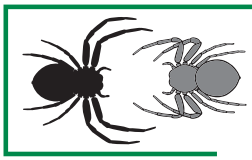
29th European Congress of Arachnology



August 24–28, 2015, Brno

Programme and Abstracts

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29th European Congress of Arachnology

Organized by
Masaryk University and the **Czech Arachnological Society**

24 – 28 August, 2015
Brno, Czech Republic

Brno, 2015

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Preface

Welcome to the 29th European Congress of Arachnology!

This congress is jointly organised by Masaryk University and the Czech Arachnological Society.

Altogether 173 participants from all over the world (from 42 countries) registered. This book contains the programme and the abstracts of four plenary talks, 66 oral presentations, and 81 poster presentations, of which 64 are given by students.

The abstracts of talks are arranged in alphabetical order by presenting author (underlined). Each abstract includes information about the type of presentation (oral, poster) and whether it is a student presentation. The list of posters is arranged by topics.

We wish all participants a joyful stay in Brno.

On behalf of the Organising Committee

Stano Pekár

Organising Committee

Stano Pekár, *Masaryk University, Brno*
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Arachnologische Gesellschaft, American Arachnological Society, Becherovka, British Arachnological Society, Dynex, Ento Sphinx, European Society of Arachnology, Grupo Ibérico de Aracnología, Keyence International, Mendel Museum, Nikon, Olympus, Pensoft, Regina Coeli, Réva Rakvice, Siri Scientific Press, and Zeiss.

The logo

The three different colours of spiders correspond to the Mendel's discovery of the genotypic ratio (1:2:1) for heterozygotes in the F1 generation. Different spider postures represent different fields of current research in arachnology (ecology, behaviour, physiology, taxonomy). M. Řezáč, P. Saska, S. Pekár, and S. Komínek.

Content

General Information

Oral presentations

Each speaker will have **15 minutes** available (including questions and discussion). Please, prepare your presentation in **MS Office PowerPoint for Windows** or as a **PDF** and bring it on a **USB memory stick**, using your last name as the file name. Users of Macintosh should export their presentation to a Windows compatible platform.

Posters

Poster boards are situated in the foyer of the congress venue. There will be two poster sessions, on Tuesday and Thursday. Presenters should be at their posters during the sessions.

Student awards

Altogether 12 students will be awarded, six for oral presentations and six for posters. For both oral and poster presentations there will be two categories of prizes: Ecology and Behaviour, Taxonomy and Genetics. Prizes will be given to the winners at the closing ceremony.

Brno City Transportation

Should you use Brno City Transportation, tickets are available in kiosks and in automatic ticket machines and must be marked upon boarding the car. A non-transfer ticket valid for a 15 min drive costs CZK 20. A transfer ticket (allowing to change tram, bus, train, and trolleybus lines) is valid for a 60 min drive and costs CZK 25. The same ticket can be used for all types of transport (trams, buses, trains, trolleybuses).

The Venue

The registration and social events will take place in the foyer of the Faculty of Economics and Administration of Masaryk University. Lectures will take place in the main lecture hall. Coffee breaks will be also served in the foyer. The Wi-Fi network of Masaryk University is available at the venue (you will receive a password to connect).

Meals

Lunches will be served in the foyer. Use tickets that you obtained during registration.

Arachnological Games with BBQ

Teams composed of 5 players will compete for the Arachnological Cup! Participants not wanting to play are invited to support the players. We will play Kubb ("The King's Game"). Teams must register during the first two days of the congress at the registration desk with a team name. The games will take place behind the dormitory (given favourable weather). BBQ and beer will be provided following the games at an extra price (10 EUR).

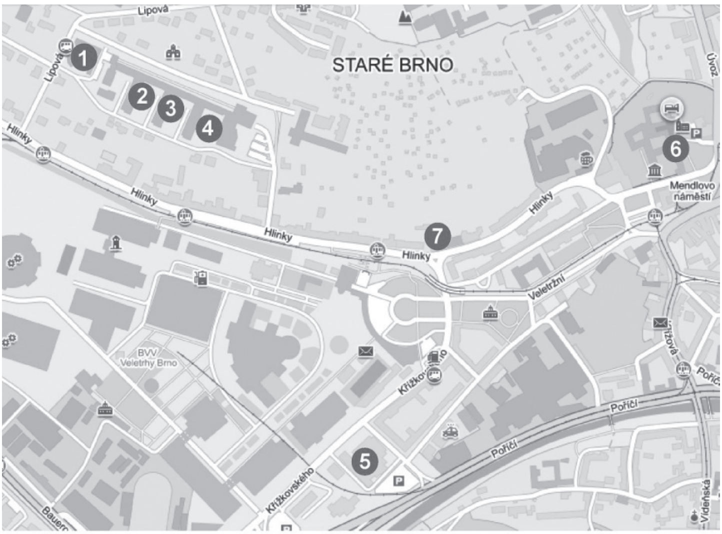
Information on merchants

In the foyer of the congress venue you will find Nikon and Keyence microscopes on display. You can also purchase books on arachnids, such as the German version of Foelix's Biology of Spiders, and tools for collection (pincers, sweeping nets, etc.) provided by Ento Sphinx.

Information on arachnid collection

Permits are required to collect arachnid specimens in protected areas in the Czech Republic. During excursions we will visit a few protected areas where it will be possible to collect arachnids. The protected areas we will visit are fragile habitats, therefore, please minimise the disturbance while collecting. You will have a permit to collect arachnids but not to collect other organisms. The permit is only valid on the day of the excursion. You can collect arachnids only by hand (using pooter, pincer, etc.). Other methods of collection are not allowed. A condition of the permit is sending the list of species collected during the excursions (including all locality data). The list of species must be sent to Vladimír Hula (Hula@mendelu.cz) before the end of 2015. Please, do not forget to acknowledge the permit from the park authority in publications that would include material collected during excursions. Please, send us a copy of such publications.

Map of the venue



1 Venue	3 Student dormitory	5 Voronež hotel	7 Congress dinner
2 Garni hotel	4 Games & BBQ	6 Mendel Museum	

Programme

* identifies a student presentation

Sunday, August 23	
16:00	Registration in the foyer of the venue
19:00	Welcome mixer in the foyer of the venue. Light meal and drinks will be provided.
23:00	Go to bed and sleep well!

Monday, August 24

8:00	Registration in the foyer of the venue
9:00	Opening ceremony *Stano Pekár* – Organiser *Jan Buchar* – Honorary member *Vlastimil Růžička* – Organiser of the previous congress in 1994 *Petr Dvořák* – Vice-rector for research of Masaryk University

Plenary lecture – Wim Damen

9:30	**The spider *Parasteatoda tepidariorum* as an emerging model organism in studying developmental genetics and evolution** *He is a professor with the Faculty of Biology and Pharmacy, Jena University, in Germany. He studies the genetic basis of evolution and biodiversity using the common house spider Parasteatoda tepidariorum. With his group he focuses on questions central to the evolution of segmentation, as well as the role of Hox-genes and the Wnt-signalling pathway in the development of the spider.*

Session – Morphology

	Chair: Christian Kropf
10:15	These legs were made for walking ... - Evolutionary morphology of the walking appendages in arachnids (Chelicerata; Arthropoda) *Jens Runge**
10:30	Chemical communication in spiders - SEM and electrophysiological analysis of chemosensory sensilla on *Argiope bruennichi* (Araneae, Araneidae) *Anne-Sarah Ganske**
10:45	Conserved tarsal sensilla in Opiliones: contribution for systematics and sensory biology *Guilherme Gainett**
11:00	*Coffee break*

Session – Genetics

Chair: Wim Damen

11:30	Evolution of sex chromosomes in spiders *Jiří Král*
11:45	Cytogenetics is not dead! What kind of important information could bring us cytogenetic data in the century of progressive molecular studies? *Jana Plíšková**
12:00	Karyotype evolution of scorpions from the family Buthidae (Arachnida: Scorpiones) *František Šťáhlavský*
12:15	Karyotype evolution of harvestmen (Arachnida, Opiliones) *Hana Svojanovská**
12:30	Karyotype evolution of the pseudoscorpion genus *Chthonius* (Arachnida: Pseudoscorpiones) in the Alps inferred from molecular data *Jana Kotrbová**
12:45	GBOL offers a comprehensive perspective on spider mitochondrial diversity in Germany *Christoph Muster*
13:00	*Lunch*

Session – Taxonomy

Chair: Paula Cushing

14:30	Ancient spiders and Salt lakes *Paul A. Selden*
14:45	Two species or just one? DNA barcoding fails in *Enoplognatha* spp. *Liana Lasut**
15:00	Taxonomic study of *Oedothorax*, a hopeful dwarf spider genus for investigating the evolution of sexual dimorphic male head structures *Shou-Wang Lin**
15:15	Haplogyne spiders: a valid taxonomic group or a morphological term? *Yuri Marusik*
15:30	Keeping up the morphology approach: remarkable new characters for the systematics of the Zodariidae (Araneae) *Rudy Jocqué*
15:45	*Coffee break*

Session – Phylogeny

Chair: Christoph Muster

16:15	Not as far as it seems: phylogeographic patterns of phoretic pseudoscorpions from the family Chernetidae (Chernetidae, Pseudoscorpiones) *Věra Opatová*
16:30	Cinderella and the Sleeping Beauty: phylogenetic placement of the subfamily Sulsulinae (Oonopidae) *Tamás Szűts*
16:45	Elucidating cryptic species in the southern unstriped scorpion, *Vaejovis carolinianus* (Scorpiones: Vaejovidae) *Paula E. Cushing*
17:00	Independent evolution of genital and sexual size dimorphism *Ren-Chung Cheng**
17:30	*Congress photo*

Opening party

19:00	Opening party in Mendel Museum, monastery and the adjacent garden.
24:00	Try to go to bed!

Tuesday, August 25

Plenary lecture – William O.C. Symondson

9:30	**Molecular analysis of prey choice by spiders** *He is a professor at Cardiff School of Biosciences, Cardiff University, in the UK. His research focuses on predator-prey interactions and trophic relationships. His work reveals how non-pest prey can affect spiders feeding on pests, predation by spiders on pests, intraguild predation, and the first use of next generation sequencing to analyse the complete dietary ranges of specialist and generalist species of spiders.*

Session – Predator-prey interactions

Chair: William O.C. Symondson

9:45	Discovery of a monophagous true predator, a specialist termite-eating spider (Araneae: Ammoxenidae) *Lenka Petráková*
10:00	Is prey-capture efficiency innate or gained by experience in a specialised spider? *Eva Líznarová**
10:15	Does spider presence influence feeding behaviour and virus transmission of leafhoppers? *Orsolya Beleznai**
10:30	Cues used in prey classification by a euryphagous jumping spider *Maciej Bartos*
10:45	Effect of prey density and insecticides (lambda-cyhalothrin and profenofos) on the functional response of *Guizygiella melanocrania* (Araneae: Tettragnathidae) *Muhammad Khalid Mukhtar*
11:00	*Coffee break*

Session – Ecology

Chair: Wolfgang Nentwig

11:30	Spider perception of aposematism and mimicry *Jan Raška**
11:45	The role of ultraviolet colour in Batesian mimicry: a case study using myrmecomorphic spiders *Guadalupe Corcobado*
12:00	First oligophagy in the true spider parasitoids (Ichneumonidae, Ephialtini, Polysphincta group) and the plasticity in host utilisation *Stanislav Korenko*

12:15	Effect of canopy openness on distribution of epigeal spider communities in former coppiced oak forest stands with implications on forest management *Ondřej Košulič*
12:30	Biodiversity of epigeic spider communities in different managed non-forest habitats in the Eastern Carpathians *Pavel Žila**
12:45	Spider assemblages of mountainous mires and adjacent habitats *Konrad Wiśniewski**
13:00	*Lunch*

Session – Physiology

Chair: Yael Lubin

14:30	Do the proportions of the spinning duct influence the material properties of major ampullate fibres? *Milan Řezáč*
14:45	Glue-coated capture threads of spiders are optimised for a certain humidity and pulling-rate *Matjaž Gregorič*
15:00	Antimicrobial defence of *L. geometricus* eggs *Vardit Makover**
15:15	Investigating temporal patterns of neurohormonal levels associated with aggression and wariness in orb-weaving spiders *Rebecca J. Wilson**
15:30	Bio-pesticidal potential of selected protein fractions of jumping spiders (Araneae: Salticidae) *Hafiz Muhammad Tahir*
15:45	Effect of heavy metals accumulation on the activity of detoxifying enzymes in wolf spider, *Pardosa oakleyi* *Abida Butt*
16:00	*Coffee break*

Poster session I

16:00

Arachnological Games with BBQ

18:00	The games will take place on the outskirts of the dormitory (given favourable weather).
23:00	You better go to bed!

Wednesday, August 26

Mid-congress excursion

8:00	We will meet in front of the venue to board buses at 8:30. We expect to return at 17:30.

Route 1: Spider collecting trip

We will spend the whole day walking and collecting spiders in the Pavlovské vrchy Hills protected area and nearby areas. The walk will be about 6 km long. Lunch will be provided as a package. The Pavlovské vrchy Hills are located approximately 40 km south of Brno. We will go to the top of the hill, Děvín, which is a limestone hill reaching only 550 m a.s.l., but it is a dominant feature in the surrounding lowland landscape of the north-western edge of the Pannonian forest-steppe region. It is part of the Dolní Morava UNESCO Biosphere Reserve. Děvín is mostly forested with thermophilous oak, oak-hornbeam and ravine forests which have been coppiced for many centuries. The steep south-facing slopes of Děvín are covered with dry grasslands with many species of continental or submediterranean distribution which reach the western or northern limit of their distribution here. The most remarkable species of invertebrates include *Saga pedo* (grasshopper), *Parnassius mnemosyne* (butterfly), *Eresus moravicus*, etc. On the tour we will also visit ruins of the Děvičky and Dívčí hrady castles. In the afternoon we will visit Křivé jezero Nature Reserve, a water meadow between two rivers.

Route 2: Spider collection, cultural and wine tasting trip

Mikulov is located approximately 50 km south of Brno on the southern foot of the Pavlovské vrchy Hills (part of the Dolní Morava UNESCO Biosphere Reserve). In the morning we will walk up the hill, Svatý Kopeček, a protected area. It is a limestone slope with *Stipa* grasses with a baroque pilgrimage chapel (approx. 2 km walk). This site hosts several Pannonian spider species, which occur in the territory of the Czech Republic only in this place (i.e. *Phlegra cinereofasciata*, *Canariphantes nanus*). Lunch will be provided as a package. Then we will take a short walk through the historical centre of the town (former Jewish quarter, including a synagogue and cemetery). On the way back to Brno we will stop at a winery – to taste wine and learn about local wine production.

Route 3: Cultural trip to Lednice

We will explore the Lednice–Valtice Cultural Landscape, a UNESCO World Heritage Site. It is situated approx. 50 km southeast of Brno. It is probably one of the largest landscape parks in the world. It was established at the end of the eighteenth century by the local lords of the House of Liechtenstein. The area is famous for the masterful integration of various architectonical structures, including Valtice and Lednice chateaux, French-style gardens and natural elements of the lowland and hilly landscape.

In the morning we will walk in the park to explore the neo-gothic chateau of Lednice and other buildings, such as the Minaret. Lunch will be provided as a package. In the afternoon, we will take a boat trip to John's Castle, a romantic castle ruin.

Russian party

19:00	Russian party at the congress venue with a DJ. Everybody attending the party is expected to bring a drink and/or meal. Czech beer and service will be provided.
24:00	Do not forget to go to bed!

Thursday, August 27

Plenary lecture – Jordi Moya Laraño

9:00	**Arachnids: from genes to ecosystem functioning and vice versa** *He is a researcher at the Experimental Station of Arid Zones, Almería in Spain. He is interested in the role that generalist predators play in ecosystems both from an ecological as well as an evolutionary point of view. In collaboration with computer scientists, he implemented an Individual-Based Model platform, Weaver, which aims at understanding eco-evolutionary dynamics in complex food webs across space.*

Session – Ecosystem service

	Chair: Jordi Moya Laraño
9:45	Biological control in winter: Novel evidence for the importance of generalist predators *Stano Pekár*
10:00	The relationship between niche properties and composition of spider communities in vineyard terraces *Radek Michalko**
10:15	Sink or sail: novel behavioural adaptations on water in aerially dispersing species *Sara L. Goodacre*
10:30	Spider communities in managed steppe ecosystems: how to survive burning, mowing, grazing or 'absolute non-disturbance'? *Nina Polchaninova*
10:45	*Coffee break*

Session – Conservation

	Chair: Soeren Toft
11:15	The IUCN Spider & Scorpion Specialist Group *Pedro Cardoso*
11:30	Importance of post-industrial sites for threatened spiders in the Czech Republic *Robert Tropek*
11:45	*Latrodectus hasseltii* - an another unwanted Australian in New Zealand *Cor Vink*
12:00	Epigaeic invertebrate composition and distribution patterns in two sub-tropical nature reserves, Eastern Cape, South Africa *Augustine Niba*
12:15	Bringing forgotten predators into the picture of Himalayan Biodiversity Conservation *Shazia Quasin*

12:30	Protocols in, data out: why do we need standardised and optimised sampling of communities? *Jagoba Malumbres-Olarte*
12:45	*Lunch*

Session – Biogeography

Chair: Pedro Cardoso

14:15	Shedding light on darkness: An integrative approach to elucidate the evolutionary history of the Alpine-Apenninic troglophilic *Pimoa* spiders *Stefano Mammola**
14:30	The uplift of Himalaya as a trigger for spider species diversification: the case of the genus *Nesticella* (Araneae: Nesticidae) *Francesco Ballarin**

Arachnid Film Showcase

14:45	Wolf spider: The Mother *Lukáš Pich* *Cteniza* mating behavior *Rizzo Pierluigi* Role of water in a life of a fishing spider *Petr Dolejš* *Hadzinia ferrani*, sp. n. (Opiliones: Nemastomatidae), a highly specialized troglobiotic harvestman from Slovenia *Peter Kozel* *Euryopis episinoides* on the hunt *Stano Pekár*
15:15	*Coffee break*

ESA General Assembly

15:45	ESA General Assembly
16:45	20th International Congress of Arachnology, Golden, Colorado USA *Paula Cushing*

Poster session II

17:15	

Congress dinner

19:00	Congress dinner at Železná růže restaurant. Meal and drinks will be provided.

Friday, August 28

Plenary lecture – Jonathan Pruitt

10:00	**From individuals, to populations, to communities, to extinction: when does animal personality matter?** *He is an Associate Professor in the Department of Biological Sciences, University of Pittsburgh, Pittsburgh, U.S.A. His research explores the evolutionary origins and ecological consequences of individual variation. In particular, he explores how temporally consistent individual differences in behaviour influence the roles that individuals play within societies.*
10:45	*Coffee break*

Session – Sexual selection

	Chair: Gabriele Uhl
11:15	The sex pheromone of the cross spider *Araneus diadematus* *Andreas Fischer**
11:30	Flexible use of complex copulatory organs in a dwarf spider *Katrin Kunz*
11:45	Efficacy of mate plugging is a result of an interplay between male and female behaviour in *Philodromus cespitum* (Philodromidae) *Lenka Sentenská**
12:00	What happens beneath the blanket? Insight into courtship and copulatory behaviour of wolf spiders of the genus *Alopecosa* (Araneae: Lycosidae) *Pavel Just**
12:15	Optimal mating in *Pisaura mirabilis* females *Søren Toft*
12:30	Intersexual genital complexity and coevolving mating rates *Matjaž Kuntner*
12:45	Reproductive role shapes task differentiation in a social spider *Anja Junghanns**
13:00	*Lunch*

Session – Behavioural Ecology

	Chair: Matjaz Kuntner
14:30	Neuroplasticity in a jumping spider *Philip O. M. Steinhoff**
14:45	The effect of nutrition over ontogeny on sexual cannibalism and reproductive success in raft spider *Simona Kralj-Fišer*

15:00	Density dependent fitness and dispersal in a colonial spider, *Cyrtophora citricola* *Lior Ventura**
15:15	Comparison of overwinterings in two harvestman species (Arachnida: Opiliones) in subterranean habitats *Peter Kozel**
15:30	Characterising and assessing the adaptiveness of diel rhythm in behaviours of two orb-weaving spiders *Sara Normark**
15:45	*Coffee break*

Session – Faunistics

Chair: Christian Komposch

16:15	The Ausobsky-harvestman-collection – A unique window into the past *Christian Komposch*
16:30	Present knowledge on the spider fauna of the Carpathians and Slovakia *Peter Gajdoš*
16:45	An overview on the Croatian spider fauna *Luka Katušić**
17:00	Spiders associated with alfalfa in Hamedan, Iran *Mohammad Khanjani*
17:15	Ecological distribution of Turkish scorpions *Ersen Aydın Yağmur*
17:30	Diversity of the cave spider fauna in Chonduea Mountain, Nakhon Sawan, Thailand *Prasit Wongprom**
17:45	Vertically niched, conductor-less and sexual piercing: spiders from the Nat Ma Taung in Myanmar *Peter Jaeger*

Closing ceremony

18:15	

Saturday, August 29

Post-congress excursion

8:00 We will meet in front of the venue and board a bus.

