitat structure, but had a significantly nested pattern. Eagle owl was the most abundant breeding raptor, accounted the 29.8% of all mortality events, and co-occurred with 50% of all species. Our results confirmed that the eagle owl fulfilled all the criteria identified a priori to justify its selection as an indicator species of electrocution. The methodology described here can be easily applicable and may optimise the monitoring of human infrastructure impacts on wildlife communities.

The effect of group size and a genetic polymorphism on the use of personal and public information

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Individuals can use two kinds of information to guide their decisions. First, through trials and errors, they can cumulate personal information provided by their environment like visual cues. Second they can cumulate public information by observing others' behaviors or interacting with them. Using *Drosophila melanogaster* as biological model, we focused on the effect of some genetic and environmental variations on the relative use of these information source in a spatial learning task. We use the foraging gene polymorphism known to affect a wide range of physiological and behavioral responses including the use of personal and public information (Foucaud et al. 2013). We asked how group size variations affect information use for both « Rover » and « Sitter » individuals.. We used spatial learning task in which flies are introduced into an arena heated at an aversive temperature and have to reach a safe cold zone. Over trials, flies could improve their search by using fixed distal visual cues (personal information) or the position and behavior of other flies (public information). We show that group size strongly facilitate individual search over trials for both Rover and Sitter. However our results suggest that « Rover » and « Sitter » individuals were differently affected by the group size. « Rover » individuals switched progressively from the use of personal information to the use of public information when the group size increased. But « Sitter » individuals always used the public information. These results suggests that the balance between the use of personal and public information depends on the group size and could be affected by the genetic variation.

Predator exposure leads to a short-term reversal in female mate preferences in green swordtails

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Ecological factors have been shown to influence mate choice, resulting in the alteration, loss, and even reversal of mate preference. One such factor is the presence of a predator during mate choice, since females that associate with conspicuous males may experience a higher risk of mortality in high-predation environments. Despite accumulating studies demonstrating predator-induced plasticity in female preferences, it is still unclear how these changes affect the strength or direction of selection. Additionally, even though the temporal dynamics of female plasticity (and the cues that induce it) have important implications for the evolutionary dynamics of sexual selection, little is known about this temporal aspect of mate preferences. Here, we addressed this gap using female green swordtails, *Xiphophorus helleri*, which typically prefer males with long swords. We first examined mate preference in the control (no predator) treatment and asked whether the preference changes immediately following predator exposure. In this experiment, females preferred long-sworded males in the control treatment and short-sworded males in the predator treatment. This suggests that natural and sexual selection may act synergistically in high-predation environments, with both favoring this shorter sword length. We then asked whether females still prefer short-sworded males 24 hours after exposure to the predator. Our results demonstrate that the reversal in female preference does not persist after 24 hours, suggesting that the effect of predators on mating behavior may be more complex than previously thought. Thus, under otherwise identical circumstances, the outcomes of sexual selection will vary because of differences in predator cues and predator encounter rates. At low and high predator abundances, there may be directional sexual selection for long and short swords, respectively. On the other hand, intermediate predator abundances or variability in predator abundance might result in mate choice patterns that maintain genetic and phenotypic variation in sword length.

The diet and predation rate of domestic cats (*Felis catus*) in urban area of southern Poland

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Despite its long domestication history the domestic cat (*Felis catus*) remained a skilled predator and can contribute to substantial decrease of potential prey species populations. Thus, it is the main reason for conducting research on the cat's diet and predation impact in many places in the world. Only a few studies on this carnivore were conducted in the urban areas and none of them was done in Poland. Therefore, the aim of this study was to analyze the diet of domestic cats and their potential threat to local fauna. We collected and analyzed the content of 81 cats' stomachs obtained from road-kills between November 2011 and April 2013 in Krakow city, Poland. The main components of the cats diet were anthropogenic food (65 % FO - Frequency of occurrence) and small rodents (24 % FO). Insectivores, birds and invertebrates had complementary contribution. Most of the prey species found in cats stomachs were common species in this area. The most frequently eaten prey species was common vole (*Microtus arvalis*) which comprised 63 % of all prey items. The chi-squared test showed significant differences in the cats diet dependent on season ($\chi^2 = 22,89$; $df = 2$; $p < 0,001$), age ($\chi^2 = 5,12$; $df = 1$; $p < 0,05$) and urbanization level ($\chi^2 = 12,25$; $df = 1$; $p < 0,001$). The diet did not differ between sexes. The overall predation rate on vertebrate prey was $PR = 15,93$ prey items/cat/month. PR calculated in our study was higher compared to estimations in other studies based on the prey-brought-home method (e.g. $PR = 1,75$ Baker et al. 2008; $PR = 0,67$ Tschanz et al. 2011) but lower than estimated for cats in rural areas of central Poland based on the scats and stomachs content analysis ($PR = 26,17$, Krauze-Gryz et al. 2012).

