Colloque de l’École Doctorale BEE
(Biodiversité, Ecologie, Evolution)

Congress of the Graduate School BEE
(Biodiversity, Ecology, Evolution)

Programme détaillé du samedi 21 mars
Detailed program Saturday, March 21
2015
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Accès/ Venue

Adresse du colloque/ colloquium address:
L’accueil du colloque se trouvera dans le grand hall à l’entrée principale du bâtiment D
The reception desk will be in the hall at the main entrance of the building D

ULB - Campus du Solbosch
avenue Depage no 30, bâtiment D/building D
1050 Bruxelles (Ixelles)

En transports publics/ Transfer to the colloquium by public transport:
prendre le bus 71, le tram 25 ou 94 et descendre à l’arrêt ULB.
Take lines bus 71, tram 25 or 94, and get off at the stop ULB.

Parking:
Disponible avenue Depage et aux alentours de l’ULB.
Available avenue Depage, in front or close to the Building D.

Accès Internet/ Internet access:
L’accès Internet est actuellement très limité au bâtiment D. Il sera accessible uniquement dans le hall et seulement 25 personnes pourront se connecter en même temps. Pour les accès (login et password), merci de les demander à l’accueil.

Internet access is currently very limited in building D. It will be accessible only in the lobby and only 25 people can connect simultaneously. For access (login and password), please request at the reception.
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<td>Origin and history of the Dahomey–Gap separating West and Central African rain forests: insights from the phylogeography and ABC demography history analysis of the legume tree <em>Distemonanthus benthamianus</em>.</td>
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<td>Functional strategies and trade-offs in plant communities along a copper gradient in Katanga (<em>D.R. Congo</em>).</td>
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<td>L’allométrie hauteur-diamètre spécifique au site des forêts denses humides d’Afrique centrale.</td>
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Séance plénière/ Plenary session

Doyle McKEY
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Résumé/ Summary :

Dans les savanes inondables, certains animaux ‘ingénieurs du sol’ édifient des structures surélevées qui leur permettent d’échapper à l’inondation. En créant des milliers d’îlots régulièrement espacés d’une ressource rare et cruciale—le sol bien drainé—ces organismes construisent des paysages spectaculaires, transformant ainsi le fonctionnement de tout l’écosystème. Dans ces mêmes milieux, les humains créent des paysages similaires, construisant des champs agricoles surélevés pour cultiver des plantes ne tolérant pas l’inondation. Les ingénieurs humains et non-humains interagissent, les uns utilisant et modifiant les constructions des autres, façonnant des paysages qui sont ni naturels ni culturels, mais bioculturels. Ces environnements sont des terrains de jeu pour examiner des questions d’ordre fondamental (comment les interactions entre organismes et milieu génèrent-elles des écosystèmes spatialement auto-organisés ? comment concevoir les interactions entre humains et écosystèmes ?) et appliqué (l’agriculture peut-elle profiter en imposant une organisation spatiale qui imite l’auto-organisation de la nature ?). Nous examinerons ces questions au travers d’un voyage sur deux continents et deux mille ans d’histoire et ouvrant vers l’avenir : l’agriculture sur champs surélevés peut-elle réconcilier production, biodiversité et services écosystémiques en travaillant avec les zones humides, et non en s’y opposant ?
Mixed Platanthera populations: a case of introgression or selective pressure.
-Fabiana Esposito, Earth and Life Institute, Orchid Research Group, UCL,
-Daniel Tyteca, Earth and Life Institute, Orchid Research Group, UCL,
-Nicolas Vereecken, Evolutionary Biology & Ecology, ULB,
-Rosita Rinaldi, Plant Biology Dept., University of Naples Federico II.

Two Platanthera species are widespread throughout Europe (P. bifolia and P. chlorantha). Though very close genetically, they exhibit significant morphological, phenological and ecological differences. Moreover, particular floral characteristics would normally prevent effective cross-pollination between both species, and these specifically attract different moth species through emission of different fragrances. However, situations where both species come in contact are not rare, and at various locations intermediate individuals are observed. In most cases these have been interpreted as hybrids between the two species. In this research, by using a combination of DNA analysis, morphometrics, crossing pollination experiments and fruit set analysis in two mixed Belgian populations, we show that there is very little if at all introgression, which implies that there are strong reproductive barriers between both species. Instead, there appears to be selective pressure, by which P. bifolia individuals tend to acquire P. chlorantha-like characteristics, presumably enabling them to exploit pollinators of the latter, and thereby benefit from its higher reproductive success. Fragrance analysis is still under way. Additionally, morphological, phenological and ecological characteristics of P. bifolia individuals from mixed populations are shown to diverge significantly from those of individuals found in pure P. bifolia populations supporting the hypothesis of two different taxa.