During this three-day excursion we will explore the beauties of one of four National Parks in the Czech Republic, Podyjí (Thaya) National Park. The park is situated along the deep Dyje River valley along the border with Austria where it connects to the National Park Thayatal in Austria. It consists mainly of different light forest types on acid soils and rocks and rare continental heathlands. There are also deep scree slopes with so-called ice caves. The spider fauna of the park has not been studied adequately, yet. We will be guided by a ranger from the park office.

We will travel by bus to Znojmo where we will sightsee and tour the town. In the afternoon we will visit the famous Havranické heathland. At the end of the day we will do wine tasting and tour the old former monastery cellars of the Znovín winery.

The next day, August 30, we will visit a famous baroque chateau in Vranov nad Dyjí. Then we will take a boat trip to early medieval Bítov Castle. This castle is surrounded by oak-pine forests where we can collect spiders.

The last day, August 31, in the morning we will return to Brno by bus.

List of posters

* identifies a student presentation

Behavioural Ecology

BE01	Individual behavioural differences in a specialised ant-eating spider *Zodarion rubidum* *Pavla Dudová**
BE02	Web modification in *Cyclosa fililineata* and *Cyclosa morretes*: evaluating role of host food deprivation and effect on parasitoid survival *Thiago Kloss**
BE03	Comparison of a trophic niche and capture efficiency between an araneophagous specialist and a generalist (Gnaphosidae, Lamponidae) *Ondřej Michálek**
BE04	Heterospecific sexual interactions among *Nephila* species *Shakira Guaní Quiñones-Lebrón**
BE05	The Carpathian Scorpion: *Euscorpius carpathicus* (Scorpiones: Euscorpiidae): Prey selection and capture behaviour *Alexandru Sotek**
BE06	Spermatic induction behaviour of the Uruguayan spider *Anelosimus vierae* (Theridiidae) *Carmen Viera*
BE07	Facultative sexual cannibalism in an apparently monogamous spider *Alpaida veniliae* (Araneidae) *Carmen Viera*
BE08	Feeding behaviour of the spider *Lycosa poliostoma* (Araneae: Lycosidae) on different soybean pests from Uruguay *Carmen Viera*
BE09	Diet influences female signal reliability for male mate choice in *Argiope trifasciata* (Forsskål, 1775) (Araneidae) *André Walter*
BE10	Proteomic explanations for the adaptive significance of kin recognition in the subsocial spider *Stegodyphus lineatus* (Latreille, 1817) (Eresidae) *André Walter*
BE11	Foraging tactics in a prey-sharing spider *Marlis Dumke**

Biogeography

BG01	Using spiders as phylogeographical models in South America - a case study with *Nephila clavipes* (Araneae: Nephilidae) *Luiz Filipe Macedo Bartoleti**
BG02	Testing biogeographic and speciation patterns in Caribbean tetragnathids *Klemen Čandek**

BG03	Ancient roots, new places: First evidence of the presence of *Cteniza sauvagesi* in Southern Italy, supported by molecular data and ecological niche modeling *Marco Isaia*
BG04	From past to future: the response of *Troglohyphantes* to climate change dynamics *Elena Piano**
BG05	The distribution specificity of some European spider species near the eastern limits of their ranges *Artem Sozontov**
BG06	Systematics and biogeography of *Cytaea* Keyserling 1882 (Araneae: Salticidae), preliminary results *Łukasz Trębicki**

Ecology	
EC01	Management diversity within organic production influences epigeal spider communities in apple orchards *Yvan Capowiez*
EC02	Pompilidae, the important group of spiders enemies *Jan Erhart*
EC03	Steeplebushes conquer the countryside: Direct and indirect effects of the invasive *Spiraea tomentosa* on the indigene spider fauna of wetland meadows *Henning Haase**
EC04	Araneofauna of grapevines under different management regimes – increasing diversity and abundance of spiders in agroecosystem *Lucie Havlová**
EC05	Urbanisation alters drastically the structure of vegetation-dwelling spider assemblages *Roland Horváth*
EC06	Toxicity effect of a crude extract of *Embelia ribes* and two commercial pesticides on mortality and foraging behaviour of a potential biocontrol agent *Oxyopes lineatipes* *Ondřej Košulič*
EC07	New method for sampling soil arachnids *Peter Kozel**
EC08	Distribution of spiders and harvestman on tree trunks in town and forest *Ondřej Machač*
EC09	Occurrence of spiders in the diet of the fledglings of some hole-nesting bird species: Reevaluation of materials collected in the 1980s *Dávid Mészáros**

EC10	Increased habitat complexity improves the suppression of pest *Cacopsylla pyri* by winter-active spiders *Radek Michalko**
EC11	Catching of spiders in shallow subterranean habitats in the Czech Republic *Vlastimil Růžička*
EC12	Back to square one: Secondary succession from different starting points. Reconstruction of sandy grasslands within the framework of the 'Kisalföldi Homokpuszta' LIFE project (LIFE08 NAT/H/000289) *Csaba Szinetár*
EC13	Group selection harvesting supports the diversity of ground-dwelling spider assemblages *Bence Tajthi**

Faunistics	
FA01	Lycosidae of the Judean shrubland: a peek into taxonomy and life history *Igor Armiach**
FA02	Check list of mire spiders of Latvia *Inese Cera*
FA03	A collection of sea spiders (Chelicerata: Pycnogonida) in the National Museum, Prague (Czech Republic) *Petr Dolejš*
FA04	Alien species of Slovakian spider fauna *Peter Gajdoš*
FA05	Spiders of Vršac Mountains - First faunistic result and new national records *Igor Gajic**
FA06	Cave survey yields two new spider family records to Israel *Efrat Gavish-Regev*
FA07	Spiders of Subotica Sandlands (Serbia) – sandy place, but wetland species *Gordana Grbic**
FA08	Spider red lists *Fabian Hofmann*
FA09	The pseudoscorpion diversity in the city of Vienna, Austria *Christoph Hörweg*
FA10	New records of Pennsylvanian trigonotarbid arachnids from West Bohemia, Czech Republic *Ivana Hradská*
FA11	Carboniferous arachnids in Czech republic *Ivana Hradská*
FA12	A first approach on the study of the arachnofauna in the Dadia National Park, in North-East Greece: a taxonomic and biogeographic analysis *Marjan Komnenov**

FA13	*Pholcus phalangioides* in Finland (Araneae, Pholcidae) *Seppo Koponen*
FA14	First record of the widow spider *Latrodectus elegans* Thorell, 1898 (Araneae, Theridiidae) from Indochina *Ondřej Košulič*
FA15	Notes on the occurrence of the wolf spiders (Araneae: Lycosidae) in Sardinia *Lenka Kubcova*
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Abstracts

Student – Poster presentation

Lycosidae of the Judean shrubland: a peek into taxonomy and life history

Igor Armiach[1], Iris Bernstein[1], Tamar Dayan[1,2] & Efrat Gavish-Regev[1,2,3]

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The Lycosidae are among the most noticeable spider families in Israel, found in high abundances in all terrestrial habitats. Nonetheless, the taxonomy, ecology and life history of the species that occur in this area remain little studied. Our study examined the effect of environmental variables on the activity density of lycosid species in the Judean foothills, during spring (March-April-May) of 2012. 382 individuals collected from pitfall traps (Bernstein, 2013), were identified and assigned to four species, namely: *Alopecosa albofasciata* (Brullé, 1832), *Pardosa subsordidatula* (Strand, 1915), *Hogna* cf. *graeca* and *Lycosa piochardi* Simon, 1876 and three size groups. Each size group was considered by us as belonging to the same ecological guild. We used multivariate analysis to test the effect of ground cover (plants, stones, bare), grazing and time in the season on the species, sex and developmental stages (adults vs. juveniles) distribution patterns. All species, sex and developmental stages showed a significant response to the time in the season. One of the species showed a significant response to the interaction between time and geophyte density. The response to time in the season provides an insight into the life cycles of the lycosid species in the Judean foothills and suggests the possibility of habitat partitioning, with spider species of the same size reaching their activity peaks at different times.

Student – Poster presentation

Insights into karyotype evolution of Ricinulei (Arachnida)

Ivalú M. Ávila Herrera, Tereza Kořínková, Martin Forman, Klára Jílková & Jiří Král

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The relict order Ricinulei occurs in the Neotropical region and Africa. Extant ricinuleids comprise only a single family including three genera: *Cryptocellus*, *Pseudocellus*, and *Ricinoides*. Phylogenetic relationships of ricinuleids are unresolved. According to molecular data, extant ricinuleids are formed by two sister clades. Ricinuleid cytogenetics is unknown. In order to obtain basic karyological information, we have studied representatives of both primary lineages of extant ricinuleids: *Cryptocellus* and *Pseudocellus*. Chromosome preparations were obtained by a spreading technique. Detection of nucleolar organiser regions (NOR) was performed by FISH using an 18S rDNA probe. Ricinuleids exhibited relatively high number of monocentric chromosomes. Male and female karyotypes did not contain any morphologically differentiated sex chromosomes. In *C. narino* (2n = 46), monoarmed chromosomes prevailed over the biarmed ones. Monoarmed chromosomes were acrocentric. One chromosome pair included a terminal NOR. Duringmale meiosis, chromatin displayed a considerable decondensation during a short period between pachytene and diplotene. Following recondensation, bivalents showed low number of chiasmata. In the karyotype of *P. gertschi* (2n = 40) the monoarmed pairs only slightly prevailed over the biarmed ones. The karyotype consisted of two metacentric, three submetacentric, three submetacentric/subtelocentric, and 12 monoarmed (i.e. subtelocentric and acrocentric) pairs. A small acrocentric pair bore an NOR on the end of its long arm. According to our data, ricinuleid karyotypes are relatively conservative. Although sister clades of recent ricinuleids separated during the Mesozoic, their karyotypes remain similar. *Cryptocellus* and *Pseudocellus* differ only somewhat by diploid number and by the ratio of monoarmed and biarmed chromosomes. They exhibit only a single NOR pair, which is probably an ancestral arachnid feature. In spite of a slow karyotype evolution in ricinuleids, chromosome data appear to be a promising tool to reconstruct phylogeny of this group. However, information from more species of the studied genera as well as from the remaining genus *Ricinoides* is necessary.

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Student – Oral presentation

The uplift of Himalaya as a trigger for spider species diversification: the case of the genus *Nesticella* (Araneae: Nesticidae)

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The family Nesticidae is a relatively small family of troglophilic spiders with a worldwide distribution. So far 228 species and 13 genera have been described. In Eastern and South-eastern Asia the wide majority of the species are actually included in the genus *Nesticella* Lehtinen & Saaristo, 1980. With the exception of the blind species *N. marapu* Benjamin, 2004, these spiders show few morphological adaptations to the cave-like environment and can be usually found both in caves and outside, under stones and in the litter of humid forests. The whole genus is actually poorly studied and its systematics have been debated in the past. The aim of our study is to analyse the phylogenetic relationships of the *Nesticella* species and infer the centre of origin and the colonisation pathway of this genus. To accomplish our goal we analysed the sequences of nearly 50 species using two mitochondrial (COI & 16S) and four nuclear genes (18S, 28S, H3 & Actin5c) for a total of more than 6000 bp. Preliminary results show that the genus *Nesticella* is clearly polyphyletic with several sub-clades and two main clades distinctly separate from each other by the geographical barrier of the Red River Fault in South China. It is likely that the geological processes related to the uplift of Himalaya and Qinghai-Tibet plateau had an important role in the early diversification of this group of species. This first input has been followed by colonisation routes to Northeast and to Southeast Asia. Furthermore, the presence of geographically widely distributed clades represented only by a reduced number of species suggests that ancient colonisations followed by extinctions may also have occurred in the past.

Student – Poster presentation

Using spiders as phylogeographical models in South America - a case study with *Nephila clavipes* (Araneae: Nephilidae)

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Neotropical biomes are supposed to have a complex and entangled evolutionary history that can be accessed by the phylogeographical patterns of widely distributed species. However, most studies in this region focus on species or groups sampled in just one biome. As spiders are a very diverse and abundant group we searched for a species distributed in several biomes to conduct a phylogeographical study in order to understand the history of Neotropical rainforests. *Nephila* is a pantropical genus, with only two species in South America: one with a narrow distribution, and the widely distributed *N. clavipes*, that occurs in the Amazonian and Atlantic Forests and also in the humid patches of drier biomes. We sampled 301 individuals from 42 localities along *N. clavipes* distribution and obtained partial sequences of the mitochondrial gene COI. We found high levels of genetic diversity and lineage differentiation since the Pleistocene. From the four highly structured genetic groups, three had a strong geographical association (Amazon, Atlantic Forest, and the Central part of Brazil), and the fourth group presented a scattered distribution. This study contrasts with the findings for other Nephila species that presented little genetic structure even in comparable sample areas. Demographic analyses showed signs of recent expansion in the groups from the Amazon and Atlantic Forest, compatible with a range expansion of these two biomes. Our data are congruent with paleoclimatic models for the Amazon and Atlantic Forests that suggest connections between them during the Last Glacial Maximum. Our results show that even efficient dispersers may present strong genetic structure, possibly related to the evolutionary history of the biomes these organisms inhabit. *N. clavipes* seems to retain genetic demographic signatures and to be a good model for evolutionary studies.

Oral presentation

Cues used in prey classification by a euryphagous jumping spider

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Over the last decades jumping spiders (Salticidae) have become successful models in the studies of vision-mediated behaviour and visual information processing in arthropods. Recent research on *Portia* spp. and *Evarcha culicivora* have revealed that these jumping spiders seem to be extremely discerning predators. They can selectively attend to specific visual stimuli, filtering relevant information and respond by using appropriate predatory techniques. In all the salticids prey recognition seems to be based on a unique search image as all these spiders are highly specialised, oligophagous predators capturing distinct prey species, such as other jumping spiders, ants or blood-filled female mosquitoes. The majority of salticids, however, prey upon a wide variety of arthropods. They often adopt prey-specific predatory techniques, so once the object is recognised as prey the next task is to classify it into one of different categories against which a specific predatory tactic is used. However, the prey that falls into each of these categories may be morphologically and behaviourally diverse. Therefore one of the major problems the spiders face in prey recognition is not to single out a particular prey pattern but rather to classify a range of different patterns into a limited number of categories – a particularly challenging task for an organism with severe brain limitations. In order to find how euryphagous salticids classify their prey I used *Yllenus arenarius*, a jumping spider with a recognised diet and prey-specific predatory behaviour. The spiders were tested with virtual prey models displayed on a miniature screen. The cues used in the tests were: body length (short vs. long), motion type (crawling vs. non-crawling), number of details (0-4) and position of details (on the leading body end vs. on the trailing body end). It was found that for classifying prey items into different groups with distinct escape risks *Y. arenarius* uses some general cues, such as body length and motion type. In contrast to highly specialised, oligophagous salticids, the spiders did not use any potentially specific combinations of prey details, such as wings, legs, antennae or the head spot. It appears that the use of body length and motion type enables the spiders to properly classify a significant proportion of potential prey as organisms with either low or high risk of escape.

Student – Poster presentation

Role of the methoprene and allatostatin A in the protein synthesis induction in females of *Parasteatoda tepidariorum*

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Spiders play a crucial role in ecosystems. For afew decades, this group of arthropodshas beenthe object of different analyses. However, their neuroendocrine system is a very neglected field of research. Lack of data about juvenile hormones (JHs) in spiders is observed. Information about neuropeptides is restricted to few a publications about their distribution and localisation in the central nervous system in a model species of spider – *Cupiennius salei*, and they were based only on immunohistochemical analysis. The role of juvenile hormones and neuropeptides in the spider's ontogenesis is still unknown. The current knowledge about families of these substances comes from studies carried out on insects. These hormones control the process of molting and metamorphosis in the larval stages. In adult insects, they regulate vitellogenesis and ovarian development in females, and spermatogenesis and growth of the accessory reproductive glands in males. JHs analogs are suspected to play a part in spider development, but none have yet been identified. Allatoregulating neuropeptides are multifunctional peptides. The biosynthesis of juvenile hormones is regulated by both stimulatory (allatotropic) and inhibitory (allatostatic) neuropeptides. The main aim of the research was to investigation the role of the allatostatin A and the juvenile hormone analogue (methoprene) in the induction of protein synthesis in the spider species *Parasteatoda tepidariorum* (Theridiidae). Topical application of methoprene and injection of the allatostatin A were carried out on females in the penultimate larval stage (35th day of development). Three different concentrations of analysed substances were used. The time of tissues collection was chosen experimentally and it was: 3h, 5h, 7h, 12h, and 24h after injection/topical application. Midgut glands, ovaries and hemolymph of female *P. tepidariorum* were chosen to check protein profile by SDS-page method. Analysis of results indicates changing in the protein profile in midgut glands, ovaries and hemolymph of *P. tepidariorum*, both under the influence of methoprene and allatostatin A.

Student – Oral presentation

Does spider presence influence feeding behaviour and virus transmission of leafhoppers?

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Natural enemies regulate insect prey populations not only by consuming them, but also by their shear presence causing 'predator stress' (PS) to prey. Prey behaviour may dramatically change in response to PS, including reduced feeding in herbivores. We propose to study the cascading effect of PS and predation on a 'spider-leafhopper-plant virus-plant' model system, which consist of organisms commonly occurring in European agricultural fields, field margins and fallows and has economic importance because of the viral plant disease involved. The model system includes the spider *Tibellus oblongus*, the leafhopper *Psammotettix alienus*, the wheat dwarf virus (WDV) and cereals as host plants. The model predator and prey are among the dominant herbivorous and predatory arthropods in the agricultural landscape. *Psammotettix alienus* is the only known vector of WDV which causes severe damage to cereals. We have established in previous studies that T. oblongus is an important natural enemy of the leafhopper. We have examined how the presence of spiders affects the feeding site selection of leafhoppers, and also on penetration. We performed a microcosm test where spiders and leafhoppers were separetaly enclosed on barley leaves in mesh covered isolators. Leafhoppers could sense spiders both in visual and olfactorial ways, and detect a spider's movements. After a 24 hour plant access period, plant leaves from the leafhoppers part of isolators were cleared and salivary sheaths were stained. The spatial distribution of feeding sites and success of penetrations were counted. Our result showed several changes in leafhopper behaviour both before and after penetration started. Feeding site preference and penetration success also showed differences due to spider presence. Leafhoppers made unsuccesful penetration on the lower side of plant leaves. Leafhoppers made shorter sessions of each behaviour, while the number of behavioural events raised. As time went by this effect reduced. The most possible explanation of this phenomenon is that inner stress – like starvation – override environmental stress factors like predator presence. Although virus transmission efficiency was not changed in the presence of spiders, changes in feeding-related behaviour of leafhoppers will have aneffect on virus spread. Detailed knowledge about such beneficial cascades may enable us to exploit natural enemies in new ways and that the results can be used for planning more environmentally friendly management practices.