Yellowhammer dialects mystery: using bioacoustics to understand invasion history

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Presented project stems from a succesful citizen-science project «Dialects of Czech yellowhammer», which involved public to map distribution of yellowhammer dialects in the Czech Republic. In this project, our focus moved towards Britain and to New Zealand, where were yellowhammers introduced in the 19th century by British colonists. It has three principal aims. In the first part, people from the UK (mother country) and New Zealand (introduced range) are encouraged to record song of yellowhammers and thus map the current distribution of its dialects in both countries. So far, dialects recorded in New Zealand are quite alike those in Europe. Suprisingly enough, some of these dialects haven't been discovered in Britain yet. In the second part, thourough analysis of historical resources (e.g. reports of acclimatisation societies) in New Zealand libraries revealed more detailed data about numbers of introduced birds and localities of release. As a last stage, data about history of introductions will be compared with the current distribution of dialects in mother country and in new range to see, whether it reflects invasion history well.

Circadian rhythm of activity and niche differentiation in two competing *Drosophila* species

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Acceleration of intercontinental trade tends to favor accidental introduction of exogenous species. In the new environment, among various ecological factors that may promote or oppose the installation of invasive species, high resource availability, due to high resource supply or low consumption rate by competing species, is crucial. One mechanism that can limit interspecific competition is niche differentiation. A shift in the temporal niche may occur between indigenous and introduced species through a difference in circadian rhythm of foraging activity (such as locomotion, flight, egg-laying), that is also highly sensitive to ambient temperature.

Drosophila suzukii, coming from Asia and observed for the first time in Europe and North America in 2008 appears to be a highly invasive species since it was observed in 2012 in almost all temperate areas of both continents. While other frugivorous *Drosophila* species lay eggs only on decayed fruits, this species can oviposit and develop on healthy ripening fruits. In absence of healthy fruits, *D.suzukii* is able to grow on decayed fruits and, in this case, is exposed to competition with other *Drosophila* such as *Drosophila melanogaster*.

The aim of this study was to compare the circadian rhythm of activity of the two potentially competing species, *D.suzukii* and *D.melanogaster* at four different temperatures. A measure of expression kinetic of three main clock genes (clock, period, timeless) was also realized to test for the correlation between the activity rhythm and the level of gene expression. Results suggest that *D.suzukii* and *D.melanogaster* have different circadian rhythm in interaction with temperature. *D.suzukii* is active on a more restraint thermic range than *D.melanogaster* and its circadian rhythm is less plastic regarding temperature. Activity is partly correlated with gene expression. Temporal and thermic niches overlap and a shift in circadian rhythm could not be claimed to decrease interspecific competition.

Avian malaria and its consequences for reproductive investments in blue tits (*Cyanistes caeruleus*)

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Avian malaria is a widespread vector-borne disease caused by parasites from genus *Plasmodium* and *Haemoproteus*. These parasites are commonly used as a model system for testing hypotheses in evolutionary ecology. Their impact on the host is dependent on specific host-parasite system, but usually parasites impose fitness costs to their hosts by reducing their survival, fecundity, or mating success. Unfortunately, previous studies do not give a clear answer on the impact of these parasites on the host. Some of them shows the negative effect of infection, while another suggest a positive relationship between the presence of parasites and reproductive success.

Here, we studied whether the infection with malaria parasites is associated with reproductive investments. The magnitude of investment was assessed with the measures of offspring quality: body mass, tarsus length and cell-mediated immune response. We also take into account the mating success by verifying whether the occurrence of extra-pair offspring in the brood is related to infection status with avian malaria parasites of the social father in the wild blue tit (*Cyanistes caeruleus*) population characterized by relatively high frequency of extra-pair matings (40% of nests contain at least 1 extra-pair offspring) and approximately 60% infection rate with malaria parasites among adult males and females. Our results suggest that infection of the parents positively affected offspring performance but only in harsh environmental conditions. Parasitic infection had also effect on female's decision about engaging in the extra-pair copulations but these decisions were dependent on her infection status, not only male's infection. We will discuss possible explanations for these results.