Analyse génomique de l’adaptation d’un insecte phytophage à sa plante-hôte en utilisant le RAD-sequencing.
-Chedly Kastally, Université Libre de Bruxelles, Evolution Biologique et Ecologie,
-Patrick Mardulyn, Université Libre de Bruxelles, Evolution Biologique et Ecologie

Gonioctena intermedia est une chrysomèle adaptée au froid spécialiste de deux plantes-hôtes: le cerisier à grappe, Prunus padus, et le sorbier des oiseleurs, Sorbus aucuparia. Des populations isolées de ces insectes se retrouvent dans les massifs d’Europe. En utilisant la méthode du RAD-seq (Restriction site Associated DNA sequencing), nous avons séquencé quatre groupes de 15 individus, échantillonnés dans des populations bien isolées, deux associées au cerisier et deux au sorbier, dans deux régions différentes : les Carpates et les Alpes. L’association entre les fréquences alléliques et l’identité de la plante-hôte a été testée pour plus de 9000 SNPs. Concernant 798 et 555 SNPs respectivement, la fréquence allélique diffère fortement entre populations d’une même région. Parmi ceux-ci, 35 sont associés à la même plante-hôte: des individus provenant de régions montagneuses différentes associées à la même plante partagent majoritairement le même allèle. Ces loci sont potentiellement associés à l’adaptation parallèle de ces insectes à leur plante-hôte.
Afzelia species trees are morphologically very similar and display continuous characters variation. Despite the established identification keys, species recognition in the field remains problematic. To be able to revise its taxonomy molecular phylogenetic analysis of cpDNA and nDNA sequences were performed on harvested samples over their whole area reparation. A total of 28 cpDNA concatenated, 28 nDNA PEPC-E7 and 17 ITS sequences of collected samples were aligned with those outgroups. A phylogenetic tree was inferred using two datasets: (1) mutiple accessions per species implemented in NETWORK and MRBAYSES and (2) single accession per species, implemented in BEAST. In this last analysis we used the uncorrelated lognormal relaxed clock model and calibrated it following the chronogram legumes. The results of phylogenetics analyses support that A. africana is a monophyletic group. All the other sampled Afzelia species emerged as a paraphyletic group: relationships within this clade were not resolved except clade of A. quanzensis that appears monophyletic. The reconstructed chronogram of Afzelia suggests that all main lineages diverged before Miocène (14 Mya). Due to the similar ecological conditions and geographical overlap of populations, rapid/recent speciation, incomplete lineage sorting may be potential causes of insufficient resolution of phylogenetic trees obtained in this study.
**DEMENOU Boris**  
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*Origin and history of the Dahomey–Gap separating West and Central African rain forests: insights from the phylogeography and ABC demography history analysis of the legume tree Distemonanthus benthamianus*

-Boris B. Demenou, ULB, Evolution Biologique et Ecologie  
-Rosalia Pineiro, Natural History Museum of Denmark, Evolutionary Genomics, Centre for Geogenetics  
-Olivier J. Hardy, ULB, Evolution Biologique et Ecologie

Tropical rain forests of Central and West Africa are separated by a 200 km wide savannah corridor called Dahomey-Gap (DG) which is located in south Benin, south Togo and south-eastern Ghana. Paleovegetation data show that the DG area was forested during the African Humid Holocene period and opened c. 4 kyr ago. The objective of this study is to attempt infer the history of this gap and their forest populations from the phylogeographic patterns and demographic history of D. benthamianus, one of a few tree species characteristic of rain forests which occur nevertheless in the DG, within isolated forest fragments and gallery forests. Phylogeographic analysis revealed five gene pools: one in West Africa, one in the DG and three in Central Africa. DG populations appear well differentiated from the gene pools of both West and Central African forests and display a lower genetic diversity than those of forested areas. ABC analyses infer contrasted demographic histories during the last 1 Myrs according to the gene pools. While forested areas display signature of past bottleneck, the Dahomey-gap gene pool has declined, probably during the last glacial maximum or the Holocene. D. benthamianus populations found in the DG would originate from the admixture of West and Central African forest, and result from recent colonization.