Oral presentation

Effect of heavy metals accumulation on the activity of detoxifying enzymes in the wolf spider *Pardosa oakleyi*

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In this study, we assessed the relation between detoxifying enzymes and heavy metal body burden in the spider *Pardosa oakleyi*. To estimate the quantity of two heavy metals (Cr and Cu) in the soil, samples were collected from three locations that vary in pollution level. Spiders were also sampled from the same sites and analysed for metal contents. The activities of glutathione-S- transferase (GST), acetylcholiesterase (AChE), carboxylesterase (CarE) and Cytochrome P450 (CYP 450) were also assayed in the spiders. In the soil, the concentration of Cr ranged from 13 to 114 µg/g and Cu from 28 to 112 µg/g. Metal body burden in spiders from three sites also varied from 5 to 74 µg/g of Cr and 32 to 81 µg/g of Cu. Highest concentrations of Cr and Cu were found in spiders collected from the site with lower metal contents in the soil. A strong negative relationship was observed in the levels of GST, AChE and CarE and metal body burden in spiders. Cytochrome p450 did not show any relation with the metal body burden of spiders. The results indicate that high bioaccumulation of heavy metals Cr and Cu leads to decrease activity of detoxifying enzymes.

Student – Poster presentation

Testing biogeographic and speciation patterns in Caribbean tetragnathids

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Biogeography, species richness and evolution of the Caribbean Tetragnathidae spiders are still largely unknown. We have access to rich biological material from this area, consisting of more than 1000 individuals, collected through years of extensive field work as part of the 'CarBio' project. Our long term plan is to reveal biogeographic patterns and genetic structure of tetragnathid spiders on the archipelago, and test how dispersal ability of selected lineages relates to diversification on islands. Specifically, we aim to 1) define molecular operational taxonomic units (MOTU) of Caribbean tetragnathids, 2) reconstruct a population level phylogeny, 3) reconstruct a species level phylogeny, 4) combine those results with geographic data to determine dispersal patterns for selected lineages, and 5) test if and how dispersal ability affect speciation. Here, we present preliminary results of this ongoing work. Based on CO1 gene sequences obtained from over 700 terminals, we constructed a population level phylogeny of Caribbean tetragnathids, and used these data for constructing haplotype networks, which are informative of levels of gene flow between populations. To define MOTUs, we also performed species delimitation tests using Poisson Tree Processes (PTP), General Mixed Yule Coalescence (GYMC) and Automatic Barcode Gap Discovery (ABGD). Our preliminary results reveal varying patterns of genetic structuring among island populations of over 100 MOTUs, of which numerous species remain to be described.

Poster presentation

Management diversity within organic production influences epigeal spider communities in apple orchards

Yvan Capowiez[1], Gaelle Marliac[1], Christophe Mazzia[2], Jean-Francois Cornic[1] & Alain Pasquet[3]

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When compared to conventional production, organic production often has positive effects on the biodiversity of non-pest arthropods. However, organic production is only defined by the ban of synthetic pesticides and fertilisers and each farmer can still apply a wide variety of management practices that may also directly and indirectly influence arthropod biodiversity. Taking epigeal spiders inhabiting apple orchards as a case study, we first characterised the main agricultural practices applied in 20 selected orchards around Avignon in the South-East of France. Using ordination (PCA) and classification (HAC) methods, we identify three groups within these organic apple orchards: (i) the Biodynamy group, (ii) the Net group and (iii) the Classic group. The growers from the Biodynamy group used significantly less insecticides (40% less than those from the Classic group) and had more favourable habitat management practices (hedge and ground cover). We then sampled spider communities in each orchard in spring (April) and summer (June) using pitfall traps and showed that the spider communities in the Biodynamy and Net groups were significantly more abundant (+4 % on average), species rich (+60 % on average) and diverse (+70 % on average) than those in the Classic group. GLM analysis showed that these differences were mainly due to reduced insecticide use but also the hedge quality of these orchards. A trait-based approach was further used to differentiate the spiders found in three groups of orchards. The most striking finding was that spiders that use webs to forage (Linyphiidae, Agenilidae and Titanoecidae) were favoured in the Net group. This is most likely because these nets protect the orchards from the major pest, allowing reduced pesticide use and also because the nets protect orchards from the windy conditions frequently observed around Avignon.

Oral presentation

The IUCN Spider & Scorpion Specialist Group

Pedro Cardoso

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A very powerful tool for lobbying in favour of the conservation of species, including their inclusion in international agreements and law, is their threat assessment according to the criteria of the International Union for the Conservation of Nature (IUCN). Yet, at present, only 203 species of arachnids (less than 0.2 % of the described and probably less than 0.05 % of the extant) have been evaluated. With the long-term goal of putting arachnids on the global conservation map, the Spider & Scorpion Specialist Group (SSSG) was recently created. It counts on the expertise of more than 60 experts worldwide, all working voluntarily for this mission. The main objectives of the SSSG are to assess the extinction risk of a representative sample of arachnid species globally; assist on international law and agreements (e.g. Habitats Directive, Convention on International Trade in Endangered Species - CITES); contribute towards national and regional legislation protecting threatened species; develop scientifically sound species conservation strategies in cooperation with relevant authorities; and promote the public knowledge of arachnids. The SSSG is now working towards assessing most of the Macaronesian endemics, all the CITES-listed species and, under the auspices of a "charismatic invertebrates" project, all Nephilids, Archaeids and Theraphosa in the world. We are also working on the Species Conservation Strategy for Hogna ingens, the Desertas wolf-spider, recently assessed as Critically Endangered. Finally, the SSSG is contributing towards the development of guidelines to identify Key Biodiversity Areas at the global level and the use of the Red List Index for monitoring biodiversity status change over time. Future projects include: [1] evaluate the extinction risk of a global sample of arachnid species; [2] assess the most common causes of threat and best mitigation measures; [3] find ecological characteristics shared by threatened species.

Poster presentation

Check list of mire spiders of Latvia

Inese Cera[1] & Maija Štokmane[2]

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Mires cover 4.9 % of the territory of Latvia. About 18.8 % of the mires are protected as Natura 2000 sites, about 50.1 % retain as little disturbed or natural and about 31.1 % are used for peat extraction (including the historical peat extraction sites) or other purposes (e.g. agriculture, forestry). Natural peat bogs have the highest threats by industrial use and thus need to have the highest conservation priority. The long-term ecological monitoring of natural and degraded bogs is desired to compare the re-naturalisation of degraded and the development of natural bogs. Until recently spider communities were investigated only in natural and protected mires in Latvia. This study summarises all research on spider fauna in Latvian mires. During the last century the spider fauna of mires in Latvia was investigated by M. Šternbergs. After him during the last two decades,most spider investigations were done by I. Cera, V. Spuņģis and M. Štokmane. Additionally, spiders were collected in 2014 at two high bogs and one transition mire in the eastern part of Latvia and one high bog in thesouthwestern part of Latvia. Spiders in mire habitats were collected by soil frame (by M. Šternbergs), pitfall traps and entomological sweep net (by later studies). A formaldehyde and salt solution was used as the fixation solution for spider collection in pitfall traps. More than 180 species were identified. In comparison, about 500 spider species are currently known in the territory of Latvia. Linyphiidae (73) and Lycosidae (25) are families which represent most of the species in mires, the next are Theridiidae and Gnaphosidae (16 and 15 species, respectively). Most of the species were found also in other habitats, but there are species found only in mires – *Arctosa alpigena*, *Piratus* and *Piratula* species, *Gnaphosa nigerrima*, *Antistea elegans* and *Ozyptila gertchi* etc. The investigation during 2014 in three bogs of the eastern part of Latvia discovered two new species: *Araencus crassiceps* and *Pardosa atrata*, and new localisation of *Gnaphosa lapponum* and *G. nigerrima*. The current research clearly showed that spider fauna of mires in Latvia are not completely investigated, since new species might be found easily.

This work has been supported by European Social Fund within the project at the Institute of Biology, University of Latvia „New interdisciplinary group of scientists for sustainable use and protection of Latvian mires" (Nr. 2014/0009/1DP/1.1.1.2.0/13/APIA/VIAA/044).

Student – Oral presentation

Independent evolution of genital and sexual size dimorphism

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Sexual size dimorphism (SSD) is a phenomenon that can affect the evolution of mating strategies and life history. Spider female-biased SSD is interpreted to be driven by different evolutionary pressures on each sex, e.g. fecundity favouring large females and other types of selection maintaining small males. Since most other morphological traits relate to size, highly sexually size dimorphic species may face a morphological conflict that relates to size difference in male and female reproductive organs. Prior studies on very few selected spider species suggested that genital evolution is under sexual selection and that sexual genital size dimorphism (SGD) increases with SSD. Here, we investigate macroevolutionary patterns of SSD and SGD in Argiopinae, a global lineage of orb weaving spiders with varying degrees of SSD. We first tested the validity of general hypotheses of female biased SSD and genital size evolution in spiders by performing comparative analyses of size data on a Bayesian species level phylogeny. To test the role of sexual selection in genital size evolution, we compared allometric patterns of somatic and genital size characters regressed on body size in both sexes, and then tested for genital size coevolutionary pattern between the sexes. Finally, we explored the relationship between sexual size and genital size dimorphism. Against predictions, we found SSD evolution in argiopines to be non-directional and isometric, and size changes were phylogenetically correlated between the sexes. Our analyses failed to detect the predicted negative allometry in male and female genital size, thus providing no support for sexual selection driving genital evolution. Male genital size was only correlated to female external, and not internal genital size. In addition, comparative analyses found no relationship between sexual size and genital size dimorphism. Our combined results question the validity of general hypotheses explaining the evolution of female biased SSD and genital size evolution in spiders.

Student – Poster presentation

Disentangling the size and shape components of sexual dimorphism

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Many organisms are sexually dimorphic, reflecting sex-specific selection pressures. But although sexual dimorphism may consist of different variables from size to shape and physiology, most research emphasises a single aspect of sexual dimorphism, notably size, without specifying its components and their relationship. Among terrestrial animals, spiders exhibit most extreme sex-specific differences in size and abdominal shape, and therefore represent ideal models to address this question. Here, we dissect sexual dimorphism in spiders at two phylogenetic hierarchical levels. At the species level, we employ comparative phylogenetic tests to explore the association between sexual shape dimorphism (SShD) and sexual size dimorphism (SSD) in the orbweb clade Argiopinae. At the genus level, we then explore such patterns on a phylogeny of orb weavers (Araneoidea). Female argiopines had more diverse abdominal morphotypes than the males and the abdominal shape evolution was only poorly correlated between the sexes. Phylogenetic and comparative data suggested that evolution of sexual shape dimorphism in argiopines was related to geographic history, but that sexually shape monomorphic cases arose through selection for male size, perhaps acting against fecundity selection. While in argiopines there was no clear association between SShD and SSD, we detected a significant correlation in all orb weavers at the genus level. The shape and the size components of sexual dimorphism may thus respond independently to selection pressures, but at certain phylogenetic levels SSD may be a prerequisite for SShD. Research on other animal groups is needed to establish whether the here detected patterns on spiders are general.

Oral presentation

The role of ultraviolet colour in Batesian mimicry: a case study using myrmecomorphic spiders

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Since it was discovered that some animals were sensitive to ultraviolet light (UV), numerous works have studied this phenomenon across different taxa and contexts. There is good evidence now showing that sensitivity to UV rather than being an exception, it is a common pattern found across the animal kingdom. It is also known that UV cues are used in both intra- and inter-specific communication in a variety of animals. Nevertheless, there are some contexts where the role of UV colouration has been neglected. This is the case of Batesian mimicry, a defensive strategy by which a palatable species (the mimic) resemble an unpalatable or noxious species (the model) to avoid predation. This strategy has evolved independently in many different taxa whose predators can perceive UV colour. The aim of this study was to evaluate the role of UV in Batesian mimicry using myrmecomorphic spiders as a model system. To evaluate UV colour in mimic spiders and ant models we first measured their reflectance spectrum from 300–700 nm with a spectrometer. Then, we calculated an UV colour index independent of the visual system considered to assess whether mimics and models significantly differ in their UV colour. Finally, we tested whether a potential predator of the ant-mimicking spiders, the wasps, would be able to discriminate between mimics and models using the UV information. We found that for most of the studied species, mimicking spiders reflect significantly more UV than their ant models. Moreover, we found that this difference in UV colour is such that wasps would be able to discriminate between mimics and models using only the information from the UV colour. Thus, we show that UV colour has the potential to play an important role in Batesian mimicry and should be always taken into account when measuring mimetic accuracy in any studied system involving predators with UV vision.

Oral presentation

Elucidating cryptic species in the southern unstriped scorpion, *Vaejovis carolinianus* (Scorpiones: Vaejovidae)

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Nearly half a billion years old, the Appalachian Mountains are one of the oldest mountain ranges on earth. Landscape perturbations and climate fluctuations have caused repeated isolation and speciation in these mountains, accelerating rates of diversification in dispersal-limited organisms. Phylogenetic studies of terrestrial vertebrates endemic to the Appalachians continue to reveal new cryptic (morphologically indistinguishable) species, but thorough genetic assessments are still lacking for many groups of dispersal-limited arthropods. In this study, we are testing the hypothesis that the southern unstriped scorpion, *Vaejovis carolinianus* (Beauvois, 1805), represents a complex of cryptic species in the southern Appalachian Mountains and southeastern United States. We generated mitochondrial DNA sequences (COI) from throughout the species' range and used phylogeographic techniques to assess the level of genetic differentiation within and among populations. Preliminary analyses suggest that *V. carolinianus* comprises at least three clades that diverged in the Early Pliocene, hinting at the possibility of a cryptic species complex. However, additional samples and genomic techniques are still needed to elucidate species limits among southern unstriped scorpions.

Oral presentation

The spider *Parasteatoda tepidariorum* as an emerging model organism in studying developmental genetics and evolution

Wim G. M. Damen

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Our understanding of development and the underlying developmental mechanisms mainly rely on studies on a few well-established model organisms like the fruit fly *Drosophila melanogaster*. However, to comprehend questions on evolution, on the proximal causes of biodiversity and on how to get different forms we need to understand the evolutionary changes of the developmental processes that result in these different forms and shapes. For that reason we are studying spiders. *Parasteatoda tepidariorum* is emerging as a model organism for developmental genetic studies. Various genetic, molecular and genomic tools are now available that allow the study of various developmental processes and allow the comparison to other animals to understanding the evolution of animal form. Here I will present our results on segmentation in the spider and what these data imply for our understanding of the evolution of segmentation.

Poster presentation

Ozyptila balcanica sp. n. a new spider species from the Balkan Peninsula (Araneae, Thomisidae)

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The genus *Ozyptila* Simon, 1864 currently includes 108 species, 16 of them being known from the Balkan Peninsula (WSC 2015). *Ozyptila balcanica* sp. n. (male/female) is described and illustrated from localities in Bulgaria (Zemen gorge), Greece (Pelopones) and FYR Macedonia (Skopje region, Osogovo Mt. Range). The new species corresponds well with *Ozyptila umbraculorum* Simon, 1932, known from Portugal, Spain and France. Pictures and photos of both taxa are also presented.

Poster presentation

A collection of sea spiders (Chelicerata: Pycnogonida) in the National Museum, Prague (Czech Republic)

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The arachnological collection of the National Museum, Prague (NMP) contains spirit material of sea spiders (Pycnogonida). They are marine predators with parasitic larvae called the protonymphons. The phylogenetic position of pycnogonids is still unclear, being traditionally treated as a class of the subphylum Chelicerata. The sea spider collection in the NMP is rather small, containing only ten specimens. Some of them were identified, the others not. Therefore, all specimens were revised and the unidentified ones were determined and equipped with appropriate labels. The collection now contains following species: *Boreonymphon robustum* (Bell, 1855), *Endeis spinosa* (Montagu, 1808), *Nymphon grossipes* (Fabricius, 1780), *Nymphon hirtum* (Fabricius, 1780), *Nymphon hirtipes* Bell, 1853, *Nymphon stroemi* Krøyer, 1844 and *Pycnogonum litorale* (Strom, 1762) [*Colossendeis proboscidea* (Sabine, 1824) from Bjørnøya was not found in the collection despite it was mentioned in the accessory book from the year 1902]. They were all collected in the North Atlantic Ocean and adjacent seas. Four of them came from the Sars collection (Bergen, Norway) and three specimens came from the V. Frič collection (Prague, Czech Republic). From these two sources, six specimens were mounted for exhibitional and educational purposes. Despite the collection containing no types, it introduces (thanks mainly to the mounted specimens) an interesting group of marine animals.

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Poster presentation

Comparison of two identification keys for spider families (Araneae)

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Proper determination of spider species is one of the most important parts of an arachnologist's work. Experienced specialists can recognise the family of the spider on first sight; however, beginners or occasional determiners could have problems with determination of the family. Incorrect recognition of spider families are often caused by inappropriate choice of morphological characters for determination. Untill now, young naturalists in the Czech Republic use mostly the key in Buchar *et al*. (1995). Fortuitously, a new key was published this year (Kůrka *et al*. 2015), using different morphological characters than the previous one. Thus, these two Czech keys were tested by 60 respondents, which revealed features causing difficulties in classifying spider families. The following families were easily identified by both keys: Agelenidae, Dysderidae, Gnaphosidae, Hahniidae, Oxyopidae, Pholcidae, Salticidae and Tetragnathidae. On the contrary, Miturgidae and Pisauridae were the least successfully determined families by Buchar *et al*. (1995), and Amaurobiidae, Clubionidae, Dictynidae and Theridiidae were the least successfully determined families by Kůrka *et al*. (2015). The most problematic morphological characters were the number and position of trichobothria, number of claws and number of eye rows. Such characters thus should not appear at the beginning of the identification keys. When creating a new key, more attention should be paid on the aptitude of lay observers who look upon the spider body inexpertly, not being influenced by arachnological traditions, and therefore, with a certain dose of exaggeration, objectively.

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Student – Poster presentation

Individual behavioural differences in a specialised ant-eating spider *Zodarion rubidum*

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Inter-individual differences in behaviour can influence the number, type, and intensity of ecological interactions. Inter-individual behavioural differences have been referred to as behavioural tendencies, personalities or behavioural syndromes. One well-known syndrome is a positive correlation between foraging aggressiveness and boldness. For example in euryphagous spiders the aggressive/bold individuals can kill more prey and possess a wider trophic niche in comparison to timid/shy individuals. However, the effect of individual differences has never been studied in specialised stenophagous spiders. The main aim of this study was to investigate individual differences in behaviour of the prey-specialised ant-eating spider *Zodarion rubidum*. We were particularly interested whether behavioural traits of a specialised predator affect its prey selection. We expected that the timid/shy individuals will evince a higher degree of selectivity to avoid risk of being injured or killed by dangerous prey. We used female individuals of *Z. rubidum* and three ant species that represent its prey: *Formica cunicularia, Lasius niger* and *Tetramorium ceaspitum*. We carried out a series of experiments to quantify behavioural traits in each individual (latency to resume movement, exploration behaviour, escape distance, and foraging aggressiveness). Subsequently, we tested the spider's prey selectivity towards two ant species, one representing aggressive prey and the other timid prey. Although our results revealed consistent behavioural differences among individuals, we failed to observe effects of these differences on prey selection. Obtained results suggest that the inter-individual differences in behaviour of stenophagous predators alter the intensity of predator-prey interactions. Our results provide new insights into the relationship between individual-level variation in behaviour and predator-prey interactions in a bi-trophic system.

Student - Poster presentation

Foraging tactics in a prey-sharing spider

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Group foraging is a key component for the sociality of many animals. As conspecifics share food patches or captured prey, they directly benefit from each other. In several species, this feeding behavior has led to individuals developing different foraging tactics, such as searching and sharing prey with group members (producers) or feeding on the prey of others (scroungers). We experimentally studied foraging tactics in the subsocial crab spider *Australomisidia ergandros*, where siblings live in groups of 5 up to 40 individuals and share large prey items with group members who did not participate in the hunt. Given this variation in numbers, we further investigated the effect of group size on the feeding behavior. Spiderlings were individually marked and we observed feeding interactions during ten trials in groups of 6, 10 and 14 individuals. We found that the spiderlings mainly used one of three different foraging tactics: Producing, scrounging or feeding alone. Compared to groups of 6, individuals in groups of 10 and 14 scrounged and overall fed significantly more, however there was no significant difference between groups of 10 and 14. These results indicate that larger foraging groups are more efficient since a higher number of individuals benefits from the food discovery of a few. Our findings on the existence of foraging tactics in *A. ergandros* furthermore underline the complexity of social systems in spiders.