A General model of Distant Hybridization: a silent threat for species persistence

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Interspecific hybridization is enhanced by human activities, such as translocation of invasive species or habitat modification, and may threaten species persistence. Hybridization between distantly related species often leads to infertile hybrids or fertile hybrids without chromosomal recombination during gametogenesis. We present a model describing those types of hybridization, which considers density-dependent competition, assortative mating and dominance/recessive inheritance. We illustrate its use for assessing extinction risk by two examples. We first modeled the asymmetrical reproductive success between Atlantic salmon and brown trout, whose hybridization has been increasing due to releases of domestic fish in the wild. Second, we studied the impact of the invasive frog *Pelophylax ridibundus* on two western European endemic waterfrogs, *Pelophylax lessonae* and *Pelophylax esculentus*, when introduced from different geographical origins having singular hybridogenetic properties. The results of our model give the conditions under which interspecific hybridization can lead to population extinction, providing clues for conservation actions. In both examples, the threat is demographically mediated, either through wasted mating potential or through demographic displacement between species. Our results highlight why distant hybridization should be considered in conservation assessments, one of the fields in which our model constitutes a valuable new tool.

Genetic variation in host plants influences the mate preferences of a plant-feeding insect

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Many species spend their lives in close association with other organisms, and these environments provided by other individuals can play an important role as causes of variation in phenotypes. When this is the case, the genotypes of the individuals constituting the environment may influence the phenotypes of individuals living in that environment. When these effects are between heterospecifics, interspecific indirect genetic effects (IIGEs) occur. Several studies have detected IIGEs, but whether IIGEs contribute to variation in sexually-selected traits remains virtually unexplored. I assessed how mate preferences in a plant-feeding insect are influenced by the genotype of their host plant. I established clone lines of a sample of host plant genotypes constituting the background biotic environment for a random sample of insects that we reared on them. I found that the insects' mate preferences varied according to the clone line on which they developed. These results demonstrate that genetic variation in host plants has cross-trophic consequences on a trait that has strong effects on fitness and inter-population dynamics such as diversification in communication systems. I will discuss how IIGEs on mate preferences may influence the way in which selection acts, including the maintenance of variation and the promotion of evolutionary divergence.

Differential stress tolerance according to genetic variability on populations of herbaceous species at the Southamerican Andes

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Plant populations of Southamerican Andean species experience a broad range of environmental conditions that can be faced by phenotypic plasticity or ecotypic differentiation and local adaptation. Nevertheless, in order to be able to respond, genetic variability plays a fundamental role, being the one that allows populations to have enough diversity to be able to cope with different environments.

On this study we compared the stress tolerance and other physiological parameters of two sister species of herbaceous plants in Los Andes, Chile. They are fundamentally different in their reproductive systems, which gives them very different values of genetic variability as a result. Therefore, our comparison seeks to understand, how genetic variability may play a role in the stress tolerance of herbaceous plants and how could it determine the differential vulnerability of these two species to climatic changes.

Global modelling for mammal conservation

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The Global Mammal Assessment program at Sapienza University of Rome coordinates the updates of mammal extinction risk data on the IUCN Red List and carries out global scale analyses aimed at elucidating patterns, processes and scenarios of mammal distribution, threat, and conservation. Here I present a global dataset that incorporates data on habitat suitability, life history traits, and threats to terrestrial mammals. These data are combined into sets of global modelled distributions - both current and projected into the future - that account for spatial structuring of populations and scenarios of global change. I discuss the assumptions, uncertainty, strengths and limitations of these data, as well as their application in continental and global conservation analyses. These include analyses of structural connectivity of protected areas in Africa and globally; an assessment of the likelihood of success of conservation actions across the world's threatened mammals; an analysis of the factors that affect the extinction risk of African mammals; and a global identification of priority areas for investment to abate threats to mammals from habitat destruction.

Spatially-explicit trends in the global conservation status of vertebrates

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The world's governments have committed to preventing the extinction of threatened species and improving their conservation status by 2020, but different regions face very different challenges. This analysis quantifies the contribution of regions and nations towards recent global trends in the diversity of land and marine birds, mammals and amphibians, to guide action towards the 2020 target. Most of the global biodiversity losses took place in just eight countries (Australia, China, Colombia, Ecuador, Indonesia, Malaysia, Mexico, United States), but other megadiverse countries (Brazil, India, Madagascar) performed better in conserving their share of global diversity. Economic wealth does not explain these patterns: economically-rich nations did not perform better than the poorest. Reducing global rates of biodiversity loss requires strategic investment in the regions with the highest responsibility for the world's biodiversity, focusing on those species most in peril, and reducing the most serious threats.

Deciphering the effects of unpredictable fire and climate variability in population dynamics of the spur-thighed tortoise in the south-east of Spain

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Environmental variability and stochastic disturbances may play an important role in the dynamics of species, especially in arid and semiarid environments. Population fluctuations are usually driven by a combination of multiple factors. In this work, we developed a simple conceptual model to decipher the role of climate variability and catastrophic fires on the population dynamics of the endangered spur-thighed tortoise (*Testudo graeca*) in the south-east of Spain.