**KUHN Alexandre**  
Doctorant/ PhD student, ULB, Evolution Biologique et Ecologie  
alexkuhn@ulb.ac.be

*Déterminisme génétique des castes femelles chez la fourmi désertique Cataglyphis hispanica.*

-Alexandre Kuhn, ULB, Evolution Biologique et Ecologie  
-Hugo Darras, ULB, Evolution Biologique et Ecologie  
-Serge Aron, ULB, Evolution Biologique et Ecologie

Chez les hyménoptères sociaux, abeilles, fourmis et guêpes, la caste d’une femelle (ouvrière stérile ou reine reproductrice) est généralement déterminée par des facteurs environnementaux tels que la quantité de nourriture disponible ou la température lors du développement. La fourmi désertique Cataglyphis hispanica a évolué un mode de reproduction surprenant, appelé hybridogenèse sociale. Dans toutes les populations de cette espèce, deux lignées génétiques coexistent. Les reines s’accouplent à des mâles de la lignée génétique alternative à la leur et produisent des ouvrières hybrides interlinéées par reproduction sexuée. Contrairement aux ouvrières, les mâles et les nouvelles reines sont produits de façon clonale, de sorte que seul le matériel génétique maternel est transmis de génération en génération. Ici, nous montrons que ce système reproducteur repose sur un déterminisme génétique de la caste par lequel les ouvrières ne se développent qu’à partir de génomes hybrides interlinéées, tandis que les nouvelles reines se développent toujours à partir de génomes non-hybrides. Remarquablement, ce déterminisme génétique complet de la caste permet le maintien de deux lignées génétiques divergentes au cours du temps, malgré leur hybridation systématique pour la production d’ouvrières.
**Gateway to genetic exchange? DNA double-strand breaks in the bdelloid rotifer Adineta vaga submitted to desiccation.**

-Manon Knapen, UNamur, Laboratory of Evolutionary Genetics and Ecology, Belgium
-Anne-Catherine Heuskin, University of Namur, Research Centre for the Physics of Matter and Radiation (PMR), Belgium
-Florent Pineux, Namur Research College and Department of Chemistry, University of Namur
-Stéphane Lucas, University of Namur, Research Centre for the Physics of Matter and Radiation (PMR), Belgium
-Jean François Flot, Max Planck Institute for Dynamics and Self-Organization, Biological Physics and Evolutionary Dynamics, Germany
-Romain Koszul, Institut Pasteur, Groupe Régulation Spatiale des Génomes, France
-Karine Van Doninck, UNamur, Laboratory of Evolutionary Genetics and Ecology, Belgium.

The bdelloid rotifer lineage Adineta vaga inhabits temporary habitats subjected to frequent episodes of drought. The recently published draft sequence of the genome of A. vaga revealed a peculiar genomic structure incompatible with meiosis, suggesting that DNA damage induced by desiccation may have reshaped the genomic structure of these organisms. However, the causative link between DNA damage and desiccation had never been proven to date in rotifers. Using pulsed-field gel electrophoresis to monitor genomic integrity, we followed the occurrence of DSBs in dried bdelloids that accumulate with the time spent in dehydrated state increases and are gradually repaired upon rehydration. Even when the genome was shattered into small DNA fragments by proton radiation, A. vaga individuals were able to efficiently recover from desiccation and repair a large amount of their DSBs. Interestingly, when investigating the influence of UV-A and UV-B exposure on the genomic integrity of desiccated bdelloids we observed that these natural radiations also caused important DNA DSBs, suggesting that the genome is not protected during the desiccated stage but that the repair mechanisms are extremely efficient in these intriguing organisms. DNA double-strand breaks in desiccated A. vaga may represent gateways to genetic exchange, as suggested by the unprecedented amount of horizontally transferred genes identified in this organism.

**Total internal reflection accounts for bright silver sheen and provide protection from direct solar radiation in the Saharan desert ant Cataglyphis bombycina (Formicidae)**

-Priscilla Simonis, UNamur, Photonic of living Organisms group, Research Center in Physics of Matter and Radiation (PMR)
-Quentin Willot, ULB, Evolutionary Biology & Ecology
-Jean-Pol Vigneron, UNamur, Photonic of living Organisms group, Research Center in Physics of Matter and Radiation (PMR)
-Serge Aron, ULB, Evolutionary Biology & Ecology

The desert ant Cataglyphis bombycina (Formicidae) is one of the terrestrial living organism best prepared to stand high temperatures. One of the most obvious features is its white metallic color resulting from a high optical reflection obtained on a dense covering of the body by bristles. Those bristles are of triangular shape and support a total internal reflection phenomenon. This special coating allows the ant to gain less heat under direct sunlight and thus serve as protection against the intense solar radiation its natural area.
KAISER Aurélien  
Doctorant/ PhD student, UCL, ELIB  
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Urban conditions affect adult personality in a sex-specific manner in the Speckled wood butterfly.  
-Aurélien, Kaiser, Université catholique de Louvain, Earth and Life Institute  
-Thomas, Merckx, Université catholique de Louvain, Earth and Life Institute  
-Hans, Van Dyck, Université catholique de Louvain, Earth and Life Institute  

Using the Speckled wood butterfly (Pararge aegeria L.) as a model species, we examined differences in larval survival and personality traits between offspring from urban and rural populations. Also, we investigated to what extent these traits were affected by forced development on low-quality larval food. For the experimental set-up, gravid females were sampled from rural and urban populations and their offspring reared on watered versus drought-stressed host plants using a split-brood design. Next, all behavioural assays were conducted under controlled and replicated laboratory conditions. Results show reduced survival of drought-stressed larvae. Behavioural traits were found to be consistent within individuals and can therefore be referred to as personality traits. Both landscape of origin and diet treatment did affect personality and this mostly so in a sex-specific way with more pronounced differences in females than in males. In particular, we found that urban-origin butterflies were less explorative, with urban-origin females also less bold and covering smaller distances than rural-origin females. Our results hence support the assumption that urbanization favours behavioural types that differ from those found in rural and more natural areas.