Poster presentation

Spiders (Araneae) described between1931-1939 by Romanian arachnologist Aleksandru Roşca

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For almost 40 years Alexandru Roşca had studied spiders of the territories that are now parts of Romania, Ukraine, Bulgaria and Moldova. According to the register of the «Alexandru Roşca» collection deposited in the «Grigore Antipa» National Museum of Natural History (Bucharest), the first of A. Rosca's spider material was collected during May 1928; the last material was collected during May 1966. He published 19 papers mostly written in Romanian (14 papers), but a few in German (4 papers) and French (1 paper). Due to political repressions followed by his expulsion from the university, A. Roşca did not complete and publish the «The Romania Spider Catalog» (Catalogul Araneelor din România). It took him a long time to work on it. During 1931–1939, A. Roşca had described 13 spider species. To date, five species names have been synonymized and six names remain doubtful. Two of Roşca's species are common in Europe and information on them is updated. *Eucta reimoseri* Roşca, 1939 [=*Tetragnatha reimoseri* (Roşca, 1939)] has specific habitat requirements (rush communities) and to date is recorded from Romania, Poland, Germany, Hungary, Belgium, Austria, the Netherlands and Italy. In the case of *Lycosa maculata* Roşca, 1939 [=*Pardosa roscai* (Roewer, 1951)] the name replacement was done by C. F. Roewer in 1951 (preoccupied by C. W. Hahn in 1822). It was later considered as the subspecies *Pardosa cribrata roscai* (Fuhn & Niculescu-Burlacu, 1971); in 2009 it was restored to the rank of species – *Pardosa roscai* (Roewer, 1951) (Bayram *et al.*, 2009). To date, *Pardosa roscai* (Roewer, 1951) is distributed in Romania, Bulgaria and Turkey.

Student – Oral presentation

The sex pheromone of the cross spider *Araneus diadematus*

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In spiders, chemical communication has a key function in mate attraction. Usually sex pheromones are released by adult virgin females and also subadult ones just before their maturity in order to attract males for mating. These pheromones consist of a bouquet of substances, containing the information of the attractiveness of the emitter. In insects it is known, that sex pheromones do also play a role in interactions of the same sex (social selection). However, this has not yet been shown for spider pheromones. So far only a few sex pheromones have been chemically identified in spiders. Therefore the aim of our study was to identify the sex pheromone of *Araneus diadematus* (Araneidae), and compare it with the recently identified pheromone of *Argiope bruennichi* (Araneidae). Furthermore we wanted to proove the existence of social selection through spider sex pheromones. In Y-tube dual choice experiments with males, we were able to show that virgin females are significantly more attractive than subadult ones, indicating that the sex pheromone is mainly produced by adult females. Furthermore, we could show that adult virgin females are repelled by the smell of the same gender. Therefore the social selection theory through sex pheromones was proven for the first time in spiders. In chemical analyses using gas chromatography and mass spectroscopy (GC, GCMS) we identified a benzene, different carbonyls and esters in the cuticle surface extracts of virgin females and in silk extracts. A statistical comparison showed differences in the odour bouquets of subadult and adult females. We used gas chromatography coupled with electroantennography (GC-EAD) in order to identify bioactive compounds among the substances we found. GC-EAD has been shown to be an efficient method to identify insect pheromones but has so far not been used to identify pheromones in spiders. We identified six electrophysiologically active compounds. In future investigations we will perform further GC-EAD analyses and bioassays with synthetic compounds in order to identify key compounds for male attraction.

Poster presentation

Evolution of nucleolus organiser regions in spiders: are these loci a suitable marker to study spider evolution?

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Although spider karyotypes have been studied for decades, most data on their chromosomes have been only obtained by standard cytogenetic methods. Molecular approaches have been omitted. Therefore, the present study introduces fluorescence in situ hybridization using the 18S rDNA probe to determine fundamental traits of evolution of nucleolus organiser regions (NORs) in spiders. A set of analysed species was designed to test the limits of utility of this marker for phylogenetic reconstructions. We focused especially on entelegyne spiders. Due to conservative diploid numbers and chromosome morphology of entelegynes, other markers are needed to analyse their karyotype evolution. Our set included 55 entelegynes belonging to 19 families. More data have been obtained from the basal families Eresidae, Hersiliidae, and Oecobiidae (35 species). Furthermore, we investigated six species belonging to basal ophisthotheles (haplogynes and mygalomorphs). Our data revealed much higher diversity of NOR pattern than previously thought basedon data obtained by standard cytogenetic methods (i.e. silver staining). Numbers of NOR loci varied considerably from one to ten. Although most species showed low number of NORs (one or two), a high number of these sites (four and more) was surprisingly common, being found in several unrelated enetelegyne families (Araneidae, Eresidae, Hersiliidae, Lycosidae, Oxyopidae, Salticidae, and Sparassidae). Most of these families included both species with high and low NOR number. Most NORs exhibited a distal location (i.e. at the end of chromosome arm). Interestingly, four unrelated entelegynes displayed pericentric location (i.e. close to centromere) of a NOR site. Chromosomes including this derived NOR pattern were acrocentric. Mygalomorphs showed low numbers of NORs, which exhibited an enormous size. These unusual NORs have evolved by expansion of rDNA repeats. Our results indicate that NOR data can be used to study evolution of spider families or genera (especially if NOR pattern is more or less stable than the other karyotype features). Remarkably, we found also intraspecific diversity of NOR pattern in some species. This kind of NOR variability could be used in intra- or interpopulation studies. More data are necessary to elucidate utility of NORs to analyse high-level spider phylogeny.

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Student - Oral presentation

Conserved tarsal sensilla in Opiliones: contribution for systematics and sensory biology

Guilherme Gainett[1], Nathália Fernandes[2], Prashant. P. Sharma[3], Ricardo Pinto-da-Rocha[1], Gonzalo Giribet[4] & Rodrigo Hirata Willemart[1,2,5]

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Studies on Opiliones systematics and behavioural ecology have dramatically increased in recent years, with great contributions from molecular systematics, behavioural experiments and natural history papers. In systematics, however, very few morphological characters have been identified, especially when it comes to higher level systematics. Knowledge on sensory structures is also limited when compared with other arachnid orders (e.g. Araneae, Acari, Amblypygi, Ricinulei). Moreover, studies on such structures bring very important proximal information for behavioural ecology. Here, we investigated (with SEM) a promising character system: the pair of sensilla basiconica (SB) on the last tarsomere of pairs of leg I and II and the undescribed Apical-Hood sensillum (AHS), a single seta which occurs adjacent to the pair of SB. These sensory structures occur in all laniatorid families (29 families, 38 species, pair of SB absent in Sandokanidae), in 2 Dyspnoi families (3 species) and are absent in Cyphophthalmi (5 species) and Eupnoi (2 species). They have conserved position and general morphology, both being sexually monomorphic, similar in legs I and II, inserted in an oval shaped basal membrane and bearing no wall-pores. AHS shaft tapers toward the apex, varies in the longitudinal groove patterns and always ends in a characteristic "hood-shaped" structure, which possibly has 2 pore openings. In the pair of SB, the proximal seta is usually shorter than the distal and the shafts vary from short and conic to elongate forms. The apex has a sharp tip with a longitudinal slit. The presence of both characters in all species of Laniatores and Dyspnoi studied shows how widespread this sensory system is in Opiliones, and the interfamilial differences in Laniatores may prove useful for systematics. Histological studies and phylogenetic tests of trait correlated are current being applied to investigate function and test whether those two characters are functionally/phylogenetically correlated. Our study provides a unique chance of generalising the function of these structures for a large group of Opiliones, contributing for the understanding of their sensory biology and higher level systematics.

Student - Poster presentation

A case study on the evolution of sexually dimorphic glands in Zalmoxidae (Opiliones, Laniatores)

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Sexually dimorphic glands are frequently associated with the production of pheromones and appeared independently in several animals. In Opiliones of the suborder Laniatores (Arachnida), these sexually dimorphic glands have been reported in at least one third of the ~30 families, but there are no studies investigating whether they have a common or an independent evolutionary origin. The family Zalmoxidae is an interesting model for investigating this question: some males have swollen basitarsus III and/or IV, the family has been well sampled and an important fraction of species have already been evaluated phylogenetically in a recent study (Sharma & Giribet 2012). To test the hypothesis of homology, we examined 103 terminals from Sharma & Giribet (2012), of which 60 had males and females. From these, we describe the external morphology of all species in which males have swollen basitarsi (5 species), using scanning electron microscopy. Additionally, we coded presence/absence of the gland on legs III and IV to conduct an ancestral state reconstruction and trait correlation test using the phylogeny of the family (ongoing). Our morphological results show that in all cases the gland openings occur on the ventral surface of the swollen tarsomere, with characteristic associated sensilla. However, the five species differ in the morphology of the pore openings, sensilla shape and insertion into the cuticle. So far, our morphological data alone is insufficient to test the homology hypothesis of these glands, but the differences observed suggest that they might have evolved convergently. In addition, the function of such glands remains unknown. Pairing these data with phylogenetic inference might help resolve this question and provide insights on how sexually dimorphic glands evolved in Laniatores.

Oral presentation

Present knowledge on the spider fauna of the Carpathians and Slovakia

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The Carpathians are a range of mountains forming an arc roughly 1,500 km long across Central and Eastern Europe, making them the second-longest mountain range in Europe. They cover an area of 190,000 km^2 and, after the Alps, form the next most extensive mountain system in Europe. Assessment of the Carpathian spider fauna was done in the framework of the BIOREGIO project in 2014 with objectives to improve knowledge on insufficiently known Carpathian spider fauna and ensure a favourable conservation status for threatened species. For all of the Carpathian countries, except Ukraine, national check lists for their whole territories were published but without details about the species present within the Carpathian arc. We tried to fill these gaps. From a methodological aspect we respected the borders of the Carpathian region delimited in the Carpathian Biodiversity Information System (CBIS), with 309 orographic units (available on www.carpates.org/ cbis/orogs.html), and the species nomenclature according to *Fauna Europaea*. We made use of data and check lists for individual Carpathian countries that were created by national experts. The levels of knowledge about spiders in individual Carpathian countries are different. The highest richness of spider fauna (within the boundaries of this project) is documented from the Slovak, Czech, Romanian and Poland Carpathians (929, 671, 619, and 570 species). Less data are from Hungarian and Serbian Carpathians (182 and 203 species). Presently from the whole Carpathian unit 1067 spider taxa (cca 21.76 % of 4,913 European species) are documented. From them, 185 species are listed in the Carpathian red list (draft). Altogether 49 endemic species were found in the Carpathians (4.6 % of 1,069). The majority of "endemic species" is concentrated in Romania (41 species). Occurrence of species in orographic units is presented. Slovakia is mainly cover by Carpathians, but its south part belongs to Pannonian region. The present study provides also information on the updated national Slovak check list of spiders. According to the Fauna Europaea (Helsdingen *et al*. 2015), 921 spider species belonging to 38 families (also with questionable species) are listed in the database from the Slovak territory. During the last 15 years after publishing of Catalogue of Slovakian (Gajdoš *et al*. 1999) several species were revised and other species have been recorded as new to the Slovak fauna. So far, presently 933 spider species are known for Slovakia and occurrence or status of another 29 species is questionable.

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Poster presentation

Alien species of Slovakian spider fauna

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Here we present the first draft of the checklist for alien spider species in Slovakia. In Europe there are several projects concerning alien and alien invasive species at the national, regional and Pan-European levels. Two of them, EASIN (European Alien Species Information Network) and DAISIE (Delivering Alien Invasive Species Inventories for Europe), cover the whole of Europe. In the EASIN database 129 spider species are listed, and the DAISIE database consists of 85 species. Combination of both databases list 137 spider species. In total, 52 species (46 from EASIN database and 38 from DAISIE database) were recorded as well in Slovakia. Their species status in Slovakia is assessed. In addition, two species not listed in above mentioned databases and recorded in Slovakia within last two decades, *Scytodes fusca* and *Orchestina pavesii*, we consider as alien species for Slovakia.

Work was done in the framework of VEGA project 2_0117_13.

Student - Poster presentation

Spiders of the Vršac Mountains - first faunistic results and new national records

Igor Gajic[1], Gordana Grbic[1] & Marko Malinovic[2]

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A landscape of outstanding features, the "Vršac Mountains" are the highest mountains in the north region of Serbia. The mountains are built of Paleozoic rocks (over 260 million years old) which are surrounded by Neogene sediments (about 60 my old), including those of the ancient Pannonian sea (about 25 my old). Contrary to some literature data, the Vršac Mountains are not part of the Carpathians, but belong to Serbian-Macedonian Massif according to their geotectonic position and geological structure. Owing to their exceptional natural conditions, they are one of the richest IBAs in Serbia, with 120 bird species. Some other representatives of the fauna are grey and red fox, deer, wild boars and wolves. In contrast to birds and mammals, the spiders of the Vršac Mountains had never been explored, making it a blank spot on the European spider map. In order to change that, in 2014 we organised the "Spiders of the Vršac Mountains" project which provided the first arachnological data for this area and a basis for the creation of management strategies in its further conservation and protection status. Intensive fieldwork, based on collecting material using pitfall traps, hand collecting, and sweeping and beating method has been carried out. As a result, we created an initial inventory list of spider species for this area and recorded new species for the Serbian fauna.

Student - Oral presentation

Chemical communication in spiders - SEM and electrophysiological analysis of chemosensory sensilla on *Argiope bruennichi* (Araneae, Araneidae)

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Communication in spiders is assumed to be mainly performed by olfaction, irrespective of whether they are cursorial or web-building. However, rather little is known about the chemical signals or cues involved in olfaction and only one volatile pheromone responsible for male attraction to virgin females has been identified until now. Even less is known about the receptive structures involved in olfaction: s-shaped and blunt tipped sensilla with a subterminal pore opening are considered to be responsible for detecting volatile substances in spiders. A single previous electrophysiological analysis demonstrated that contact pheromones are perceived with these sensilla and consequently it is assumed that the same structures are responsible for long distance olfaction. To close this gap, we investigated the distribution and function of the suspected sensilla in the orb-web spider *Argiope bruennichi* for which the pheromone that is released by virgin females has been identified and synthesised. Firstly, we scrutinised the structure and distribution of the supposed chemosensory sensilla on all legs and pedipalps of mature males and females of *A. bruennichi* under the Scanning Electron Microscope. Both sexes possess tip-pore sensilla on all extremities. The distribution pattern of sensilla differs only slightly between the sexes: on the male pedipalps chemosensory sensilla occur exclusively on the cymbium whereas the pedipalps of the females also have sensilla on other segments. Secondly, ongoing electrophysiological studies will test if the tip-pore sensilla of males are used to perceive the volatile sex pheromone of virgin females. Our study will further test if the location on the body determines the functional specificity of the sensilla.

Poster presentation

Cave survey yields two new spider family records to Israel

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Between September 2013 and June 2014 we conducted the first thorough arachnid cave survey in Israel, including more than 40 caves scattered from the Arava area in the south, upper Galilee and Golan in the north, the Jordan Rift Valley in the east and the Coastal Plain in the west. The survey was conducted in different seasons: late summer to autumn, spring, late spring to early summer. We collected arachnids by means of pitfall-traps (with NaCl solution, left in caves for 74-77 days) and hand collecting (with help of flashlights and UV light). In each cave we sampled arachnids at the cave entrance, the intermediate part of the cave (twilight zone) and the dark zone, when it was applicable (some caves were short and did not contain twilight and dark zones). In addition we recorded the physical and climatic attributes of each cave such as length, opening size, elevation, geology, precipitation, temperature (every hour for 74-77 days), humidity and luminance. As part of this survey we found one male belonging to the troglophile family Leptonetidae, and more than ten individuals, including adult males and females, belonging to the Afrotropical family Phyxelididae. Both families are reported here for the first time from Israel. Both are known from several localities in the Mediterranean region and from Turkey, respectively, yet each has only one reported locality from the Levant *sensu stricto* (namely, Cyprus, Israel, Jordan, Lebanon, The Palestinian Authorities and Syria): Leptonetidae was reported from Lebanon, and Phyxelididae from Cyprus. The specimens of both families were found in Israel in relatively temperate and humid caves (March to June: 14-20 °C; Overall range for all caves: 7-32 °C) with medium-high annual precipitation (500-650 mm; overall range for all caves: 50-850 mm), intermediate elevation (120-180 m asl; Overall range for all caves: -380 to 690 asl) and only in the western part of the country.

Poster presentation

Araneae – Spiders of Europe

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The online key for the identification of all spiders in Europe grew considerably in the last years. It offers detailed information for nearly 4,500 species, on average they are illustrated with 7 diagnostic drawings, a distribution map and phenology data. For this, we included the information from more than 1,700 publications. Recent additions include a photo gallery (starting 2011, meanwhile nearly 3,000 photos included) and a barcoding module in 2012. This allows tracing the barcoding status for all European species and contains reports on barcoding projects in Europe. A biodiversity module will be added soon, to provide information on the distribution of species and family richness per region or country and checklists for all regions or countries.

Oral presentation

Sink or sail: Novel behavioural adaptations on water in aerially dispersing species

Morito Hayashi[1,2,3], Mohammed Bakkali[4], Alexander Hyde[1] & Sara L. Goodacre[1]

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Long-distance dispersal events have the potential to shape species distributions and ecosystem diversity over large spatial scales, and to influence processes such as population persistence and the pace and scale of invasion. How such dispersal strategies have evolved and are maintained within species is, however, often unclear. We have studied long-distance dispersal in a range of pest-controlling terrestrial spiders that are important predators within agricultural ecosystems. These species persist in heterogeneous environments through their ability to re-colonise vacant habitat by repeated long-distance aerial dispersal. Individuals are strictly terrestrial, are not thought to tolerate landing on water, and have no control over where they land once airborne. Their tendency to spread via aerial dispersal has thus been thought to be limited by the costs of encountering water, which is a frequent hazard in the landscape. In our study we find that ballooning in a subset of individuals from two groups of widely-distributed and phylogenetically distinct terrestrial spiders (linyphiids and one tetragnathid) is associated with a hitherto undescribed ability of those same individuals to survive encounters with both fresh and marine water. Individuals that showed a high tendency to adopt 'ballooning' behaviour adopted elaborate postures to seemingly take advantage of the wind current whilst on the water surface. The ability of individuals capable of long-distance aerial dispersal to survive encounters with water allows them to disperse repeatedly, thereby increasing the pace and spatial scale over which they can spread and subsequently exert an influence on the ecosystems into which they migrate. The potential for genetic connectivity between populations, which can influence the rate of localised adaptation, thus exists over much larger geographic scales than previously thought. Newly available habitat may be particularly influenced given the degree of ecosystem disturbance that is known to follow new predator introductions.

Student - Poster presentation

Spiders of Subotica Sandlands (Serbia) – sandy place, but wetland species

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The landscape of outstanding features – the Subotica Sandlands – is situated in the far north of Vojvodina province, close to the border of Serbia and Hungary and isrepresented by a mosaic distribution of habitats, among which are sands, steppes and woods. However, as a result of high influence of underground water, there are also different wet habitats such as marsh, flooded woods, and bogs. All habitats are especially important because of their special ecosystems' biodiversity. At a national level, it represents a natural asset of great importance, and since 2003 falling under protection category II. On the international level it has been a European IBA since 2000. From the arachnological point of view, this place is totally unexplored. No literature exist. With a desire to change that, in 2015 we started the "Subotica spiders" project with comprehensive fieldwork. The goal of the first year was get an overview of the arachnological fauna in wet habitats, so traps were placed in occasionally flooded wood, wet meadow and wet field of *Carex* sp. habitats. A preliminary inventory list of spider species is presented. Special emphasis is given to some species that are new records for the Serbian fauna.

Oral presentation

Glue-coated capture threads of spiders are optimised for a certain humidity and pulling-rate

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The araneoid orb web includes several key evolutionary adaptations that have facilitated the diversification of araneoid spiders. A notable example is the capture thread coated with viscous glue, which functions to retain prey that strikes the web. Single glue droplets show a viscoelastic response to the rate of pulling, and they extend differently with varying humidity and temperature. Multiple glue droplets function collectively in adhesion through a suspension bridge mechanism, but little is known about how this is influenced by atmospheric humidity. Furthermore, preliminary data indicate that capture threads exhibit their maximum stickiness at a different humidity in different species. In order to understand how glue droplets behave to cause this humidity response, we explored the pull-off behaviour of whole capture threads at varying humidity (30-85 %) and pulling-rates (0.15-47.6 mm/s). We investigated three araneid species occupying diverse habitats: *Argiope trifasciata* (arid habitat), *Larinioides cornutus* (interemediate humidity habitat), and *Verrucosa arenata* (humid habitat). Single glue droplets exhibited the largest extension at the highest humidity and lowest pulling-rate. However, our results show that the thread's overall stickiness is not a mere sum of single droplet behaviour. We observed that several droplets extended on their own to form the previously described "suspension bridge mechanism" in conditions of lower humidity and intensified pulling-rate. At increasing humidity and decreasing pulling-rate, we found a hitherto undescribed formation of a continuous glue-sheet, which transitioned into the coalescence of the glue and the sliding of glue on the stretching silk thread. While we observed this transition in the pull-off behaviour for all investigated species, the humidity and pull-off speed at which the transition occurs varies considerably between species. Our preliminary adhesion data indicate that the highest capture thread adhesion in all species is achieved at conditions, which reflect the transition between the suspension bridge mechanism and glue-sheeting.