We fit to logistic models long-term data (1999-2013) from a well preserved tortoise subpopulation affected by a fire in 2004. This approach let us to recognize endogenous and exogenous factors affecting the species' dynamics. We found that fire significantly reduced the carrying capacity of the habitat, and its effect was controlled in further analyses. Moreover, our models reflected that density-dependent factors (as competition or predation), play an important role in the tortoise's dynamic ($R^2 > 0.7$). However, exogenous climate factors (humidity and rainfall during winter and autumn) also affect the population fluctuations. We hypothesize that these variables could be related to the population recruitment or to interannual variations in the activity of tortoises. This study demonstrates that simple logistic models can be useful for deciphering and discussing the ecological mechanisms underlying the population dynamics of endangered species.

Modelling bat mortality risk on a railway using acoustic flight path reconstruction

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Impact assessments of roads and railways on bats are suffering from poor estimates of mortality and from a lack of knowledge on factors influencing mortality risk. Mortality monitoring is indeed very time-consuming and often of poor reliance because of rapid scavenging of bat casualties. However, recent developments such as high sampling rate unattended recordings and acoustic flight path reconstruction (FPR) opened the way to a large gathering of flight behaviour data and to an accurate quantification of mortality risk. Here, sets of two synchronized SM2BAT plugged to four microphones were used to perform whole night recordings on 15 sites along a 22-km railway of north-eastern France in June 2012. Recordings contained 15921 bat passes among which 200 were selected on a stratified random sampling basis for FPR. We then analysed the effects of species ecology, habitats and flight response to railway on bat mortality risk. Results showed that body size predicted better species sensitivity than its ecology, both small gleaning and small hawking bats suffering from a much higher risk (> 20% of their flight paths) than every big species (90 %). Bats seemed indeed to consider the railway much more as a corridor than as a barrier. Thus, bat conservation issues may be more concentrated on creating alternative corridors parallel to railways than on helping bats crossing them safely.

Ringing data help to understand dispersal pattern in the White Stork (*Ciconia ciconia*)

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Dispersal behavior is a primordial determinant of the structure and spatial dynamics of population. Two different types can be distinguished: the natal dispersal (ND), which is a permanent movement from birth site to the site of first breeding attempt, and the breeding dispersal (BD) which is the movement made by individuals who have already reproduced, between two successive breeding sites. The White Stork (*Ciconia ciconia*), a large migratory European bird, helps us to determine the factors that have shown an effect on these ecological processes.

Based on a 25 years ringing and resighting database, we have studied the pattern of BD and ND of this species all over the French territory according to climatic conditions, years and different populations. White Storks have shown a high propensity to disperse at the immature state (81.97%), but not exclusively, since they also shown a non-negligible BD (8.20%). The BD propensity was impacted by the age of the individuals (younger breeders disperse more often) and the climatic conditions (NAO index), whereas the ND propensity was influenced by climatic conditions, but also temporal (years) and geographical (population) situations. Using the NAO index, we can conclude that for both ND and BD, better the climatic conditions are, higher the proportion of dispersing individuals is.

The ND distances were influenced by these last two factors. The orientations have shown a random distribution for the BD, but not for the ND for which each population on the French territory shown a statistically different pattern. Nevertheless, the mean ND orientation follows significantly the orientation of mean migration direction. This highlighted the fact that individuals are biologically prone to follow it, even for dispersing processes.

XY females do better than the XX in the African Pygmy Mouse.

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All therian mammals have a similar XY/XX sex-determination system except for a dozen species. The African pygmy mouse, *Mus minutoides*, harbours an unconventional system in which all males are XY, and there are three types of females: the usual XX but also XX* and X*Y ones (the asterisk designates a sex-reversal mutation on the X chromosome). The long-term evolution of such a system is a paradox, because X*Y females are expected to face high reproductive costs (e.g., meiotic disruption and loss of unviable YY embryos), which should prevent invasion and maintenance of a sex-reversal mutation. Hence, mechanisms for compensating for the costs could have evolved in *M. minutoides*.

Data gathered from our laboratory colony revealed that X*Y females do compensate and even show enhanced reproductive performance in comparison to the XX and XX*; they produce significantly more offspring due to (i) a higher probability of breeding, (ii) an earlier first litter, and (iii) a larger litter size, linked to (iv) a greater ovulation rate. These findings confirm that rare conditions are needed for an atypical sex-determination mechanism to evolve in mammals, and provide valuable insight into understanding modifications of systems with highly heteromorphic sex chromosomes.