DELHAYE Guillaume  
Doctorant/ PhD student, ULB, Laboratoire d'Ecologie Végétale et Biogéochimie  
gdelhaye@ulb.ac.be  

Functional strategies and trade-offs in plant communities along a copper gradient in Katanga (D.R. Congo).  
-Guillaume, Delhaye, ULB, Laboratoire d'écologie végétale et Biogéochimie  
-Maxime, Séleck, ULg-Gembloux Agro-Bio Tech, Biodiversity and Landscape unit  
-Edouard, Ilunga wa Ilunga, ULg-Gembloux Agro-Bio Tech, Biodiversity and Landscape unit  
-Soizig, Le Stradic, ULg-Gembloux Agro-Bio Tech, Biodiversity and Landscape unit  
-Gregory, Mahy, ULg-Gembloux Agro-Bio Tech, Biodiversity and Landscape unit  
-Pierre, Meerts, ULB, Laboratoire d’écologie végétale et Biogéochimie  

Although functional composition of plants communities is an increasingly popular topic, studies of metalliferous environment from a functional point of view remain largely underexplored. Looking for plants functional types (PFT) is a well-recognized way to create categories based on the functional traits of the species, allowing to predict the interaction of those species with the environment. We measured 13 functional traits related to growth, resource acquisition, dispersal and metal tolerance strategy on the 73 dominant species on a naturally occurring copper and cobalt gradient in Katanga (DR Congo). We used a hierarchical clustering method with a Ward linkage to find coherent PFT. We found four coherent PFT characterized by different functional strategies. They correspond roughly to a priori defined life forms (annuals, graminoids, bulbs and xyloloid) with characteristic sets of functional traits. These groups are not distributed equally along the gradient. The xyloloid group is largely dominant on metal poor soils and is progressively replaced by annual species while increasing the soil metal concentration. Bulbs and graminoids abundance show no clear variation along the gradient. Astonishingly, different functional strategies are viable in disturbed and stressfull environment.
Both neutral and deterministic processes influence fungal ectomycorrhizal community assemblage in a dry woodland (DRC).

-David Bauman, ULB, Laboratoire d’Ecologie végétale et Biogéochimie
-Olivier Raspe, Jardin Botanique National de Belgique, Département Bryophytes et Thallophytes
-Jérome Degreef, Jardin Botanique National de Belgique, Département Bryophytes et Thallophytes
-Pierre Meerts, Université Libre de Bruxelles, Laboratoire d’Ecologie végétale et Biogéochimie
-Thomas Drouet, ULB, Laboratoire d’Ecologie végétale et Biogéochimie

The objectives of this work are to understand the mechanisms structuring the fungal ectomycorrhizal community in a 10 ha plot of dry woodland (DRC) and to quantify the relative importance of deterministic and neutral processes in its assemblage. This was achieved by confronting a molecular characterization of the underground mycocoenosis with the measurement of 55 soil variables and the characterization of functional strategies displayed by host trees. Multivariable spatial analyses allowed to disentangle the relative proportions of deterministic and neutral processes acting on the community while considering species spatial autocorrelation and the precise scales of the ecological processes. The results revealed a diversified fungal community (119 species) displaying a high number of rare species. The spatial distribution of these species was mainly generated by neutral processes. Among the deterministic processes, soil chemical parameters as well as some functional traits of host trees influence fungi repartition and lead to a broad scale spatial structuring of species distribution. Testing higher taxonomic levels revealed that the spatial structure was maintained at genus level and was explained by the same variables. Niche differentiation in the fungal ectomycorrhizal community seems thereby to occur mainly at a broad scale and at the genus level.

LOUBOTA Grace
Doctorante/ PhD student, Université de Liège, Gestion des ressources forestières

L’allométrie hauteur-diamètre spécifique au site des forêts denses humides d’Afrique centrale.