Student - Poster presentation

Steeplebushes conquer the countryside: Direct and indirect effects of the invasive *Spiraea tomentosa* on the indigenous spider fauna of wetland meadows

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The North American steeplebush (*Spiraea tomentosa*) has been popular in European parks and gardens as an ornamental shrub since the 18th century due to its rich flowering and its being easily grown under different environmental conditions. In addition, it is not seriously attacked by parasites or diseases and spreads via suckers to form colonies. These preconditions enable several steeplebush species to invasively colonise in particular moist to wet and sunny to lightly shaded habitats with acidic soils; among them Natura 2000 sites such as peat bogs, alder forests and wetland meadows. Particularly in eastern Germany and western Poland, *S. tomentosa* often forms extensive and dense stocks, displacing endemic plant species. The aim of the current investigation is to estimate the risk potential of the invasive colonisation by steeplebush to the indigenous invertebrate fauna based on the spider fauna. For the assessment of the ecological impact, three spatially separated sites are currently under research, two in Poland (SPA Bory Dolnośląskie) and one in Germany (SCI Oberlausitzer Heide- und Teichlandschaft). Per site three different types of wetland meadows are being investigated: a monodominant *Spiraea*-formation (a former wetland meadow), an uncultivated meadow without steeplebush and a regularly mowed meadow on ecologically similar soil. The survey is performed using pitfall-traps from April to October 2015. In addition, systematic net catches will be carried out at three dates in 2015. Furthermore, vegetation surveys, examination of habitat structure, soil moisture and sunlight radiation are measured in every site. First results show a lower activity density and a modified species spectrum of epigaeic spiders in steeplebush-formations compared with both meadow types.

Student - Poster presentation

Araneofauna of grapevines under different management regimes – increasing diversity and abundance of spiders in agroecosystem

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The araneofauna of vineyards is relatively known in Central Europe but we have a lack of knowledge about araneofauna which occur directly on the grapevines. Our study was conducted in commercial wine production vineyards. Our investigation was focused on spiders thatlive on grapevines, especially on the grapevine trunks. We investigated spiders in six vineyards in the south part of Moravia, Czech Republic (Šatov, Mikulov, Popice, Morkůvky, Nosislav, and Blučina). Our research goal was to find the difference in grapevine spider fauna in terraced vineyards and plain areas and to determine the species composition living on grapevines. We choose a few vineyards which consisted always of both terraced and plain portions to compare them. We assumed that terraced vineyards host a richer fauna because the density of spider species here should be increased by the presence of terraced slopes. For collecting, we used cardboard traps which were setfrom November 2013 to October 2014. The traps were collected monthly and and immediately replaced by new ones. The species composition and total abundance differed significantly between terraced and plain vineyards. In terms of abundance, the only significant results were for adults only in case of total abundance for adults as well as juveniles. The higher difference was during spring months until grapevines developed leaves. There were 727 adult spiders collected on vineyards in southern Moravia. Altogether, we collected 21 spider species which belonged to 7 families. The most important species was *Marpissa nivoyi* (Lucas, 1836), which is mentioned in the Red List as vulnerable (VU), and *Sibianor tantulus* (Simon, 1868) which has an unknown distribution in the Czech Republic. The other very interesting result was that the most common species was the myrmecomorph *Synageles venator* (Lucas, 1836), which was scarcely recorded in such large numbers as we documented in our study. The most common species all belonged to the family Salticidae: *Synageles venator* (499 specimens), *Pseudicius encarpatus* (80 specimens), *Salticus scenicus* (67 specimens) and *Heliophanus auratus* (26 specimens). The remaining species were represented by less than 20 specimens. There were no relevant differences among localities in the distribution of the most common species.

Student - Poster presentation

Observations about labial and maxillary cuspules of *Macrothele calpeiana* (Araneae: Hexathelidae)

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Cuspules are cuticle structures on the coxae of the pedipalp and on the labium. They are found exclusively on spiders from the infraorder mygalomorphae. There have been few articles published about these structures, and undoubtedly the most in-depth study to have been carried out is by Pérez-Miles and Montes de Oca in 2005 about different species from the Theraphosidae family. The focus on cuspules has been mainly of a taxonomic nature. Raven (1980) pointed out that the existence of maxillary cuspules is a characteristic which derives from the mygalomorphae, and that the presence of numerous labial cuspules is a rare characteristic in spiders, found only in Migidae, Barychelidae and Theraphosidae (mygalomorphae with 3 tarsal nails). It has been suggested that the cuspules have a mechanical, sensorial and glandular function. For the first time, we describe the cuspules of adult *Macrothele calpeiana* of both sexes from the Iberian Peninsula, and also immature specimens before their dispersion. Cuspules are observed on both the labium and the internal part of the coxae of the palps at all stages. Adults have a high number of labial and maxillary cuspules. The cuspules are similar in ornamentation and size in the same individual. Their number and size increase with age. Clear differences are observed in the microstructures of the oral and aboral faces of the maxillary and labial cuspules. An important observation to be noted is a pore in the medial area of the oral face in many of the cuspules on both the labium and the maxilla, and sometimes a pore in the apical position of the maxilla. The morphology of labial and maxillary cuspules has been observed using sweep electronic microscopy (SEM). This technique has been used in the study of the cuspules of *Macrothele calpeiana,* the only species from the Hexathelidae family present in the Iberian Peninsula.

Student - Poster presentation

Karyotype variability of suborder Cyphophthalmi on Balkan Peninsula (Arachnida: Opiliones)

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Suborder of Cyphophtalmi is a basal group of harvestmen (Opiliones) which is specific not only for several morphological signs but also, considering its age, for its spread across all continents except Antarctica. Currently, there are described only about 200 species. However, molecular phylogenetic analyses which were carried out in recent years have discovered hidden species diversity of this morphologically rather uniform group. This matter affects mainly harvestmen of small sizes (mostly 1-2.5 mm) which seem to be mites at first sight and which can be found mostly in the soil leaf litter. The suborder is divided into six families occurring mostly in different biogeographical areas. The most convenient family for our study is Sironidae (ca. 50 species) that inhabits the area of former Laurasia with representatives in Europe, North America and Japan. The hidden species diversity of the Cyphophtalmi is very likely caused by its low ability to spread and the long-term isolation of its populations. For this reason we focused on the study of karyotype variability which could also reflect isolations of single lines. For the analysis we have chosen the region of Balkan Peninsula where there is a substantial number of species of the *Cyphophthalmus*. Furthermore, during the Pleistocene era the area was glaciated which caused the creation of many refugia and thus a high degree of genetic isolation. Our results demonstrate that in this area a karyotypic differentiation occurred of the Cyphtophalmi and that the karyotypes of the Cyphtophalmi are not as uniform as recent published data indicated. We discovered that the diploid chromosome number ranged from 24 to 28. Due to the small size of chromosomes it is very difficult to characterise their morphology exactly and identify specific chromosome pairs or possible rearrangements during the evolution. Fluorescent in situ hybridization (FISH) using specific chromosome probes could contribute to the resolution of this problem in the future.

Poster presentation

Spider red lists

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Only 28 % of the European countries have a national red list for spiders. They comprise between 0.5 and 100 % of the national spider fauna and they use different classification systems. Here we analyse the criteria which have been used to establish these lists. The most obvious criterion is the degree a given species is threatened but this information is only known for a few species, in a few countries and by a few experts. Possible further criteria are the assignment of species to threatened habitats, endemism, occurrence in European countries or regions, and species traits. This information may be useful to propose, within a standardised procedure, national species lists which then can much more easily be verified as red lists.

Poster presentation

Urbanisation alters drastically the structure of vegetation-dwelling spider assemblages

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Urbanisation has a considerable direct and indirect effect on biodiversity, by reducing habitat quality, changing climate, biogeochemical cycles, soil properties, fragmenting habitats and causing human disturbances. These processes considerably influence the composition of arthropod assemblages. We investigated the role of urbanisation in shaping vegetation-dwelling spider assemblages along a rural-suburban-urban forest gradient in Debrecen and in the adjacent forest area. We collected spiders by sweep-netting from spring to autumn in every fourth week in 2011. We tested three novel hypotheses: the number of (i) xerophilous species and (ii) light-preferring species are increasing from the rural habitat towards the urban one, since urban forest patches become drier and lighter than rural and suburban ones due to park management (thinning the shrub and herb layers); and (iii) the number of web-building species is decreasing along the same gradient. We also tested four commonly used hypotheses: (iv) increasing disturbance hypothesis (species richness is decreasing by disturbance), (v) matrix species hypothesis (the richness of open-habitat species is increasing by disturbance), (vi) opportunistic species hypothesis (the richness of generalist species is increasing by disturbance), and (vii) habitat specialist hypothesis (the number of forest specialist species is decreasing by disturbance). The new hypotheses were supported by our findings, as the xerophilous and light-preferring species were the most numerous in the urban area, while the number of web-building species was the highest in the rural area. The overall species richness was the highest in the rural sites confirming the increasing disturbance hypothesis. The number of forest specialist species was also the highest in the rural area compared to the suburban and urban ones supporting the habitat specialist hypothesis. The number of generalist species was higher in the rural habitat, than in the suburban and urban ones, while the number of open-habitat species was the lowest in the suburban sites, contradicting the opportunistic species hypothesis and the matrix species hypothesis. Our findings demonstrated that human disturbance caused by urbanisation had a strong influence on the vegetation-dwelling spiders along the rural-urban gradient; therefore spiders can be used as indicators of urbanisation.

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Poster presentation

The pseudoscorpion diversity in the city of Vienna, Austria

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Pseudoscorpions represent the fourth largest arachnid order. They have adapted to almost all terrestrial habitats and can be found all over the world (except Antarctica). The distribution and diversity of these small predators are apparently strongly affected by abiotic factors (such as temperature, humidity, altitude), but still there is only limited knowledge about the human impact on pseudoscorpions. The strong influence of human activities is evident in big cities. Dense, long-time urbanisation changes the natural conditions considerably, and the pseudoscorpion distribution patterns can help determine the ecology of particular species. For this reason we analysed the distribution of the pseudoscorpions in Vienna, Austria. The species can be divided into three main ecological groups: 1) pseudoscorpions from tree hollows, 2) pseudoscorpions under tree bark, 3) pseudoscorpions in the leaf litter. We found a significant negative effect of intensive park management in the city centre on pseudoscorpion diversity, mainly caused by eliminating trees with hollows and removing leaves from the ground. In contrast, planting trees with a suitable bark in the parks has a positive effect mainly on the abundance of *Chernes hahnii*, even in the old town city centre and along heavily frequented streets. The territory of Vienna covers not only densely settled areas but also forests and parks with original natural conditions. Owing to this variability the city of Vienna is an area exhibiting an overall rich pseudoscorpion diversity including many rare species.

Poster presentation

New records of Pennsylvanian trigonotarbid arachnids from West Bohemia, Czech Republic

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Trigonotarbids are an extinct order of arachnids which ranged from the Upper Silurian (Přídolí) to the Lower Permian (Asselian). Sixty-five valid species are currently recoded in the literature and they occur most frequently in Pennsylvanian sediments in Europe and North America. Here they seem to represent one of the more common and abundant arachnid groups in Coal Measures ecosystems, their fossils regularly turning up at appropriate localities. Trigonotarbids are placed in the arachnid taxon Pantetrapulmonata as the sister-group of the orders Araneae (spiders), Amblypygi (whips spiders), Thelyphonida (whip scorpions), and Schizomida (schizomids). Most of the Pennsylvanian trigonotarbids have been found at classic Westphalian localities associated with coal mining districts, such as the Saar and Ruhr areas of Germany, Silesia in Poland, various sites such as Coseley in the English West Midlands associated with the British Middle Coal Measures, and Mazon Creek in the USA. Trigonotarbids are also well represented in the Coal Measures of central and western Bohemia in the Czech Republic. Fifteen currently valid species have been described so far from this area, although these are largely based on compression fossils which are prone to post-mortem alteration, e.g. shearing, stretching, truncation of body parts, etc. All three specimens described here were found among spoil deposits of the Týnec (formerly Masaryk or Austria 2) mine near the village of Týnec in West Bohemia, Czech Republic. In this mine bituminous coal of Pennsylvanian age was extracted between 1899 and 1965 from coal seams of the Radnice (Bolsovian) and Nýřany (Austrian) groups of the Kladno Formation. Two of which recorded specimens are incomplete opisthosomas assigned to Trigonotarbida incertae sedis. A third fossil was more complete and was described as *Tynecotarbus tichaveki* gen. et sp. nov. Its familial position is uncertain, but the presence of a weakly lobed carapace and finely tuberculate body ornament suggests affinities with the 'eophrynid assemblage'. Named was in honour of Mr. František Tichávek, who discovered the holotype and kindly made it available for study.

Poster presentation

Carboniferous arachnids in Czech Republic

Ivana Hradská

West Bohemian Museum, Plzeň, Czech Republic

In total, 37 carboniferous arachnid valid species from the Czech Republic were described. This number includes 15 species of Trigonotarbida, 11 species of Scorpiones, 8 species of Araneae, 2 species Phalangiotarbida and 1 species of Uropygi. The first carboniferous arachnid description from Bohemia were that of a scorpion, *Cyclophthalmus senior*, and a *Microlabis sterbergi* by Corda (1835, 1839). Note: *Microlabis* was originaly thought to be a pseudoscorpion. In the second part of nineteenth century, there was an increase in coal mining due to the industrial revolution, and new mines also meant an opportunity for new paleontological findings. Amongst these findings, there were many arachnids. Most of this material was collected and described by Prof. Dr. Antonín Frič (1882 – 1913) – a very important figure in mineralogy and paleontology not only nationally, but also worldwide. He was a professor at the Charles University in Prague and a currator of the paleontological collections in the Zemské Museum. Historically, the description of arachnids from Bohemia can be also found in Stur (1877), Kušta (1883, 1884), a number of them are presented in a great study by Petrunkevitch (1953) „Treatise on Invertebrate Paleontology", Přibyl (1958), and more recently in Opluštil (1985, 1986). A revision of some genera was done by Dunlop (1995a). The latest description of the new species *Tynecotarbus tichaveki* was done by Hradská and Dunlop (2013).

Poster presentation

Ancient roots, new places: First evidence of the presence of Cteniza sauvagesi in Southern Italy, supported by molecular data and ecological niche modeling

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The trap-door spider genus *Cteniza* is species-poor, ancient lineage mostly restricted to the western Mediterranean region. The species *Cteniza sauvagesi* (Rossi, 1788) has been recorded for Toscana, Sardinia and Sicily and *C. moggridgei* (Cambridge, 1874) has been reported in Liguria and SE France. A third species of doubtful taxonomic status, *C. brevidens* (Doleschall, 1871) is supposedly present in Sicily and Sardinia. Here, we provide the first evidence of the additional presence of Cteniza spiders in Southern continental Italy (Calabria). Comparative molecular analyses (cox1) conducted on the Calabrian material reveals a close relationship to the Corsican populations, type locality of *C. sauvagesi*, and rejects that new localities are the result of a recent introduction. Additionally, despite of the scarce and outdated available literature, morphological examination confirms the identification of the new material as *C. sauvagesi*. The occurrence of *Cteniza* in Calabria is further predicted by Ecological Niche Modelling techniques performed on available records. The Calabrian coast is identified as a highly suitable areas within the potential distribution range of the genus. Insights about the natural history of the species in Calabria are discussed, with special reference to the trapdoor architecture, the phenology and the food preference of the species.

Oral presentation

Vertically niched, conductor-less and sexual piercing: spiders from the Nat Ma Taung in Myanmar

Peter Jaeger

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The spider fauna of the Nat Ma Taung (Mt Victoria) in Myanmar was investigated during a two week field trip. At 3053 m it is considered the southern-most outpost of several faunal elements of the Himalaya. Spiders were found in vertical belts, i.e. tropical elements like *Argiope*, *Nephilengys*, *Cyrtophora* etc. have been found exclusively in lower elevations, in higher elevations species with adaptations to lower temperatures have been recorded. In two genera with representatives living in the leaf litter of forests, a vertical zonation was observed at elevations between 1500 m and the summit region. Five new species of the genus *Pseudopoda* (Sparassidae) were examined. Males of all five species lack the conductor, otherwise present in the subfamily Heteropodinae. One structure is discussed to act as functional substitute for the conductor. The genus *Ctenus* (Ctenidae) is known from three species, also vertically niched. Males possess an easily breakable tip of the RTA, which was found in one species penetrating the female's cuticle during the process of copulation. This is the first case of such damaging in the RTA-clade.

Oral presentation

Keeping up the morphology approach: remarkable new characters for the systematics of the Zodariidae (Araneae)

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Although there is a clear shift towards molecular characters for the delimitation of taxa and the establishment of their relationships, arguments based on morphological structures remain important, certainly above the species level. It is surprising that observation of morphological details by the means of a simple stereomicroscope, may still provide crucial characters that have been overlooked so far. It is evident that studies of the ultrastructure of somatic as well as of genitalic organs with the scanning electron microscope is even more productive in this respect. We here report on several new characters that can be used to delimit new genera, to re-establish synonymized taxa, or to corroborate the formerly doubtful inclusion of genera in a particular family. Among the spectacular new findings in the Zodariidae are the plug pit on the cymbium of some species, the first such structure that apparently produces a sticky matter to seal the epigyne via a gland clearly opening on the outside. We further illustrate the existence of dorsal abdominal glands and dorsal abdominal modifications in some males of a new genus and the discovery of a dual femoral organ. Probably the most remarkable observation is the existence of a dorsal tibial process on all legs in both sexes of all representatives of the Zodariidae. This structure provides a novel synapomorphy for the family, corroborating the inclusion of basal genera in it.

Student - Oral presentation

Reproductive role shapes task differentiation in a social spider

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The evolution of cooperative breeding is associated with reproductive conflict that results in reproductive skew and task differentiation. In eusocial insects this conflict is resolved through distinct division of labour, reproductive specialisation and sterile worker castes. Social spiders show cooperative breeding, reproductive skew and allo-maternal care where non-reproducing females forego reproduction to care for the offspring of their sisters. We investigated behavioural specialisation in mothers and allo-mothers in the cooperatively breeding spider, *Stegodyphus dumicola*. 334 boxes containing one or two reproducing females and 3 virgin allo-mothers, each individually marked, were observed daily for the participation of the spiders in caring for the egg sac. Additionally we recorded the identity of the first attacking spider during feeding trials. We found evidence for task differentiation. Allo-mothers engaged significantly more in prey attack, whereas mothers engaged more in egg sac care. Differentiation in foraging behaviour was apparent prior to the production of an egg sac within groups, suggesting that helpers may follow an early developmental trajectory. We present the hypothesis that non-reproducing allo-mothers in *Stegodyphus dumicola* may represent a worker caste that result from physiological and behavioural differentiation, comparable to workers in termites and bees but without morphologically specialised breeders.

Student - Oral presentation

What happens beneath the blanket? Insight into courtship and copulatory behaviour of wolf spiders of the genus *Alopecosa* (Araneae: Lycosidae).