Toward a mechanistic explanation of the global patterns of migratory birds diversity

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Nearly one in five bird species has separate breeding and overwintering distributions, and the regular migrations of these species cause a significant seasonal redistribution of avian diversity across the world. This large-scale ecological adjustment due to bird migration is a fascinating natural phenomenon but previous work has been mostly centred on a few species and/or at narrow spatial scales. In this study, I first quantify global macroecological patterns of migratory birds diversity, i.e., richness in migratory species and contribution of migratory birds to local bird diversity; and I investigate the processes that shape those patterns. My results reveal that seasonality in available energy is an excellent predictor of the patterns during the breeding season but a poor predictor during the rest of the year when species do not breed. The latter is better explained by a spatial process of seasonal redistribution of migratory species that incorporates the cost of migration.

The effect of habituation to novel environment on the latency to the onset of nestmate rescue behaviour in workers of the red wood ant *Formica polyctena* Först.

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The phenomenon of rescue of trapped ants by their nestmates can be studied by means of a laboratory bioassay in which a group of ant workers placed in a container encounters a nestmate tethered to a small paper disc buried in sand. We investigated the impact of duration of habituation to novel environment on the latency to the onset of nestmate rescue behaviour in workers of the red wood ant *Formica polyctena*. Five freely moving foragers of that species were placed in a cylindrical open container and confronted with a trapped nestmate. We recorded the onset of interactions with the trapped worker, the wire ring used to fix it to the paper disc, the disc itself, or the sand surrounding the trapped ant. The tested ants were allowed to habituate to novel environment during 0, 2, 5, 10, 20, 30 and 40 minutes before the start of the test. In the case of yet another experimental group the trapped ant was already present in the experimental container before the introduction of freely moving ants.

The shortest latencies from the start of the test to the first antennal contact of one of freely moving ants with the trapped nestmate were observed in the ants allowed to habituate to novel environment during 2 minutes, but the shortest latencies to the first episode of rescue behaviour were observed in the ants allowed to habituate during 10 minutes. Ants not allowed to habituate to novel environment prior to the test showed the longest latencies to the onset of nestmate rescue behaviour.

Our research demonstrated that sufficiently long habituation to novel environment before the exposure to signals emitted by a trapped nestmate facilitates the expression of nestmate rescue behaviour in workers of *F. polyctena*.

Epistasis between adults and larvae underlies caste fate and fitness in a clonal ant

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In social species, the phenotype and fitness of an individual depend in part on the genotype of its social partners. However, how these indirect genetic effects affect genotype fitness in competitive situations is poorly understood in animal societies. We therefore studied phenotypic plasticity and fitness of two clonal lineages (A and B) of the ant *Cerapachys biroi*, both in monoclonal and chimeric colonies. While clone B had lower fitness in monoclonal colonies, it consistently outcompeted clone A in chimeras. The reason was that, in chimeras, clone B produced more individuals belonging to a subcaste that specializes in reproduction rather than cooperative tasks, behaving like a facultative social parasite. A cross-fostering experiment in which larvae were raised by adult from the same or the other clonal lineage showed that the proportion of the highly reproductive individuals depends on intergenomic epistasis between larvae and nursing adults, explaining the flexible allocation strategy of clone B. Our results suggest that intergenomic epistasis can be a proximate mechanism for social parasitism in ants, revealing striking analogies between social insects and social microbes.

The updated information on distribution and conservation issues of European wildcat (*Felis silvestris*) in Poland

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The population of European wildcat was once widely distributed in Poland, but at the beginning of 19th century it decreased significantly and presently the species occurs only in south-eastern Poland. The total population size was estimated ca. 220 individuals (Okarma et al. 2002) and the species was classified as endangered (Glowacinski et al. 2001). The most recent studies on wildcat have been done over 10 years ago and no updated information was published so far. Therefore, the main aim of our study was to evaluate the current status of wildcat and its distribution, as well as to establish foundations for the future research. The study was based on questionnaires conducted in the Regional Directorates of State Forest in Krosno and Krakow and Bieszczady and Magura National Parks. The total area covered by the study was 370 thousand hectares (total number of resent questionnaires n=50). The number of wildcats was estimated as 95 individuals (1-2 individuals/forest district). The survey included questions about historical records of wildcats and recent observations with given details on habitat and distance to the nearest human settlements. 17 wildcat individuals were recorded based on snow tracking and 78 individuals due to direct observations. Nearly 40% of observations indicated wildcat's presence in the proximity of creeks, rivers or lakes. Almost 20% of respondents stated that wildcats were observed in close distance to human settlements. Based on literature review the main threats to wildcat population in Poland include: habitat fragmentation, hybridization and competition with domestic cat, and traffic mortality. Results of the study allowed us to allocate sites for the future field research, which will include radio tracking and collecting samples for genetic and diet analyses.