-Grace Jopaul Loubota Panzou, ULg-Gembloux Agro-Bio Tech, Département BIOSE - Axe de Gestion des Ressources forestières
-Jean-Louis Doucet, ULg-Gembloux Agro-Bio Tech, Département BIOSE - Axe de Gestion des Ressources forestières
-Adeline Fayolle, ULg-Gembloux Agro-Bio Tech, Département BIOSE - Axe de Gestion des Ressources forestières

L’utilisation de l’allométrie hauteur-diamètre globale ou régionale en milieu tropical pourrait avoir des conséquences importantes dans les estimations de biomasse et des stocks de carbone. L’objectif de ce travail est d’identifier les variations de l’allométrie hauteur-diamètre au sein de deux types de forêts (forêt sempervirente et forêt semi-décidue) au sud du Cameroun et d’examiner leurs conséquences sur les estimations de biomasse. Le diamètre et la hauteur ont été mesurés sur un total de 521 arbres appartenant à 15 espèces et couvrant une gamme de diamètre de 10 à 240 cm. Une calibration des mesures non destructives et destructives de la hauteur a été réalisée sur 60 arbres. Dix modèles allométriques ont été ajustés sur ces données. Le meilleur modèle a été sélectionné avec
Akaike Information Criterion (AIC). L’allométrie hauteur-diamètre au niveau des sites et entre les espèces a montré une tendance asymptotique (Modèle de Michaelis-Menten). Pour un même diamètre, les arbres étaient plus hauts dans les forêts semi-décidues que dans les forêts sempervirantes. Les différences de biomasse entre les deux types de forêts sont dues par les variations de l’allométrie hauteur-diamètre. Les variations de l’allométrie hauteur-diamètre sont donc d’une extrême importance dans les estimations de biomasse et des stocks de carbone des forêts denses humides tropicales d’Afrique centrale.

BOLOGNA Audrey
Doctorante/ PhD student, ULB, Service d’écologie sociale
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Cessation of Viola odorata seed harvesting by Myrmica rubra ants.
-Audrey Bologna, Université Libre de Bruxelles, Ecologie Sociale - CP 231
-Claire Detrain, Université Libre de Bruxelles, Ecologie Sociale - CP231
Myrmecochory-seed dispersal by ants- is a mutualistic interaction in which seeds are dispersed by ants, who consume a nutrient-rich appendage –the elaiosome- as a reward. Yet, real benefits received by ants are still unclear since elaiosome consumption can lead to a positive or a negative impact on colony’s fitness. Consequently, harvesting of myrmecochorous seeds is expected to be a dynamic process in which ant-plant interaction evolves depending on the outcomes obtained by each partners. We studied the evolution of Viola odorata seed harvesting by Myrmica rubra ants at short and long time scale. While seed harvesting was complete on the 1st week, seed exploitation by ants decreased on the 2nd week until a complete cessation during the following 3 weeks. This is a long-term phenomenon since it was maintained at least 7 weeks without any exposure to V. odorata seeds. A drastic decrease in elaiosome consumption during the 5 weeks of exposition was concurrently observed with this cessation of seed harvesting. The extinction of seeds exploitation was related to a decrease in the flow of foragers arriving at the food source as well as to a reduced probability for an ant contacting a seed to retrieve it.

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Habitat perception and the cost of dispersal in differently fragmented landscapes: a modelling approach.
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Dispersal (i.e. individual movements away from their native population) is a key process in ecology. Since it allows gene flow among populations, dispersal is of primary importance for the long-term persistence of (meta-) populations. Dispersing animals can make use of different sources of information. They may differ in their abilities to gather such information and also in the way they respond to it (i.e. decide to settle or not). For example, our lab has shown earlier
that Speckled Wood Butterflies (Pararge aegeria) from fragmented, agricultural landscapes had significantly wider perceptual ranges than did conspecifics from woodland landscapes (Öckinger & Van Dyck, 2012). This means that landscapes may differ in their functional grain, which in turn, will affect movement, relative to the organism’s landscape of origin. Lower perceptual range in woodland populations also suggests that perceptual ability could be costly. The aim of this PhD-project is to explore how perceptual distance and environmental responsiveness impact connectivity in different landscape configurations. This is addressed by a modelling approach. Here we present the first results of a spatially explicit individual-based model integrating perception, associated costs, and responsiveness in order to evaluate the effect on dispersal and functional connectivity in differently fragmented landscapes.

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*Phenotypic plasticity of the tube foot and attachment capacity in the sea urchin Paracentrotus lividus according to seawater velocities.*

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Intertidal benthic invertebrates are subjected to strong wave-induces forces that may cause dislodgement from the substrate. Hydrodynamics is one of the most important factors determining the survival and distribution of species. To counteract hydrodynamic forces, echinoids have developed adhesives appendages known as tube feet (TF). Echinoids are prone to phenotypic plasticity which refers to the fast and reversible part of the organism adaptation caused by environmental factors. The aim of this study was to determine whether habitats presenting different seawater velocities may induce plastic responses on attachment capacity in Paracentrotus lividus by evaluating their morphology and adhesive and mechanical properties of their TF. In May 2013, sea urchins at 3 localities with different water velocities were collected in French Brittany. A significant tendency was observed in morphology and TF mechanical properties with increasing water velocity. If subjected to increasing hydrodynamic forces, individuals from the exposed habitat would be the last to detach. Thus TF of Paracentrotus lividus show an intraspecific plasticity varying with water velocity, meaning that individuals naturally exposed to high hydrodynamics produce tougher TF reducing risk of dislodgement.