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In this study, we examined courtship behaviour and copulation patterns of 12 species of central European members of the genus *Alopecosa*. A few remarks on ecology are also presented. Study of reproductive behaviour in spiders has recently focused on multimodal signaling. Multimodal signaling consists of a variety of signals or cues, which need to be coordinated to achieve the proper effect. Wolf spiders use acoustic, visual and chemical communication during courtship. First thing we have to realise is that wolf spiders are spiders with relatively keen sight, thus, visual signals play an important role during courtship behaviour, resulting in particularly contrasting colouration on males' front legs (*A. pulverulenta*). Sometimes even some excessive structures emerged, such as hair tufts (*A. barbipes*) or swellings (*A. cuneata*), all of that in order to emphasise visual signals towards females. Some exceptions are present in males of nocturnal species (*A. solitaria*), who usually lack any conspicuous colouration of legs I and II, and courtship is (probably convergently) reduced to quick vibrations of males' legs. On the other hand, an interesting variability in courtship behaviour was recorded in all diurnal species. The importance of copulation pattern is discussed. Duration of a copulation, number of palpal insertions and hematodochal expansions can be considered species specific, as they encounter enormous variability among species or species-groups. For example, duration of copulation ranges from three seconds to three hours, there are some species with only two palpal insertions, each of them accompanied with one hematodochal expansion, and opposite to them, there are species with around ten palpal insertions, each with ca. 20 hematodochal expansions! We have discovered that courtship pattern is usually conservative within morphology-based groups of species and we plan to look into relationships between central European *Alopecosa* species using molecular phylogeny. There is a significant interspecific variability in both courtship and copulatory behaviour, which obviously provides very useful tool for species delimitation and for recognising sibling or even cryptic species.

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Student - Oral presentation

An overview on the Croatian spider fauna

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The creation of the most comprehensive checklist of spider fauna of Croatia is ongoing and almost completed. Currently, 644 literature references, including grey literature, data from 19 museum collections (7 of which were visited by authors for redetermination of questionable and determination of unidentified material) and several unpublished records from CBSS (Croatian biospeleological society) and CARS (Croatian Arachnological Society – Narcis Damin) collections are analysed. The checklist is currentlycomprised of 19314 literature species records, 4831 museum records and several new records. It must be noted that Croatian Natural History Museum's collection from Zagreb, with more than 2400 spider records, is not yet included in the list. More than 2500 different locality names were recorded with more than 1500 unique localities. Around 6000 different taxa names were recorded with more than 790 valid species and subspecies, belonging to 44 families. 88 taxa were excluded from the list or marked as questionable. Analyses of research intensity through time, from 1774 till today, and general species distribution is finished. Composition of Croatian spider fauna was compared to the neighbouring countries. At the moment Fauna Europaea database lists 719 spider taxa for Croatia (Van Helsdingen 2015). With this work the total count will rise to almost 800 taxa, but the number is far from complete.

Poster presentation

On the spider genus *Agelena* Walckenaer, 1805 (Araneae, Agelenidae) in Turkey

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The funnel-weaver spider genus *Agelena* Walckenaer, 1805 includes currently 66 species in the world. Two *Agelena* species are known in Turkey: *Agelena labyrinthica* (Clerck, 1757) and *A. orientalis* C.L. Koch, 1837. These two species are known by their closely related morphological pattern and genital structures. Here, we provide all available information on these closely related Agelenid species with comments on their distribution pattern in Turkey. Additional descriptions of these two species are provided based on the newly collected specimens by the authors from the different regions of Turkey. Also, some characteristic features with photographs of genital structures and general habitus of both sexes are presented.

Oral presentation

Spiders associated with alfalfa in Hamedan, Iran

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Alfalfa is one most important crops in the Hamedan area and native to this area. Different arthropods were found in this ecosystem. Up to now more than 200 arthropods were collected and identified associated with alfalfa in phytophagous, predacious, pollination, parasitoids and saprophagous roles in the Hamedan area, of which the Araneae subclass is predacious and prey on different insects and mites in this ecosystems. Currently less is known of the spider fauna in this area. This study was conducted to determine spiders associated with alfalfa in the Hamedan vicinity, 2013. In order 10 families, 19 genera and 20 species of this area were collected and identified, and their scientific names as follows: Agelenidae: *Agelescape gideoni* Levy; Araneidae: *Aculepeira* sp., *Argiope aurantia* Lucas; Theridiidae: *Steatoda paykulliana* (Walckenaer), *Episinus truncatus* Latreille; Pisauridae: *Pisaura mirabilis* (Clerck); Oxyopidae: *Oxyopes iranicus* Esyunin, *Oxyopes lineatus* Latreille; Linyphiidae: *Microlinyphia pusilla* (Sundevall), Philodromidae: *Thanatus vulgaris* Simon; Pholcidae: *Pholcus alticeps* Spassky; Gnaphosidae: *Drassodes caspius* Ponomarev & Tsvetkov, *Drassodes charitonovi* Tuneva, *Micaria* sp., *Nomisia recepta* (Pavesi), *Zelotes longipes* (Koch); Thomisidae: *Thomisus* sp., *Xysticus ninnii* Thorell, *Xysticus striatipes* Koch; Lycosidae: *Pardosa agricola* (Thorell), *Pardosa proxima* (Koch), *Hogna radiata* (Latreille, 1817), *Hogna radiata* (Latreille, 1817). Among them *P. agricola*, *T. vulgaris*, *O. iranicus*, *S. paykulliana* were found abundantly and with a wide distribution.

Student - Poster presentation

Web modification in *Cyclosa fililineata* and *Cyclosa morretes*: evaluating role of host food deprivation and effect on parasitoid survival

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Infection by parasites or the consumption of tissues by parasitoids usually leads to several phenotype alterations in hosts, such as the expression of distinct behaviours or changes in life history. Some of these changes cannot be considered primarily due to the host's own responses, but are actively induced by parasites/parasitoids to manipulate the host so as to acquire some benefit in survivorship or dispersal ability. Field experiments investigating the effects of host behaviour alterations on parasitoid's survivorship, and the mechanisms involved in these changes, are scarce. Here we evaluated web design modification in the host spiders *Cyclosa fililineata* and *Cyclosa morretes* attacked respectively by polysphinctine ectoparasitoid wasps, *Polysphincta* nr. *purcelli* and *Polysphincta janzeni*. We tested whether web design changes (i) result from nutritional restrictions on the host, imposed by parasitoids, and (ii) increase the chance of emergence of the adult wasp. Further, we described the changes in web design along parasitoid larval development. Field observations and experimental manipulations were conducted at the Atlantic Rainforest, Brazil. To evaluate the changes in webs, we compared webs constructed by parasitized spiders of different larvae instars with webs constructed by unparasitized spiders. To evaluate if food deprivation could be responsible for web modifications, we collected unparasitised spiders and manipulate food availability. To evaluate the effects of modified webs on parasitoid survival, we divided marked spiders into two groups: the spiders of first group were removed from their webs and transferred to unmodified webs; spiders in the second group were removed from their original webs and placed into plastic vials for one minute, and then transferred back to the same modified web. For both spider species, web design modification occurred only in the third instar larva, at the night preceding the host spider death, and involved reduction in the number of spirals and radii. Feeding restriction did not produce web design modifications, suggesting that the observed changes in host behaviour resulted from direct action of the parasitoid larva on the host, and are not byproducts of nutritional deficiency. Modifications in web design reduced the frequency of web ruptures, assuring a higher frequency of adult emergence, and thus, increasing parasitoid survivorship. These results confirmed that web modifications are adaptive to the parasitoid wasps.

Student - Poster presentation

A first approach on the study of the arachnofauna in the Dadia National Park, in North-East Greece: a taxonomic and biogeographic analysis

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This study presents the results of research conducted in 2008, 2009, and 2011 on the spider fauna of the National Park of Dadia Forest. Dadia Forest is a protected area of great faunistic and biogeographical interest located on the southeastern-most parts of Rhodopi Mountain Range in northeast Greece, near the border with Turkey. In total 141 species from 25 families were recorded. Seven of them represent new species for science and eight species are new records for the spider fauna of Greece. According to their distributions, the established 141 species can be classified into 23 zoogeographical categories, grouped into four chorological complexes (widely distributed, European, Mediterranean and Endemic). The relatively high number of chorotypes (23) can be explained by the fact that this area is situated in the transition zone of the European, Mediterranean and the Pontic biogeographical regions. The zoogeographical distribution shows that the complex of widely distributed species (31.9 %) and Mediterranean complex (31.2 %) are well represented. European species (19.8 %) and Endemics (9.92 %) emphasise the local character of this fauna. The occurrence of some species interesting from taxonomic and zoogeographic points

Oral presentation

The Ausobsky-harvestman-collection – A unique window into the past

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We arachnologists like to dig into old collections. Looking backwards into the past we are able to solve taxonomical, faunistical and zoogeographical riddles of the present. Ecologists usually don´t do this. The reason is simple: historical data concerning habitats, collecting sites and circumstances are normally quite poor. The harvestman collection of the Austrian researcher Albert Ausobsky is different. The geographical and ecological framework conditions of the 2,800 investigated localities are painstakingly documented. Considering the part containing the Austrian material, the Ausobsky-collection comprises 17,000 specimens belonging to 7,350 series. The majority of the material was collected from the years 1964 to 1971 in the federal country of Salzburg. Older parts of the collection date from 1927 onwards (coll. L. Schüller). Collecting methods were mainly by hand and soil sifting. Our goal was to digitalise Ausobsky´s data and to revise the material. In Salzburg 38 harvestman species, belonging to 6 families, were recorded. The most abundantly collected species was *Mitopus morio*, followed by *Nemastoma triste* and *Leiobunum limbatum*. Austrian endemic species are the two litter-inhabiting taxa *Nemastoma bidentatum relictum* and *N. schuelleri*. Remarkable is the record of the thermophilic phalangiid *Lacinius horridus*, reaching in the Lungau its western border of distribution within the Alps. The alien species *Opilio canestrinii*, nowadays widespread in urban areas, is missing in the early years of this arachnological mapping. Instead, on the walls of buildings the invasive synanthropic species *Opilio parietinus* was common. Furthermore, a way of using harvestmen for European Union nature conservation management is presented: stenotopic harvestman species can be used as bioindicators for evaluating the good state of preservation of FFH-habitat types. These outstanding data from Albert Ausobsky had already been integrated into Jochen Martens´ standard work from 1978, and they would be a perfect basis for long-time-biodiversity-monitoring. It would be worthwhile to investigate faunal change due to human impacts on habitats and climate change, as well as the effectivity of nature conservation actions.

Poster presentation

Pholcus phalangioides in Finland (Araneae, Pholcidae)

Seppo Koponen

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The invasive, indoor living *Pholcus phalangioides* (Fuesslin, 1775) is increasing and widening its range in Finland. The first observation was recorded in the Botanical Garden of the University of Turku in 1999, and four localities were reported near Helsinki in 2000-2001. Now there are about 50 observations, most of them from southwestern parts of Finland, the northernmost being at 63° 40′ N. Many populations are well-established and have lived in the same buildings for many years, two of them at least for 15 years.

Oral presentation

First oligophagy in the true spider parasitoids (Ichneumonidae, Ephialtini, *Polysphincta* group) and the plasticity in host utilisation

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Polysphinctine parasitoids adapted perfectly to a particular spider host species by many phenomode traits including behavioural manipulation of their hosts. Their host utilisation evolved in interaction with host spider behaviour in long co-evolution and resulted in locked specialisation on a specific host and, consequently, the loss of plasticity in host utilisation behaviour. Pupal stage is a critical period in development of polysphinctine koinobiont ectoparasitoids, when the spider host protecting larva during the larval stage is already dead. Therefore the final instar larva induces in the spider the production of a unique 'cocoon web', which serves as safe shelter for wasp's pupa. Architecture of the cocoon web is known to be species specific and is a result of both the parasitoid's manipulation of chemicals and the host's life history (spider webbing behaviour). The host utilisation and the host manipulation of the Australian spider parasitoid *Zatypota kauros* was investigated in the field and the laboratory in Brisbane (Queensland, Australia). *Zatypota kauros* was the first to show oligophagy within polysphinctines. Wasp attacked spiders were from three foraging guilds (orb webs, tent webs, and tangle webs) belonging to three different families (Araneidae, Nephilidae and Theridiidae). In contrast to knowledge on other polyspinctines, *Z. kauros* has shown plasticity in host utilisation of taxonomically varied spiders when induced alteration of spider web architecture was fine-tuned following the life history of a particular spider host taxon. The wide spectrum of suitable hosts occurring in different season periods, the parasitoid's ability to shift the host and the absence of possible polysphinctine wasp competitors in environment with no meteorological extremes during most of year in Queensland (warm winter, no extremes in summer) gave us the hypothesis that *Z. kauros* fine-tuned several traits of its life history to maximise the fitness in these specific conditions and evolved to be oligophagous, producing several broods in one year.

Oral presentation

Effect of canopy openness on distribution of epigeal spider communities in former coppiced oak forest stands with implications on forest management

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In historical times coppicing used to be the main method of traditional forest management of lowland deciduous woodlands. This management combined with traditional small scale land ownership and fast wood harvest rotation produced many varied habitat structures with diverse light conditions and strong responses of forest species as well as of xeric specialised invertebrates. However, coppicing declined rapidly during the 20th century due to the forest transformation into shady high forests without any active management. These factors resulted in the overall loss of woodland biodiversity in the modern landscape of Central Europe. An important question is whether even small-scale habitat structures, maintained by different levels of canopy openness, may constitute suitable conditions for forest as well as for an open habitat specialist. Here, we investigated the effect of canopy openness in former coppiced woodlands on species richness, functional diversity, abundance, conservation value and degree of rareness of epigaeic spiders. We established transects, 60 meters long, reflecting the gradient of canopy openness in each forest stand. Transects consisted of 5 regularly placed pitfall traps. Spiders were collected from May to July 2012. We recorded 90 spider species with high proportions of rare xeric specialists (40 %) and a moderate proportion of red-listed threatened species (8 %). The peaks of conservation indicators, as well as the abundance of the spider community, shifted towards more open canopy. The peak of functional diversity shifted to more closed canopies. Species richness was highest in the middle of the gradient of canopy openness, suggesting the ecotone effect. Ordinations revealed that species of conservation concern tended to be associated with sparse and open canopy in every studied location. The results suggest that a considerable proportion of epigaeic spiders, including many species of conservation importance, dependon the preservation of the sparse and open conditions, connected with small scale patches of dense canopy. Restoration and suitable forest management of such conditions (expansion of coppice management on the scale of former land ownership) will retain important diversification of microhabitats in former coppiced oak forest stands. These improvements could be suitable conservation tools to prevent the general decline of woodland biodiversity in the intensified landscape of Central Europe.

The study was supported by the IGA LDF (Reg. No. LDF_VT_2015012/2015).

Poster presentation

Toxicity effect of a crude extract of *Embelia ribes* and two commercial pesticides on mortality and foraging behaviour of a potential biocontrol agent *Oxyopes lineatipes*

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Chemical control by synthetic pesticides still remains a major strategy to control pests in integrated pest management (IPM), in spite of the serious side-effects on non-target organisms, including humans. Prior to being included in IPM, the side effects of potential new natural products on non-target organisms should be evaluated. The crude extracts of dry *Embelia ribes* leaf, by fixed-bed contacting method with hexane, were evaluated together with two commercial pesticides: azadirachtin (another natural product) and amidine (a synthetic acaricide). A potential natural biocontrol agent, the lynx spider *Oxyopes lineatipes*, served as a non-target organism. First, the effects of various concentrations of all three chemicals on mortality under several concentration levels were evaluated in order to find the mean lethal concentrations (LC_{50}). Further, the influence of both the natural products on the functional response of *O. lineatipes* in laboratory conditions was explored. In this case, spiders were exposed to 0.000125 % w/v of azadirachtin (the recommended field spraying concentration) and 0.75 % w/v of *E. ribes* crude extract (almost double dose of the mean effective concentration (EC_{50}) of *E. ribes* for broad mites). The pesticides were applied by direct spraying. Mortality increased with rising concentrations of both commercial pesticides. Mortality did not change with increasing concentrations of the *E. ribes* crude extract since the extract could not dissolve completely at concentrations of 2 % w/v or more. Azadirachtin significantly lowered the functional response of *O. lineatipes* while there was no significant difference in functional responses of spiders from the control and *E. ribes* treatments. The results show that the studied biopesticides had much lower or no significant effect on *O. lineatipes* in comparison to the commonly used synthetic acaricide. The plant extract from *E. ribes* seems to be a new suitable biopesticide, due to the absence of a negative impact on the mortality and foraging behaviour of *O. lineatipes*. On the other hand, azadirachtin that is considered as safe for non-target organisms exerted negative sublethal effects, such as disturbed foraging ability and reduced predatory capacity in recommended doses.

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Poster presentation

First record of the widow spider *Latrodectus elegans* Thorell, 1898 (Araneae, Theridiidae) from Indochina

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The genus *Latrodectus* Walckenaer, 1805 contains 31 described species and belongs to the large family Theridiidae Sundevall, 1833. Almost all species are of medical significance and may cause painful bites with serious intoxication. Only three species (*L. elegans*, *L. geometricus*, and *L. hasseltii*) are known to occur in Southeast Asia, especially in Myanmar, Thailand, Philippines, Indonesia and New Guinea. So far no *Latrodectus* species have been reported from the Indochina. Here, we present the first finding of *Latrodectus elegans* Thorell, 1898 in Vung Tau Province (Bihn Chau District) located in the southern part of Vietnam territory. This species was previously recorded only from the Oriental regions of continental China, India, Myanmar and Japan. Our discovery represents not only the first record from the Indochinese region but also the southernmost point of this species geographical range. Specimens were collected from sandy open habitats along the road and path cuts on the edge of dry dipterocarp forest. Dry conditions seem to be preferred. Five adult females and three adult males were collected. The morphometric characters of the recorded specimens are described, discussed and compared with specimens from other regions in Asia. We conclude that this report is a significant contribution to the araneofauna of Vietnam and the Indochina due to the medical importance of *Latrodectus* spiders. More findings of *L. elegans* from dry places such as sand dunes and dry tropical open forests across Southeast Asia can be expected.

Student - Oral presentation

Karyotype evolution of the pseudoscorpion genus *Chthonius* (Arachnida: Pseudoscorpiones) in the Alps inferred from molecular data

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The genus *Chthonius* belongs to the worldwidely distributed family Chthoniidae, which is one of the most diversified groups of pseudoscorpions. This family comprises more than 650 species classified in 28 genera. The representatives of this family are sedentary and commonly found in the leaf litter and upper layers of soil, but many species adapted to the cave environment or show some degree of synanthropy. The genus *Chthonius* is divided into five subgenera and with more than 260 species and subspecies and belongs among the most diversified pseudoscorpion groups. The systematics of this genus is very challenging due to very small body size (usually under 2 mm) and rather uniform external morphology in closely related taxa. Currently, 44 species of the genus *Chthonius* are know from the Alps, of which roughly half are local endemics. However, given the challenges that morphology based taxonomy faces in this particular group, a large portion of the diversity may still remain unknown. In this study we combine traditional morphology with both cytogenetic methods and molecular data in order to detect potential cryptic diversity within *Chthonius* and determine the type of the chromosomal rearrangements that played an important role in the diversification of the genus. Our results indicate variation in chromosome number in closely related species in both the analysed subgenera *Ephippiochthonius* and *Chthonius*, while the common type of chromosomal rearrangements in the karyotype evolution of this group are particularly the centric fusions. These rearrangements lead to the reduction in the number of chromosomes and their significant size differentiation within the karyotype, which may often play a key role in the reproductive isolation mechanisms and the speciation process.

Student - Oral presentation

Comparison of overwinterings in two harvestman species (Arachnida: Opiliones) in subterranean habitats

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Two phalangiid species, *Amilenus aurantiacus* (Simon, 1881) and *Gyas annulatus* (Olivier, 1791) (Opiliones, Phalangiidae), spend their winter dormancy in large numbers in subterranean habitats. In caves they rest on the walls and ceilings of the entrance sections. Both are considered trogloxenes, or the latter are sometimes classified as troglophiles. They both overwinter in gregarious formations and in this respect utilise similar strategies. For this reason, we compared various aspects of their hypogean ecophases to find similarities and differences between these species. For this purpose, literature, data and field research were combined. For preliminary field observations on gregariousness in *A. aurantiacus*, we used a night-vision, hand-held video camera. Particular ecological, physiological, behavioural and cytological aspects are considered in order to provide as holistic as possible a comparison of the two species during overwintering. Both harvestmen enter caves after the first autumn frost. While *A. aurantiacus* select the warmest available places in deeper cave sections, *G. annulatus* prefer relatively cold microhabitats located close above water currents near cave entrances. Heat and air movement disturb both individuals, while light may not. In winter *A. aurantiacus* exhibit low freezing tolerance, while *G. annulatus* possess no freezing tolerance. Although both are gregarious they differ in many points of consideration. *Amilenus aurantiacus* groups consist of up to 400 individuals, while juvenile *G. annulatus* have been found in aggregations of up to 50 individuals. In both species, overwintering individuals overlap their legs to form a network, which maximises the sensation of any important disturbance within the group. Prevalently, *A. aurantiacus* uses lipids and *G. annulatus* glycogen as energy reserve substances. In both species, the epithelium of the midgut diverticula consists of secretory, digestive and excretory cells, while in accordance with the use of lipids, adipocytes appear only in *A. aurantiacus*. In both species, autophagic activity intensifies during overwintering. In this comparison of two overwintering phalangiid species, we show that they share some features of their hypogean ecophases, but that differ they conspicuously in others. The ecological and ethological characteristics constitute one group of features, and the physiological and the cytological properties form another relatively congruent group.