Local spatial variability in host-parasitoid interaction networks

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At a landscape scale, changes in environmental factors affect community structure and distribution of insects and their parasitoids. These changes, in turn, may modify network topology, which may ultimately alter some ecosystem services. Although much less studied, local factors such as microhabitat or resource distribution should also be expected to have some bearing on community structure and spatial distribution. Surprisingly, few studies have hitherto focused on spatial variation of communities and their interaction networks at a local scale, and on the role of local factors in shaping the observed spatial patterns. Here, we studied a community of cavity nesting bees and wasps (CNBW) and their associated parasitoids in 25 sites over a 32 km² area of uninterrupted Mediterranean scrubland. Our objectives were: (1) To study the composition and spatial variability of CNBW, their parasitoids, and the interactions between both at a local scale and (2) to analyze the effects of local factors (microhabitat, nesting substrates, flower availability) on CNBW and parasitoid composition, and on interaction network structure. We obtained 888 nests, containing 3170 CNBW individuals, belonging to 12 bee species and 17 wasp species. We reared 426 individual parasitoids belonging to 18 species. Despite their mobility and the absence of environmental barriers, we found spatial heterogeneity at a scale of 500-1000m, both in CNBW and parasitoid community, and in interaction network structure. Our results suggest a strong effect of local factors and indicate that spatial variation of interaction networks may occur at a smaller scale than previously thought, thus cautioning about pooling results from distant surveys to build large-scale networks.

Can rivers be barriers of roe deer movements?

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European roe deer (*Capreolus capreolus*) crossing water bodies like lakes or rivers is a known phenomenon. However there is very little information about frequency and patterns of this activity. We analyzed four year localization data of thirteen GPS-GSM collared roe deer living in the floodplain forest of the river Tisza in the Hungarian Great Plain in order to get information of such behavior.

The width of the river is 130-160 m in the study area, the average depth is 6-8 m, the average speed is 1,5-14,5 km/h. Previously, we assumed that a water body of that size may act as a barrier for roe deer. In this study, we investigated the frequency of river crossing occasions, between and within the studied animals. Our questions were: (1) Is the river Tisza a barrier in the movements of roe deer? (2) Are there some seasonal or daily characteristics in the crossing patterns? (3) Are there any differences between the sexes?

According to our data, 10 of the 13 individuals crossed the river at least once, 8 of them did that several times or regularly. The periods spent at the different sides of the river varied from few hours to several months. During the study, animals of both sexes have crossed the river. We conclude that Tisza does not represent real barrier in the movements of roe deer and our assumption seems to be false.

The importance of drinking, how surface water availability constrains ungulate movements in a semi-arid savanna.

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Artificial water provisioning has been used extensively to maintain high wildlife densities during the dry season in arid and semiarid rangelands worldwide. In African savannas large herbivore densities decrease rapidly beyond a couple of kilometers from perennial water sources. However, little is known on individual coping strategies. For this purpose we used GPS collars to track three wild water dependent herbivore species (Elephant, Buffalo & Zebra) and one domestic (Cattle) in and around Hwange National Park, Zimbabwe, during the 2012 and 2013 dry seasons. They differ by their body size, digestive physiology, habitat preference, diet and social organization. When forage moisture content is below a given threshold herbivores need water for thermoregulation and digestion. We investigate seasonal and daily variation of movement patterns to identify the importance of thermoregulation and drinking.

We expect drinking frequency to increase for wild species as the dry season advances and when temperatures are higher but remain constant for cattle due to herding or manual provisioning by owners at boreholes. However, the distance to water of foraging patches is expected to decrease for elephants as drinking frequency increases but increase for zebra, buffalo and cattle as favored grasslands close to water sources become depleted. Finally we expect a shift in activity patterns with more time allocated to daytime resting in wild species and more travelling at night. As a result movement patterns are expected to be less sinuous during the peak dry season. Zebras and elephant are expected to have a more flexible schedule than buffalos since they do not have to ruminate following a foraging bout and live in smaller social units.

Nature's ecological recorders: stable isotopes in Mycalesine butterflies

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Mycalesine butterflies have radiated dramatically in Africa, Madagascar and Asia to produce more than 300 extant species. Larval host plants are nearly always grasses. The primary driving process of these radiations could have been the ability of mycalesine butterflies to invade the empty niches that arose as a result of the evolution of the C4 photosynthetic pathway and the world-wide expansion of C4 grasses in open, sunlit environments. Primary forest species of mycalesines are expected to be C3 specialists as the advantage of the C4 pathway declines in shaded forest understories where cool conditions improve the relative photosynthetic efficiency of C3 grass species. In more open habitats we expect mycalesines to be more opportunistic and generalist in their host plant choice or even to have become C4 specialists.