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*The effect of urbanization on behaviour and life style in ectotherm insects: a test with two orthopterans.*

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Urbanization leads to rapid and profound environmental changes, which are thought to provoke ecological and evolutionary responses in wild organisms. Comparisons between urban and rural populations provide highly interesting study systems to address hypotheses on rapid evolution in a context of human-induced rapid environmental change. This timely PhD-project will study two species of ectotherm insects (Orthoptera) and is structured around 3 general objectives. We aim testing the impact of urbanization (1) on dispersal ability, (2) on behavioural profile (“animal personality”) and (3) on the pace of life (based on resting metabolic rates) of individuals of urban or rural origin.

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**Pollinator bees – a preliminary study on the biodiversity of two southern Mediterranean ecosystems, Portugal.**

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Despite an expected biodiversity rich Mediterranean territory, little is known on the presence and distribution of native bee species in Portugal. This study aimed at providing further information on such biodiversity in an organically managed agrosilvopastoral system. Data was collected from April to June 2011 in Herdade do Freixo do Meio, Montemor-o-Novo, Portugal. Yellow coloured pan traps were placed at vegetation height, both in fallow and in montado habitats within apiary range. From the 179 captured specimens it was possible to identify 41 bee species, from 12 genera, including Apis mellifera (3.9% of bee captures). Results comprised one rare species, one possible Iberian endemism, two confirmed first records and eight possible first records. Halictidae was the best represented family, with 17 different species, from which Lasioglossum malachurum constituted 29.1% of total sampled specimens. Species captured exclusively in one of the sampled habitats and species with single records accounted for 65.8% and 48.8% of identified species, respectively, and were significantly more present at the montado sites ($\chi^2=0.035$ and $\chi^2=0.036$, correspondingly). Further analysis is necessary to evaluate the influence of habitat characteristics on species presence.
Highly pathogenic avian influenza (HPAI) viruses subtype H5N1 has been raging in world since 2003. This virus emerged in poultry in China, and thereafter spread around the world. During this spread, HPAI H5N1 rapidly diversified into several genetic lineages that were called "genotypes" and further evolved into "clades" and "subclades". The study of the geographical distribution of HPAI H5N1 has been the subject of previous studies that have focused on agro-ecological conditions associated with the presence of the virus. Several descriptive studies have also focussed on the geographical presence of different clades and sub-clades in the world. However, to date, no clade-level statistical analysis of HPAI H5N1 have been carried out, a gap we attend to fill. This study looks at the various HPAI H5N1 clades in the Mekong region from 2004 to 2013 with the aim to identify the risk factors of the presence of disease and the potential differences in these factors between clades. Using various statistical methods, the relationship between the agro-ecological variables and the presence of clades has been explored. Results show that the distribution of different clades is characterised by particular environmental signatures. This study highlights the importance of genetic information in risk factor analysis of disease distribution. Moreover, we propose an original methodology for mapping of diseases taking into account the genetic diversity of presence of disease.
two sister species E. ivorense and E. suaveolens assigned to genetic cluster were available for the lowland tropical forests of western and central Africa. Using a Species Distribution Model approach based on MaxEnt algorithm we tested for the environmental differences between species and genetic clusters within species. At species level, the climatic niche significantly differed and only slightly overlapped, suggesting a parapatric speciation along a climatic gradient. Within the two sister species, the niche of the parapatric central African genetic clusters suggests mostly a secondary contact following the recolonization from different forest refugia.

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From individual diet determination to food web disentanglement: the use of stable isotopes and fatty acids in the study of ant trophic ecology
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Ants feed on a broad range of food sources and play a variety of trophic functions in tropical forests where their biomass and diversity are high. Due to the difficulty of assessing ant diet by direct observations in the field, biochemical methods such as stable isotope (SI) and fatty acid (FA) analyses appear as a solution to investigate their trophic ecology. SI and FA analyses have only rarely been used in tropical terrestrial environments. We illustrate the use of these techniques at two different levels of resolution: 1/ at the level of a species, with the determination of the trophic position of a rare and cryptic neotropical ant species, Tatuidris tatusia, and 2/ at the level of an elevation gradient in Papua New Guinea, by testing whether ants species with a large distribution occupy the same trophic level at each elevation, and whether their food is based on the same primary sources. While feeding experiments on live T. tatusia and direct observation in the field did not provide any information on their food preference, the N isotope analysis of its tissues and of a series of other arthropods present in the leaf-litter suggested that T. tatusia are top predators in the leaf-litter food web. The study in Papua New Guinea is still ongoing. However, based on preliminary results and on a short review of the state of the art, we will show how SI and FA analyses are complementary to investigate changes in trophic interactions in food webs along elevation gradients.