Student - Poster presentation

New method for sampling soil arachnids

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Arthropods dwelling in litter and in the upper, organic soil horizon are cryptic, hiding between soil particles and below and behind shelter objects, like wood and stones. They variously respond to threats; many apply camouflage, cryptic mimesis, and when uncovered, some respond with a specific behaviour, thanatosis, i.e. death feigning. Some soil arthropods practice mimesis, which refers to resemblance to and simulation of being a non-living object. Thanatotic and mimetic arachnids are many Acari, Araneae, Opiliones, Palpigradi, Pseudoscorpiones, Ricinulei and Scorpiones. Two methods – litter and soil sifting (sieving) and, for smaller arthropods, Tullgren funnel extraction – are generally used for sampling terrestrial soil-dwelling arthropods. In the field, sifting is efficacious on hot, sunny and calm days, when the solar heat and light force animals to relocate quickly. In contrast, in cold, cloudy weather, individuals of particular species can remain immobile even for hours. However, sampling can be carried out in cloudy and moderately windy weather for treatment in the laboratory. Here we present such a combined method. For field sampling, a sieve of 25-40 cm in diameter with a mesh size of 0.5-2.0 cm seems to be optimal for most arachnids. For samples, plastic bags and a bungee cord with hooks for rapid fastening of a bag to the sieve are suggested. In the laboratory, the samples are strewed in thin layer over a white blanket or directly into a white lab tray and heated with a hand-held, heat-emitting electric light. This triggers animals to start to move very soon, fleeing from the heat, which inspired us to call this method hot dancing. The hot dancing method could be helpful in many situations for planning more continuous and/or time-proportionate field sampling of thanatotic and especially soil-mimetic arachnids and other arthropods. This is particularly important in ecological and nature conservation studies and monitoring.

Student - Poster presentation

The detailed description of three species from the genus *Lasiochernes* Beier, 1932 (Pseudoscorpiones: Chernetidae)

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Until now, ten species of the genus *Lasiochernes* have been recorded. The majority of them are rare and they are usually collected in nests of small mammals and in caves. The genus is characterised by presence of long tactile seta on pedal tarsus IV, presence of pair of long tactile setae on tergite XI, male palpal segments bear long and dense setation and T-shaped spermatheca are present in females. The aim of our study was to describe in detail the species *Lasiochernes cretonatus* Henderickx, 1998, *L.* cf. *jonicus* (Beier, 1929) and *L. pilosus* (Ellingsen, 1910). Before our research, the description of the species *L. cretonatus* was based only on a single male specimen and *L. jonicus* was described poorly, based on several adults. We examined one male and four females of *L. cretonatus* found in the Cave of 99 Holy Fathers, Crete, Greece (35° 16′ 22″ N, 23° 42′ 39″ E) and one male and one female of *L. jonicus* from Tsouka cave, Mouresi, Pelion, Greece (39° 23′ 52″ N, 23° 10′ 12″ E). We added the complete description of missing morphological characters of both species; the female of *L. cretonatus* was described for the first time. *L. pilosus* is distributed in western, southwestern and partially in Central Europe. It is host-specific, since it is exclusively found in subterranean mole-nests with a particular content of dead leaves. Incomplete description of adults, based only on a few specimens poorly reflecting intraspecific variability, and missing description of nymphs were published until now. During our research five males, seven females, 15 protonymphs, 15 deutonymphs and 15 tritonymphs were studied; they were collected in mole-nests in Borinka, Slovakia (48° 15′ 44″ N, 17° 05′ 10″ E) and in Hastière, Belgium (50° 13′ 10″ N, 4° 50′ 12″ E). The analysis of material has updated the known variability of morphological characters. Some characters were described for the first time (chaetotaxy of carapace, tergites, sternites, anterior and posterior genital operculum; complete teeth numbers on palps) and the description of nymphs was elaborated for the first time as well. Multivariate morphometric techniques (principal component analysis, discriminant analyses) were employed to assess the extent of differentiation among particular species and/or nymphs and to identify the most important differentiating characters.

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Oral presentation

Evolution of sex chromosomes in spiders

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Spiders are an interesting model to study sex chromosomes. Most entelegynes exhibit an X_1X_20 system, which is regarded as an ancestral spider trait. Its origin is unknown. The prevailing hypothesis suggests that X_1X_20 mode arose by a non-disjunction of a single ancestral X chromosome followed by structural differentiation of a new copy. Entelegynes and mygalomorphs often exhibit derived systems with more than two X chromosomes. These systems could also arise by differentiation of X chromosome copies. Sex chromosomes of some mygalomorphs comprising up to 13 X elements belong to the most complex sex chromosome systems found so far. Other spider systems include the X0 mode resulting from X chromosome fusions and neo-sex chromosomes originated by X-autosome rearrangements. The latter mechanism could also form the ancient X_1X_2Y system, which is a common feature of several haplogyne clades. Our data support the emergence of sex chromosome copies during spider evolution and their integration into the genome. Furthermore, our information suggests that spider sex chromosome systems are more complex than previously thought. Besides X chromosomes, they also include a specific sex chromosome pair (SCP). The lack of morphological differentiation indicates that the SCP differentiated only on a molecular level with one chromosome acting as a proto-X and the other one as a proto-Y. We suppose that ancestral spider sex chromosomes have been formed by the SCP; multiple X chromosomes have evolved by non-disjunctions of the X chromosome of the SCP. Notably, many mygalomorphs exhibit two SCPs. Similar morphology of these pairs and their unique spermatogonial pairing indicate that the second SCP originated by duplication of an ancestral pair. Surprisingly, we found unique germline behaviour of sex chromosomes also in spider females (i.e. in the homogametic sex). In all organisms studied so far, sex chromosomes of the homogametic sex show the same meiotic behaviour as autosomes. However, multiple X chromosomes of spider females are inactivated at prophase I. This finding supports a hypothesis suggesting the origin of multiple X chromosomes by differentiation of X chromosome copies. Meiotic inactivation of X chromosomes in spider females can suppress pairing and recombination of homeologous X chromosomes (i.e. X chromosomes belonging to different X chromosome pairs).

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Oral presentation

The effect of nutrition over ontogeny on sexual cannibalism and reproductive success in raft spiders

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Sexual cannibalism, where females attack, kill and consume males before, during or after copulation, has been explained by four non-mutually exclusive factors: failing recognition of a potential mate; mate choice, where females attack unwanted mates; hunger, when females benefit from the energy and nutrient intake by consuming the males (adaptive foraging hypothesis); or genetic constraints (aggressive spillover hypothesis). While our prior work on *Dolomedes fimbriatus* failed to support the aggressive spillover hypothesis, we showed that females adjusted their tendency to attack courting males according to her size relative to the male. Females commonly attacked males during/after copulation, but cannibalism depended on relative mate size difference, with mating success compromised in females with lower body mass. Adult body mass and female fecundity are often related to nutrition over ontogeny. Several studies report that by consuming conspecifics females benefit from a higher nutrition value (compared with other prey), which may translate to increased adult body weight/condition, fecundity, and consequent reproductive success. Here we report on our ongoing study that tests how different feeding regimes during ontogeny impact female adult mass, inter-sexual interactions and reproductive success in *D. fimbriatus*. We collected juveniles and subjected them to three feeding regimes, where they received similar amounts of food, but of different qualities: control 1, where we fed spiders with flies; control 2, where spiders were fed with flies, mealworms and crickets; and experiment, where spiders were fed with smaller conspecifics, mealworms and flies. When adult, females were weighed and subjected to two mating trials. Our preliminary analyses found no differences in female adult mass and inter-sexual interactions among the feeding regimes. If these results persist in more trials, they will not support the nutritional benefits of cannibalism in *D. fimbriatus*.

Student - Poster presentation

Female genital morphology and sperm storage in the velvet spider *Eresus kollari* (Araneae: Eresidae)

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In the present study, we examined the female genital system of a velvet spider (*Eresus kollari*) using light and electron microscopy. The female entelegyne genitalia of *E. kollari* comprises an epigyne with an anterior wide longitudinal bar and folds which are incurvated sidewards. The anterior end of these folds corresponds to enlarged anterior bulges, which are connected to a distinct copulatory duct leading to lobular spermathecae. The anterior bulge is equipped with many large pores whereas the spermathecae has many small pores. At present, only a few studies focused on the ultrastructure and possible function of adjacent epithelia in entelegyne genitalia of spiders revealing the presence of complex class 3 gland cells units around the spermathecae and ducts. Alternatively our analysis finds two different types of epithelia. The anterior bulge is equipped with class 3 gland cells whereas the spermathecae are surrounded by a putative transport epithelium. This epithelium is characterised by an extensive basal labyrinth, numerous mitochondria, and an invaginated cell apex with microvilli. The functions of the different parts are dubious, but the secretion produced by the class 3 cell glands in the anterior bulge could be involved in the transport of sperm by flushing a considerable quantity of secretion towards posterior. Alternatively, it could also contribute to the amorphous mass, which is formed during mating covering most of the epigyne. On the other hand, the epithelium around the spermathecae might only be involved in the alteration of the milieu in the spermathecal lumen but not contribute to the nutrition of spermatozoa during sperm storage.

Poster presentation

Notes on the occurrence of the wolf spiders (Araneae: Lycosidae) in Sardinia

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Several collections of wolf spiders were carried out on the island of Sardinia in 2003, 2004, and 2008. In 2003, 17 species of wolf spiders were found. Our attention was focused on the occurrence of the genus *Lycosa* Latreille, 1804 in the other two years. A total number of 8 nymphs of this genus had been obtained but only one was reared into adulthood. The island of Sardinia is situated in the western Mediterranean and its fauna has certain specifics. From the western Mediterranean Lycosa species mentioned in the molecular study of Planas *et al*. (2013), only two of them, *Lycosa oculata* Simon, 1876 and *Lycosa munieri* Simon, 1876, occur also in Sardinia. Both of these species occur in northern Africa (Tunisia) as well. Our *Lycosa* female differs from both these species. In addition to that, it showed the signs of eastern Mediterranean species from the group of *Lycosa praegrandis* sensu Zyuzin & Logunov (2000), whose occurrence reaches to the east border of Greece.

Oral presentation

Intersexual genital complexity and coevolving mating rates

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The extraordinary diversity of male and female genitalia is thought to derive, in part, from sexual conflict over polyandry, where particular features of the genitalia of one sex function to manipulate mating frequency against the interest of the other sex. The reported co-evolution of increasingly complex genitalia across species in several taxonomic groups is consistent with this view, but the crucial links with male and female mating frequencies remain untested. Here, we combine morphological, phylogenetic and experimental data to test for patterns of male and female coevolution in genital complexity and mating rates in nephilid spiders, renowned for their extreme sexual size dimorphism. In nephilid spiders, the evolution toward complex male genitals is thought to facilitate genital plugging and, in turn, plugging allows males to enforce monandry. Phylogenetically independent contrasts analyses reveal a strong, positive correlation between male and female genital complexity. Significantly, comparative tests reveal that while female and male multiple matings are associated with simpler male genitals, only male mating rates are associated with female genital morphology. Our study finds patterns distinct from those in insects where increased male genital divergence is associated with polyandry. In addition, spider genital complexity and mating rates have evolved largely independently of sexual size dimorphism, despite the positive correlation between male mating rate and female size.

Poster presentation

Integrative taxonomy of the primitively segmented spider genus *Ganthela* (Araneae: Mesothelae: Liphistiidae) – DNA barcoding gap agrees with morphology

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Species delimitation is difficult in taxa whose morphological characters are poorly known due to rarity of adult morphs or sexes, and in cryptic species. In primitively segmented spiders, family Liphistiidae, males are often unknown, and female genital morphology — usually species specific in spiders — exhibits considerable intraspecific variation. Here, we report on an integrative taxonomic study of the liphistiid genus *Ganthela* Xu & Kuntner, 2015, endemic to southeast China, where males are only available for two of the seven morphological species (two known and five undescribed). We obtained DNA barcodes (cytochrome c oxidase subunit I gene) for 51 originally collected specimens of six morphological species and analysed them using five species delimitation methods: DNA barcoding gap, species delimitation plugin (P ID(Liberal)), automatic barcode gap discovery (ABGD), generalised mixed Yule-coalescent model (GMYC), and statistics parsimony (SP). While the first three agreed with morphology, GMYC and SP indicate several additional species. We used the consensus results to delimit and diagnose six *Ganthela* species, which in addition to the type *G. yundingensis* Xu, 2015, completes the genus revision. Although multi-locus phylogenetic approaches may be needed for complex taxonomic delimitations, our results indicate that even single locus analyses based on the CO1 barcodes, if integrated with morphological and geographical data, may provide sufficiently reliable species delimitation.

Oral presentation

Flexible use of complex copulatory organs in a dwarf spider

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Animals with internal fertilisation are characterised by complex male genitalia which are useful taxonomic characters in many species. Complex genitalia have been considered to result in a lock-and-key situation during mating that serves to avoid interspecific matings. Entelegyne spiders typically possess paired male and female genitalia. It was taken for granted that the genital complexity restricts usage of each male pedipalp to a specific female genital opening. Here, we report cases of flexible pedipalp insertion in the dwarf spider *Oedothorax retusus*. Our data demonstrate that flexible use of paired and complex male copulatory organs is possible, questioning the general assumption of a fixed insertion pattern. The flexible insertion mode seems to entail a high selective advantage, since it allows the male to react to female mating history by circumventing the highly effective mating plug and mating into the unused female genital opening. Our findings disagree with the species isolating lock-and-key hypothesis for explaining divergence in genital morphology since the "key" can be applied to the mirror-inversed female "lock" in the spider species *O. retusus*. Rather, our data suggest that sexual selection has been the underlying selective regime for the evolution of highly complex and diverse genitalia.

Student - Oral presentation

Two species or just one? DNA barcoding fails in *Enoplognatha* spp.

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Enoplognatha ovata and *E. latimana* are considered two well separated species in Europe, they can be easily identified by means of genital morphology and they also differ in their habitat preferences and phenology. We test the widely used CO1 barcoding approach for species separation with inclusion of nuclear markers (ITS2, 28S, and H3). All markers failed to identify the species; this could be due to incomplete or recent speciation. In addition we performed a *Wolbachia* screening of both species from different populations across Europe. Roughly one third of individuals of both species were infected by *Wolbachia* endosymbionts. These bacteria have been considered to distort the barcode gap between species, e.g by promoting introgressive hybridization and horizontal gene transfer. These findings could explain the shared CO1 haplotypes across species and countries.

Student - Oral presentation

Taxonomic study of *Oedothorax*, a hopeful dwarf spider genus for investigating the evolution of sexual dimorphic male head structures

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Previous studies have shown that the dimorphic cephalic structures in dwarf spiders are related to nuptial gift secretion. In most dwarf spider genera there is little intrageneric variation among these structures. On the contrary, *Oedothorax*, which has both species with elaborated hunches, sulci, pits and grooves and species without them, thus lends itself in particular for investigating the evolutionary history of dimorphic head structures. We have searched for suitable outgroups and verified their close relationships with *Oedothorax* by phylogenetic analysis, and will infer the interspecific relationships of 37 of 66 described *Oedothorax* species. Our results will shed light on the evolutionary pattern of dimorphic structures in these spiders, and also provide a refined, phylogenetic classification of species currently recognised as *Oedothorax*.

Student - Oral presentation

Is prey-capture efficiency innate or gained by experience in a specialised spider?

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Prey-specialised predators are expected to possess increased efficiency in various adaptations to handle preferred prey. *Euryopis episinoides* (Theridiidae) is an ant-eating spider species which readily accepts other prey types, such as termites and fruit flies. In this study we explored if increased efficiency on ants is innate in *E. episinoides* spiders or if it can be acquired during its lifetime by experience with particular prey. We performed laboratory experiments in which we reared *E. episinoides* spiders from the first instar on two different monotypic diets: ants and fruit flies. We raised them until 3rd instar and then offered to each individual successively both an ant and a fruit fly as a prey and observed predatory behaviour in detail. In particular, we recorded the latency until the first attack, total handling time, duration of prey wrapping, waiting until paralysis and number of bites the spider used to subdue prey. We found that spiders attacked the prey they were familiar with much more quickly than the prey which was novel to them, suggesting formation of the search image for prey they were raised on. The prey capture of two prey types depended on the diet the spider was raised on. Spiders reared on fruit flies handled ants for much longer time than fruit flies, whereas spiders reared on ants handled ants as long as fruit flies. In particular, spiders on fruit fly diet wrapped ants for a longer time, waited longer for paralysis and used more bites to subdue ants. Compared to that, spiders on ant diet wrapped fruit flies only slightly longer, waited shorter for the paralysis and used fewer bites than when handling ants. These results indicate that spiders learned to handle the prey they were familiar with more effectively than alternative novel prey.

Student - Poster presentation

Investigating relationships of body and genital size evolution in nephilid spiders

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Genitalia in animals with internal fertilisation exhibit diverse morphologies and sizes, both of which relate to mating biology. Documenting and understanding the variation in these traits, both at intra- and interspecific levels, may be informative of evolutionary interplay of sizes, shapes and functions. Considering the vast diversity of body sizes, genital morphologies, and mating behaviours, spiders are well suited for research integrating functional morphology with behavioural ecology. In the most extremely sexually size dimorphic spiders, nephilids, male and female mating rates have recently been shown to strongly correlate with genital complexity, but only poorly with body size. It is unknown, however, how genital size may fit into this coevolutionary picture. To fill this gap, we examine genital size evolution in six selected species that differ in levels of sexual size dimorphism and represent genus-level clades on nephilid phylogeny. The first aim of this study is defining standard indices of genital size for nephilid spiders. We will then use these indices in a comparative framework to test whether the evolution of genital size is correlated to the evolution of body size and genital complexity. We will test for correlation of genital size dimorphism and sexual size dimorphism. Ultimately, our study aims to test the assumption that sexual selection drives genital size evolution.

Poster presentation

Distribution of spiders and harvestman on tree trunks in town and forest

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Trees are important microhabitats for arachnids – special microclimatic and structural conditions develop in the cracks of bark and hollows. Furthermore, a certain number of insects lives on the bark, which serves as prey for the predators living on or under the bark and thus offer the possibility of constant colonisation. This study is focused on the comparative distribution of spiders and harvestman on tree trunks in a town and a forest and comparison of the efficiency of three sampling methods. The research was done on the trunks of three different species of deciduous trees (linden, oak, maple) in the town of Přerov in Central Moravia and the floodplain forest near the Bečva River in the Czech Republic. Spiders and harvestmen were caught using the specific pitfall traps on a tree trunk with a solution of salt, by sticky traps and from cardboard pockets. Altogether, 90 traps (equally in the forest and the city) were used, 30 per each method. Traps were placed on the tree trunk at a height of 4 m and were exposed from May to October 2013. The traps were checkedeach month. Data were analysed by Canoco for the following factors: locality, tree species, bark structure, the circumference of the trunk. Overall, 1830 spiders and 858 harvestmen were trapped, represented by 55 spider species and eight harvestman species. The spiders *Anyphaena accentuata*, *Clubiona pallidula* and the harvestman *Rilaena triangularis* were eudominant in both localities (town and forest). Seventeen spider species and one harvestman occurred in the town exclusively, whereas 15 spider species and three harvestman species were presented in the forest exclusively. The most species of spiders and harvestmen were found on oak. The most effective method for collecting spider specimens was the cardboard pockets method, especially in autumn (September to October); it suggests high numbers of spiders overwintering on the tree bark. Nevertheless, the highest species diversity of spiders was found in pitfall traps, evaluated as the most effective method for the collecting of harvestmen, too. Three variables (the location, the type of trap and the trunk circumference) had a significant effect on abundances of spiders and harvestmen species.