Reliable host plant data are essential to be able to test this hypothesis but detailed host plant records for mycalesines are very limited. However, over the last three decades stable isotope analyses have become an important part of the ecologist's toolbox. Here, we used daily trap captures of adult butterflies from a community of three sympatric species of *Bicyclus* in Malawi to explore whether $\delta^{13}\text{C}$ the $\delta^{18}\text{O}$ values can be used to detect micro-climate conditions during the larval development of Mycalesine butterflies. In addition, we have begun to examine the larval feeding preferences, in terms of C3 and C4 grasses, in a broader phylogenetic-ecological framework. By mapping the data of this large scale isotope survey and the current habitat preferences of *Bicyclus* butterflies onto the phylogenies we are now able to reconstruct whether one or more shifts to C4 grasses were associated with the colonization of open habitats and subsequent expansions.

On Faces, Gazes, Votes, and Followers: The Evolutionary Origins and Psychology of Leadership

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Leadership is arguably one of the most important themes in the social sciences, permeating all aspects of human social affairs, from the Eurozone economic crisis to the re-election of the first Black president in the US. Parallel findings across the behavioral and biological sciences suggest that there are both commonalities and differences in leadership between humans and non-humans. Here I review the evidence for leadership patterns across taxa and present new insights on the origins and evolution of leadership, informed by recent findings in evolutionary biology, psychology, anthropology, and neuroscience (including much of our own data). I will discuss the likely evolved functions, developmental processes and psychological mechanisms underlying leadership. Finally I will argue which aspects of leadership are unique to humans and which are shared with nonhumans and present some ideas about comparative research projects.

Effects of individual heterozygosity at neutral and immunogenetic markers on roe deer natal dispersal

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Despite the key role of natal dispersal on population dynamics and genetic structure, little is known about the mechanisms involved in and the factors affecting natal dispersal. In particular, very few studies have considered the potential impacts of individual genetic characteristics on natal dispersal, although individual neutral and adaptive genetic diversity, through its potential link with fitness, disease resistance and/or inbreeding, can strongly affect the costs and benefits of dispersal for individuals. We looked at the effects of individual heterozygosity at both neutral markers (microsatellites) and innate immune genes (Toll-Like Receptors (TLR) loci) on natal dispersal (individual propensity to disperse and dispersal distance) in three contrasting long-term monitored populations of European roe deer (*Capreolus capreolus*). Our results showed that the effects of heterozygosity on natal dispersal differed between the different studied populations, between the two types of markers, between the two measures of dispersal, as well as between heavy and light individuals, highlighting the complexity and multicausal nature of dispersal. At Aurignac, in support to the body condition-dependent dispersal hypothesis, individuals with higher heterozygosity at immune genes (but not at neutral markers) and higher body mass generally dispersed more and further than lighter individuals with lower genetic diversity. However, individuals in particularly poor body condition, with both a low heterozygosity at immune genes and a low body mass, dispersed much more often and further than expected, suggesting the existence of a «leave-it» emergency life-history strategy. At Chizé, in support to the inbreeding avoidance hypothesis, dispersal propensity increased with decreasing neutral heterozygosity, but for low body masses only, which is in accordance with the hypothesis of a more severe inbreeding depression under harsher environmental conditions. Further studies are finally needed to better understand the patterns found at Trois Fontaines. These results have important implications in terms of population genetic structure.

Diversity distribution of aquatic organisms dispersed by migratory waterbirds

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Many aquatic organisms, such as aquatic plants and zooplankton, are dispersed by waterbirds that ingest and transport their propagules (seeds and eggs). To estimate their dispersal potential, we developed mechanistic dispersal models based on the movement of ringed birds and the retention times of seeds ingested by ducks. Our results suggested that propagules might be regularly dispersed at distances up to 100 km and occasionally over more than 1000 km, depending on the migratory strategy of the vector waterbird and on the propagule characteristics. We then tested whether the high dispersal potential was reflected in the local species richness (alpha-diversity) and community compositional variation (beta-diversity) of these two taxa by surveying natural aquatic communities in five European regions and analysing these diversity indices as a function of space and connectivity, as well as abiotic and biotic variables at different spatial scales. Species diversity was generally not limited by dispersal within regions (<300 km) but rather by local factors (environment). However, species richness and composition varied among regions suggesting that biogeography and dispersal limitation at continental scale are important drivers of species distribution. Because we also observed high levels of species turnover (rather than nestedness) over short spatial scales (where abiotic conditions are more similar), we asked whether priority effects could explain such differentiation. An experimental approach suggested that in fact not all dispersing species were able to invade a habitat patch (water tank) already occupied by early colonizers, independently of their composition, suggesting that priority effects might contribute to short-scale compositional variation and overall high species turnover. Our results suggest that these aquatic communities are assembled by stochastic colonization followed by priority effects and/or species sorting.