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Nineteenth century human history explains the current dominance of light-demanding tree species in central African moist forests
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The canopy of central African moist forests is dominated by light-demanding trees. Most of these species show a distribution of diameters that indicates a regeneration shortage. Here we show through the combined analysis of botanical, palaeoecological, archaeological and
historical data that most of these trees are not older than ca. 180 years. This age corresponds to the early 19th century (around 1830) when the slave-raiding, the interethnic wars and the colonization of the inlands by the Europeans disturbed the human spatial occupancy. After 1885, the spatial clumping of people and villages along the main communication axes induced less itinerancy in the forest. We believe that former activities such as shifting cultivation created scattered openings in the canopy, large enough to allow light-demanding trees to establish. Nowadays, common logging operations do not create openings sufficiently large for the regeneration of these high value timber species. Our findings emphasize the need to include considerations about the history of human spatial occupancy and activities to understand forest dynamics. We need silvicultural guidelines adapted to the autecology of the species. Population enforcements (e.g. enrichment) will be needed to ensure the sustainability of timber yields in forests dominated by long-lived light-demanding trees.

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**Termite communities in preserved and regenerating miombo woodlands in Burundi.**
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Burundian miombo is characterized by the presence of large termite mounds which may structure plant and animal communities. They may particularly influence the termite community which is of utmost importance in nutrient recycling.

The goal of our study was to evaluate the role of the large termite mounds in structuring the whole termite assemblage in preserved miombo, and its recovery during miombo regeneration. We compared a well-preserved area (Rumonge forest), a more disturbed miombo fragment on Nkayamba hill next to Rumonge town, and an adjacent area in regeneration since 2009 after clearing and cultivation. In each site, 3 grids of 7x7 quadrats of 5 m², 10 m apart, were searched for termites. We collected 1070 termite samples, representing 24 species, of which 13 were soldierless soil-feeders. The richness and species diversity were slightly higher in termite mounds than in the forest matrix. Only four species (one Coptotermes and three Macrotermiteinae) were found in the regenerating forest. The overall termite fauna of the Burundian miombo is similar to that found in the same ecosystem in Malawi, particularly rich in soldierless species. Like other authors, we observed the very high sensitivity of soil-feeders to environmental disturbance. The direct contact with the preserved and regenerating parts of the Nkayamba hill should allow us to follow the dynamics of mound re-building by Macrotermiteinae and the recolonisation by soil-feeders in the regenerating miombo.

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**Improving knowledge on Forest elephant’s ecophysiology (Loxodonta africana cyclotis) for better wildlife conservation.**

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Conservation of large wildlife species is currently a major issue in Africa. Protected areas dedicated for biodiversity conservation unfortunately do not suffice and conservation practices must be extended to man-used areas. But in those areas conservation actions are limited because of conflicts between human and wildlife especially due to damages on crops. The worst crop raiders known are elephants because they can destroy the yearly harvest of a field in a single visit. This threatens not only people livelihoods but also elephants themselves when angry farmers retaliate by shooting or trapping them. After decades of investigations crop raiding drivers related to elephants’ ecophysiology remain largely unknown. A pilot study was conducted between July and November 2014 in Monts de Cristal National Park (Gabon, central Africa) to have a first view on environmental drivers to crop raiding. While the presence of some fruiting trees around crop fields lead to more damages, high slopes discouraged elephants. In further experiments, the link between the nutritive value of raided plants and the animal’s physiological requirements and status will be assessed through hormones and parasites measurements; while tracking of individual elephants’ movements using DNA analyses in feces will be done.

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Ecological functionality in agriculture
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-Marc Dufrêne, Ulg- Gembloux Agro-Bio Tech, Biodiversiy and Landscape Unit
A presentation of an upcoming PhD thesis. This project will investigate the links existing between species diversity, functional trait diversity and the provision of pollination and pest control services in agroecosystems. This project will also explore how landscape elements, both relictual and newly implemented, can provide efficient and sustainable ecosystem services. The approach relies on analysis on Syrphidae and Carabidae community structure and on an evaluation on service provisioning.

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The role of tree species diversity in drought resistance of oak and beech sapling
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-Kris Verheyen, Ghent University, Department of Forest and Water Management, Forest & Nature Lab, Belgium
-Monique Carnol, University of Liège, Laboratory of Plant and Microbial Ecology, Botany, Belgium
Drier condition during the growing season have been predicted in the future. It has been suggested that diverse forest could maintain productivity and provide better ecosystem services under stress condition such as drought. However, those studies focused mainly on mature forest and little known about young forest. Oak and beech are the important species in European forestry, and may face a strong challenge in the future. Drought effects on young (~5yr) oak and beech saplings in monoculture and mixed with other species are not known. Moreover, single studies evaluating both above- and below-ground ecosystem response to drought are scarce. A two-year manipulative field experiment has been planned to answer the following questions. (i) Can species mixtures improve oak and beech sapling performances
under drought conditions? (ii) What are the mechanisms underlying ecosystem functioning and sapling performance in mixed species stands subjected to drought? A 3m × 3m rainout shelter will be placed only in growing season in Zedelgem sites of FORBIO experimental platform. Tree diversity varies from 1 to 4 species and about 50% of precipitation will be taken off. Both aboveground sapling performance and belowground microbial properties and biogeochemical processes will be investigated. We will present the design of the experimental tree species diversity plantation of Zedelgem site, the setting of the drought experiment and planned analysis.

**SHALUKOMA Chantal**

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**Discrimination factors of traditional healers around the mountain forest of Kahuzi-Biega.**

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Several ethnobotanical surveys have demonstrated links between the folk medicinal practices with ethnic and geographic identity of healers, while many others concluded the opposite. This study has involved 88 healers, recognized as ‘specialists’ in their communities adjacent to the mountain forest of Kahuzi-Biega, a World Heritage Site in DR of Congo. The goal was to establish a categorization that could organize healers, treated pathologies and profiles of used medicinal plants based on their ethnic origin and area of practice. A secondary goal was to evaluate whether certain medicinal species could be in danger, especially those considered essential both for healers and for gorillas of the park. Multivariate analyses showed that the ethnic belonging and geographical location did not explain practices and knowledge of healers. However, differences were observed in their degree of specialization. This indicates that healers who treat similar diseases use similar herbs. In the case of overuse, the overlap may present a threat to gorilla survival. Non-specialized healers could be distinguished from healers specialized in the care of bone traumatisms and those specialized in reproductive organs.

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**PhD Research Project - Eco-ethology of proboscis monkey and assessment of its role in forest regeneration along the Kinabatangan River, in Sabah, Borneo**

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- Stark Danica, Cardiff University, Danau Girana Field Centre
- Benoît Goossens, Cardiff University, Danau Girang Field Centre
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The proboscis monkey, *Nasalis larvatus*, is a large arboreal colobine primate endemic to the Island of Borneo, where natural forests are massively logged and converted into agricultural lands, mostly for the palm oil industry. In the Malayan State of Sabah, clearing activities lead to heavily fragmented and degraded landscapes, nowhere so visible than along the main watercourses, such as the Kinabatangan River. Habitat loss and degradation threaten many species, among which the proboscis monkey – now classified as ‘Endangered’ (IUCN, 2014).

The Kinabatangan River region is one of the five major centers of continuous population of proboscis monkeys in Sabah (North-East of Borneo). It is crucial that future conservation programs attempt to establish additional protected areas and ensure connectivity between suitable habitats. In order to fulfill this objective, further knowledge on proboscis monkey’s eco-ethology is important. My main PhD goals are 1) to determine the flora key-species for proboscis monkey, by studying its diet through the analysis of faeces using the DNA metabarcoding method, 2) to understand habitat use in relation to the nutritional quality of the available foliage and the structural characteristics of the habitat and 3) to investigate the role of *Nasalis larvatus* in seed dispersal and forest regeneration within such a fragmented ecosystem.

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**Mapping of the Brazilian Mangrove Forest with environmental drivers.**

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Identification and delineation of geographic areas which comprise similar environmental drivers to structure biota and communities have been facilitated by computational developments in pattern recognition and classification algorithms. This paper presents a methodology for selection of variables and mapping of mangrove ecological regions. The regions are identified based on a Self-Organizing Map (SOM) neural network that is initially configured to work over a set of 23 variables, including 19 bioclimatic variables, sea surface temperature, and salinity. The Brazilian mangroves under study comprise the full latitudinal range from the northernmost coastal state Amapá to the Southern state of Santa Catarina. The mangrove map is converted into points that represent the location of mangrove forests totaling 390 points and representing all mangrove locations. The k-means algorithm is used for identification of the clusters.

A mangrove ecological regions map is drafted with a reduced set of variables (minimum sea surface temperature, precipitation seasonality and salinity). The methodological approach shows to be consistent with several available maps and can be reproduced over different areas. We intend to extend and improve this methodology in order to map the global structure of mangrove biogeographical areas from an ecological point of view.