Australopiths, baboons, chimpanzees, and speculations about the origin and evolution of war

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Efforts to understand the origin and evolution of warfare in humans have been greatly influenced by studies of warlike intergroup aggression in chimpanzees. In recent years, however, evolutionary anthropologists have increasingly turned to dry country Papionins (baboons and gelada monkeys) for insights into the behavior and ecology of early hominins. Consideration of several features of paleoecology, australopith fossils, and comparison with living species suggest that australopiths may have lived in multi-level societies, more like those of hamadryas baboons and gelada monkeys, than those of chimpanzees. Paleoecological studies indicate that australopiths lived in seasonally dry mosaic habits that included substantial woodland and grassland components -- habitats more similar to those of baboons and geladas than the moist forests where most chimpanzees are found. Stable isotope studies have revealed that like baboons, but unlike chimpanzees, australopiths had diets rich in C4 foods such as grasses and sedges, underground storage organs of these plants, and/or grass-eating animals. Australopiths had substantial sexual dimorphism, indicating a higher degree of reproductive skew than in chimpanzees or bonobos. In living species with comparable levels of sexual dimorphism, males live either in stable groups (such as gorillas and savannah baboons) or in multi-level societies (such as hamadryas baboons, geladas, and several Asian colobines). Comparison with living apes and humans suggests that australopiths are likely to have required a relatively high quality diet, and are thus unlikely to have lived in stable multimale groups in the seasonally dry habitats where their fossils have been found. Australopiths are thus more likely to have lived either in small groups or in multi-level societies, composed of multiple "one-male units," each consisting of a single adult male, several adult females, and their young. One-male units may have gathered together into larger groups during times of food abundance, and/or at sheltered sleeping sites such as cliffs and groves of trees. Such multi-level societies are in many ways more similar to those of modern humans than those of chimpanzees and bonobos. Whether such groups would have participated in coalitionary killing is difficult to predict. If, like chimpanzees and bonobos, australopiths maintained a pattern of female dispersal and male philopatry, males may have maintained coalitional bonds with related males and defended group territories. Such a dispersal pattern is supported by recent stable isotope studies but remains far from certain. Additionally, with hands free to wield weapons such as sticks and throwing stones, australopiths potentially would have been able to concentrate force during fights against outnumbered enemies, which would further amplify the benefits of numerical asymmetries. However, examples of coalitionary killing by males in multilevel societies are rare, and it is possible that australopiths had little or no intergroup killing. In this case, warfare may be a more recent feature of the human lineage.

In search of a new movement framework based on energy.

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Attempts have been made to understand the movements of animals since the times of the ancient Greeks and before. Modern day attempts range from detailed studies of how animals respond to specific stimuli, through state-space models to overarching models, such as Random Walk and Lévy Flight. Perhaps disappointingly, these approaches tend to be descriptive rather than predictive. I will use an energetics-based approach to argue that animal motion can be couched in terms of movement efficiency and/or necessity. The hope is that future studies should be able to identify and justify the decisions that animals should take to inform their movement so that we may be able to predict when animals will move and where they might go.

An attempt to evaluate gorillas exhibits in European zoological garden based on their educational role

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The aim of this study was to identify the criteria influencing the educational value of animal enclosures. Next, the criteria were used to evaluate exhibits of gorillas in 12 European zoological gardens. The criteria were identified during a two-stage cosy analysis, which included project, behavioural and organisational assumptions. The analysis provided 54 criteria divided into 9 groups: area size, vegetation, water, ground (relief), landscape (shaping of visibility), arrangement, equipment components, microclimate, animals. The criteria were then used to evaluate the exhibit using an ordinal scale (-1, 0, +1). The final result indicated the best designed and arranged exhibits with highest educational value in Cologne and Hanover. Area size, landscape (shaping of visibility) and arrangement grouped the key criteria for evaluating the educational value of an exhibit. Wide range of active behaviours of gorillas were observed on exhibits with exterior enclosures. Besides naturalistic exhibits with the low numbers of animals (Warsaw and Opole zoos), a high number of points obtained the «laboratory-like» exhibit with a big group of gorillas (Berlin zoo). Moreover, it was proved that criteria from landscape (shaping of visibility), arrangement and vegetation groups were decisive in creation of a «natural» barrier between the visitors and animals, which harmonised with the surrounding landscape. Exhibits with natural exterior enclosures got the highest scores.

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