Student - Oral presentation

Antimicrobial defense of *L. geometricus* eggs

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Antibiotic resistance is now one of the most pressing global healthcare problems facing society. The growing challenge of microbial resistance emphasises the importance of novel antibiotics or new assemblies for old ones. Arthropods represent more than 80 % of all animal species. Their eggs are a rich source of nutrients for the developing embryo, making them a favourite food source for other organisms. The presence of protective factors in the egg stage is essential to prevent infections, assuring the completion of embryo development. Various types of molecules are known as antimicrobial agents in invertebrate eggs, among them indole derivatives, free fatty acids and proteins. The Brown Widow spider *Latrodectus geometricus* (Theridiidae) has been selected as a model organism in the current study in order to examine the antimicrobial activities carried out by the eggs to protect the developing embryos. Preliminary results showed significant antibacterial activities of the whole eggs against various Gram-positive and Gram-negative species. Egg homogenate exhibited strong inhibition against Gram-negative bacteria as well. This study is the first step toward the identification of the antimicrobial agents protecting *L. geometricus* eggs, their origin, their antimicrobial spectrum and their mode of action.

Oral presentation

Protocols in, data out: why do we need standardised and optimised sampling of communities?

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Maximising resources is critical when conducting field data collection – how much we can do depends on the how much funding, time and human power we have. This is especially so when sampling mega-diverse invertebrate communities in ecosystems such as tropical forests or Mediterranean ecosystems. Indeed, how we collect also depends on the specific objectives of our study. So very specific sampling protocols and designs may prevent obtained data from being re-used for other purposes. Here we will present our recently developed protocol for sampling spider communities in tropical forests. Named Tropical Forest COBRA, after the protocol originally designed for Mediterranean forests, it combines samples of different methods in a way that a) it provides the best possible picture of the community (optimised), in this case an extremely diverse one, and b) it allows for comparison across sites (standardised). With the same effort, the collectors can obtain both a rigorous list of species and relative abundance data. Therefore, the resulting data may have multiples uses, such as biodiversity surveys for conservation purposes, and analyses of species and communities for understanding ecological patterns and processes at different scales. Using results from a study in the Udzungwa forest, the Eastern Arc Mountains, Tanzania, as an example, we will demonstrate how easily one can produce such protocols and their usefulness while showing their technical and practical aspects.

Student - Oral presentation

Shedding light on darkness: An integrative approach to elucidate the evolutionary history of the Alpine-Apenninic troglophilic Pimoa spiders

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Long term climatic changes, such as the Pleistocene glaciations and other large-scale climatic upheavals, profoundly shaped present-day biogeographic patterns, especially concerning the cave-dwelling endemic biocenosis. Pulses of population expansions and contractions happening during the Pleistocene left their stamp on local genetic diversity and current population structure. In addition, such dramatic changes are considered among the most important factors determining the colonisation of the subterranean habitat. We studied the phylogeography of *Pimoa rupicola* (Araneae, Pimoidae), an endemic Alpine-Apenninic species preferably found in caves and other shaded humid habitats. We sampled several populations in caves and similar habitats across the known geographical range of the species in the Western Italian Alps. By coupling phylogeographic analysis on DNA sequence markers (cox1 and ITS2) and Ecological Niche Modelling (ENM) techniques, we reconstructed population history of *Pimoa* and unraveled the factors that shaped its present-day geographic range. We uncovered two well-supported, deeply divergent lineages within *P. rupicola*, one including all northernmost populations (from the Graian to the Cottian Alps) and a second one comprising the remaining populations on the south (down to the French and Italian Riviera). Based on our time estimates, northern and southern lineages split at the end of the Miocene, when increasing seasonality replaced from a subtropical climatic conditions. Around 1 Mya the two lineages underwent strong bottlenecks, consistent with the Quaternary glacial cycles. Extinction driven by glacial maxima left their fingerprint in population expansions detected by the genetic data. By projecting ENMs into the paleoclimatic reconstruction of the Last Glacial Maximum, we identified several areas devoid from glaciers that may have acted as glacial refugia for few surviving populations within the two lineages. Subsequently, the dynamic of recolonisation followed a south-north path, finally leading to the distribution ranges that we observe nowadays. Nowadays, northern and southern populations are adapted to slightly different environmental conditions. The observed niche partitioning between the two *Pimoa* lineages probably explains their present geographic segregation.

Oral presentation

Haplogyne spiders: a valid taxonomic group or a morphological term?

Yuri Marusik

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The name Haplogynae was suggested by Simon (1893) for a taxon grouping six families of ecribellate spiders: Sicariidae, Leptonetidae, Oonopidae, Hadrotarsidae, Dysderidae, Caponiidae. The limits of Haplogynae remained almost the same until Lehtinen (1967) demonstrated that division of spiders to Cribellate and Ecribellate is unnatural because it is based on a plesiomorphic character. Lehtinen (1967) united Haplogynae with cribellate Filistatidae due to some similarities in copulatory organs and suggested name Filistatoidea. Since then almost all classification schemes consider these groups as related. Haplogynae is no typified taxon name (not based on the genus name) and therefore it is not clear to which of six families it can be applied if it will be found that Haplogynae is not a monophyletic group. There is a lot ofconfusion between the taxon name haplogyne and the morphological term haplogyne. For example all Mygalomorphae have haplogyne type copulatory organs, although they donot belong to Haplogynae. The same is true for „Paleocribellata". Oppositely some Haplogynae have a developed epigyne (Pholcidae). The morphological term „haplogyne" has no proper definition, because Simon's haplogynes were defined as spiders with simple external genitalia like the Mygalomorphae. Families currently placed in Haplogynae have entirelly different structures of endogynes. In the presentation I will try to provide arguments that Haplogynae in a polyphyletic taxon and the general morphological term haplogyne has to be more specific to reflect the structure of the copulatory organs, not only simplicity.

Poster presentation

Unexpected visitor: mermithid nematode (Mermithidae, Nematoda) – surprised host: Bark Spider, *Caerostris sumatrana* (Araneae, Araneidae)

Šárka Mašová[1], Ondřej Košulič[2] & Chaowalit Songsangchote[3]

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A new record of a parasitic nematode from the family Mermithidae (Nematoda) parasitising a female Bark Spider, *Caerostris sumatrana* Strand, 1915 (Araneae: Araneidae) from the Phethaburi province (Ban Lat district) in the southern part of Central Thailand is described. The host spider belongs to the orb-web guild, occurring in shrubs and trees of lowland dipterocarp forests. Specific identification was impossible because morphological identification of mermithids to genus and species mainly requires adult male samples (2 molts after emergence) (Poinar 1985, Allard and Robertson 2003) and only a subadult developmental stage was available. The nematode was extremely long in respect to its spider host, length was about 28 cm, brownish in colour, slightly transparent at tapered rounded ends. Probably, it belongs to the genus *Aranimermis* Poinar & Beton, 1986 on the basis of the characteristics: presence of six cephalic papillae in one plane, amphids located near to the lateral cephalic papillae, mouth opening terminal and postparasitic juvenile without tail appendages. This finding is among the first records of a mermithid parasite from an orb web spider species living in higher vegetation in Southeast Asia and the first record of nematode parasitism in the host species of genus *Caerostris* Thorell, 1868.

Student - Poster presentation

Occurrence of spiders in the diet of the fledglings of some hole-nesting bird species: Reevaluation of materials collected in the 1980s

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Research on the composition of the diet gathered by birds has a long history. Former national research has not only studied predation on spiders, but also they have analyzed the full spectrum of the diet. The present study is based on materials collected in the 1980s which were not determined earlier at species level. Our study concentrated on the spider species as food. Additionally, the connections between the different bird species living at the same area were also studied. The species level determination of the predated animals can bear several important pieces of information, which can be essential in getting to know the ecological attributes of a species or a community. The study of the analysis of the bird diet can impart new results as well, because species could be found that may not have been collected with the usual collecting methods. During 1980-1981 in the Julianna-major and the orchard of Törökbálint we have evinced 48 species of spiders in the diet of the nestlings of 7 bird species (great tit, blue tit, collared flycatcher, large woodpecker, medium woodpecker, nuthatch and short-toed tree-creeper). We have assigned the collected spider species to the studied bird species and we have examined the correlation between the collected prey and its habitat. We have summarised the connections between bird species and spiders in a chart. To compare them we have studied the diversity ordering and diet niche overlap among great tits and collared flycatcher, because of the relatively high number of individuals in terms of prey. The results clearly demonstrate the eating habits and strategies of each bird, as well as the possibility of niche segregation of the cohabiting species.

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Student - Poster presentation

Comparison of a trophic niche and capture efficiency between an araneophagous specialist and a generalist (Gnaphosidae, Lamponidae)

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Trophic specialisation among predators may be the driving force behind the evolution of specific adaptations, especially if the prey is dangerous. The prey of araneophagous spiders (i.e. spiders hunting other spiders) is dangerous because it possess weapons such as venom and silk. Therefore, araneophagous specialists have evolved many adaptations, which allow hunting such a prey. The aim of this study was to explore the trophic niche and selected aspects of predation of the araneophagous specialist *Lampona murina* in comparison with the related generalist *Drassodes lapidosus*. *Lampona murina* had narrow trophic niche with a dominance of spider prey, while the niche of *D. lapidosus* was wide. *Lampona murina* also captured spiders bigger than itself with higher success. Comparison of paralysis latency of two prey types (spider and cricket) revealed the venom of *L. murina* was more effective for both prey types than the venom of *D. lapidosus*. Investigation of hunting strategy showed L. murina relied on grasping a prey with two pairs of legs possessing dense hair, so called scopulae. *Drassodes lapidosus* immobilised a prey with silk. The results indicate *L. murina* possess adaptations – such as effective venom, specific hunting strategy and hardened cuticle – analogous to adaptations of non-related araneophagic spiders. These adaptations increase the effectiveness of hunting the spider prey.

Student - Oral presentation

The relationship between niche properties and composition of spider communities in vineyard terraces.

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Environmental conditions belong to the ecological filters that select species from the regional pool into local communities according to species functional traits. Niche position and width can both influence the species composition and abundance distribution in local communities because only species that are able to cope with local conditions will persist. The niche width can influence the structure of local communities via trade-offs between specialists and generalists. Specialised species should outperform generalists in utilising their preferred resource while generalists have a wider resource base to build up their populations. However, these depend on several factors, e.g. spatio-temporal heterogeneity, that determine which strategy will be selected. Here we studied how the habitat niche properties influence the community composition of spiders in vineyard terraces. We selected four vineyards and established four plots in each of the studied locations. Spiders were collected by sweeping from April to October 2011. We obtained the niche properties of each species from available literature. We found that the position of habitat niche was significantly clustered in the spider communities and it influenced the presence of spider species in the vineyard terraces. However, the niche position did not affect the distribution of abundances. Instead, the distribution of abundances was influenced by niche width and the abundances of spiders increased with broadening niche width. The results can be explained by the heterogeneity-stability hypothesis and the generalists were selected by the spatio-temporal heterogeneity of the terraces.

Student - Poster presentation

Increased habitat complexity improves the suppression of pest *Cacopsylla pyri* by winter-active spiders

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Intraguild interactions among biocontrol agents can significantly dampen their predation pressure on pest. Increased habitat complexity can enhance the predation on pest as it provides more hideouts from intraguild predation (IGP) and/or harsh environmental conditions for the mesopredator. On the other hand, the increased complexity can also provide more ambush hideouts for the IG predator or hideouts from predation for the pest. Winter-active spiders, *Anyphaena accentuata* and *Philodromus* spp., significantly lower abundance of a serious pest in the pear orchards *Cacopsylla pyri* during winter season. However, IGP imposed by *Anyphaena* on *Philodromus* lowers their predation pressure on *Cacopsylla*. We were therefore interested if an artificially increased habitat complexity improves their potential to suppress *Cacopsylla*. At the start of winter, we installed cardboard traps around trunks and branches of trees in a commercial pear orchard. At the start of spring, we collected psyllas from the branches where the cardboards were installed and compared to the branches in the adjacent trees. We also collected all spiders from the cardboard traps. We found that the trees with cardboards had on average lower abundances of psyllas than the trees without cardboards. We did not found any relationship between abundances of all spiders and the difference in abundances of *Cacopsylla* between the trees with and without cardboards. However, we found a hump-shaped relationship between abundances of winter-active spiders and the difference in abundances of *Cacopsylla* between the trees. When the abundances of the winter-active spiders were low, the cardboards represented suitable conditions for *Cacopsylla* and the trees with cardboards hosted even more psyllas than trees without them. When the abundances of the winter-active spiders were too high, the abundances of *Cacopsylla* were similar between the trees. This suggests that an increased interference between winter-active spiders lowered the predation pressure on *Cacopsylla*.

Student - Poster presentation

Investigating the effects of fluoxetine and mianserine on anti-predator behaviour of the orb weaver *Larinioides cornutus* (Araneae: Araneidae)

Madeleine Miller, Rebecca Wilson & Thomas C. Jones

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Biogenic amines have been shown to regulate aggression-related behaviours in both vertebrates and invertebrates, potentially playing a role in the overall fitness of the animal. Being both predators and prey, spiders are an ideal model organism for studying such behaviour in the laboratory and field. In orb-weaving spiders, a careful balance of aggression must be maintained to optimise foraging while avoiding predation. Prior research in our lab has shown that modifying these biogenic amines alters aggression/wariness in the furrow orb-weaver *Larinioides cornutus*. Due to the tractability of an anti-predator behaviour in *L. cornutus* with exogenous octopamine and serotonin 5-HT, we are now interested in modifying this behaviour with antagonistic drug manipulations. Fluoxetine, a selective serotonin reuptake inhibitor which antagonises 5-HT2C receptors, and mianserine, an octopamine receptor antagonist, will be used to modify levels of serotonin and octopamine respectively. In order to quantify changes in aggression, the anti-predator behaviour called the "huddle" response will be scored 24 hours before and after drug manipulation. In addition, direct effects of octopamine and serotonin levels will be quantified after each drug manipulation using high performance liquid chromatography with electrochemical detection. The goal of this work is to further understand the role of these neurohormones in spider behaviour, and to develop tools with which behaviour can be manipulated in the field.

Oral presentation

Arachnids: from genes to ecosystem functioning and vice versa

Jordi Moya-Laraño

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Despite previous beliefs, researchers have found that evolution by natural selection can occur rather rapidly (i.e. in ecological time). These changes in gene frequencies and associated traits can actually affect the functioning of the ecosystem, closing what we know as eco-evolutionary feedback loops. Exploring these effects in ecological networks, where hundreds of species may be embedded and where myriads of interactions occur, is a challenge. However, different approaches including the evolutionary comparative method, field experiments and computer simulations can help with this task. I will explain how I envision this ongoing link between ecology and evolution for arachnid-centred food webs. From the empirical point of view, one needs to accurately measure functional trait variability (both within and among species) and also the quantitative genetic basis of at least some of the most relevant traits. One then can make predictions of how all these traits combined will determine target ecosystem functions, such as trophic cascades affecting litter decomposition. One could also predict how different food web multidimensional environments will shape the evolution of traits in the species embedded in these webs. Once one has measured the quantitative genetics of functional traits, a combination of target experiments and computer simulations can help in this task. In that sense I will introduce Weaver, a computer package in continuous development which is based on realistic traits and species parameterizations, serves to simulate spatially-explicit eco-evolutionary dynamics in complex food webs. I will show examples of arachnid traits currently studied such as egg size, mobility, speed, body size and even the association between venom composition and colouration. The ultimate goal of using real food webs, combined with the experimental approach and these computer simulations, is to establish Feedback Research Programmes (FRP) in which the computer is able to simulate and make predictions about realistic scenarios and suggest experiments. The data collected from such experiments is then used to feed the simulation platform back, allowing the computer to get closer to the real system step by step, thereby increasing the predictive capability of future simulations. I am currently using this approach for Food Web Engineering (FWE), in which the aim is to combine the species and traits that maximise biological pest control in agro-ecosystems.

Oral presentation

Effect of prey density and insecticides (lambda cyhalothrin and profenofos) on the functional response of *Guizygiella melanocrania* (Araneae: Tetragnathidae)

Muhammad Khalid Mukhtar, Hassina Ghulam Muhammad & Hafiz Muhammad Tahir

Department of Zoology, University of Sargodha, Punjab, Pakistan

Spiders were collected directly by hand and shakingthe plants of a citrus orchard, from the vicinity of Sargodha, Pakistan, and kept in glass jars. The spiders were divided into three groups of five spiders each. Group I served as control and was given tap water only, Group II were given lambda cyhalothrin, and Group III were given profenofos. Three separate experiments were performed during which spiders were presented with different prey densities of insect pests in their glass jars. One *Guizygiella melanocrania* was offered with five different prey densities i.e one, three, five, ten, fifteen, in each of five separate glass jars. Predation rates of spiders were observed after every three hours. Sub-lethal dose of insecticides (lambda cyhalothrin, and profenofos) were applied to spiders. The effects of insecticides (lambda cyhalothrin and profenofos) under different prey densities on the functional response of *G. melanocrania* was compared by applying a two Sample T-test through Minitab (Version 14). At a prey density of 5, the comparison of prey consumed by *G. melanocrania*, the control and lambda cyhalothrin had a t value of (2.12), and a P value of (0.101), the control and profenofos had a t value of (2.83), and a P value of (0.047), and the lambda cyhalothrin and profenofos had a t value of (0.71), and a P value of (0.519). So, the differences at this low density were statistically, not significant. At a prey density of 10, the comparison of prey consumed by *G. melanocrania*,the control and lambda cyhalothrin had a t value of (2.50), and a P value of (0.088), the control and profenofos had a t value of (4.95), and a P value of (0.008), and the lambda cyhalothrin and profenofos had a t value of (1.00), and a P value of (0.391). So, it is seen that difference in (control and lambda cyhalothrin: lambda cyhalothrin and profenofos) were statistically, not significant. But the control and profenofos had a significant difference. At a prey density of 15, the comparison of prey consumed by *G. melanocrania*, the control and lambda cyhalothrin had a t value of (4.24), and a P value of (0.013), the control and profenofos had a t value of (6.36), and a P value of (0.003), and the lambda cyhalothrin and profenofos had a t value of (2.12), and a P value of (0.101). So, the differences at this high density in (control and lambda cyhalothrin: control and profenofos) were statistically significant. It was observed that difference between (lambda cyhalothrin and profenofos) was statistically not significant. The functional response of the spiders increased with increasing prey density in both treatment and control.

Oral presentation

GBOL offers a comprehensive perspective on spider mitochondrial diversity in Germany

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The German Barcode of Life (GBOL) project is a national network of 17 biodiversity research institutions, aided by 200 taxon specialists with the aim to establish a DNA barcode library of as many animal, fungal and plant species as possible that occur in Germany. During the first period of the project (2012-2015), more than 3500 COI barcodes of 561 morphologically determined species of spiders and 38 species of harvestmen have been generated. With species coverages of 57 % in spiders and 75 % in harvestmen these are the most comprehensive barcoding datasets that have been produced so far for these arachnid groups at any national scale. Sampling scheme was designed to capture intraspecific geographic variation within the country effectively. The mean number of sequences obtained per species was 6 (range: 1-48; 116 singletons). As expected, interspecific divergence (median 17.8 %, p-distance) exceeds intraspecific divergence (median 0.3 %) by more than one order of magnitude, and the lower 95% percentile of interspecific variation (13.8 %) does not overlap with the upper 95% percentile of intraspecific variation (2.6 %). However, the barcoding gap was not complete, as in 47 species some pairwise intraspecific distances exceeded 3% (max 10 %). On the other hand, 50 species included pairwise distances of < 3 % as compared with the closest congener. In four congeneric species pairs identical sequences were even found (*Enoplognatha latimana/ovata*, *Pardosa lugubris/saltans*, *Tibellus maritimus/oblongus*, *Xysticus audax/cristatus*). This shows that some of the species which pose challenges to morphological determination are not easier to identify molecularly (while barcoding helps in corroborating synonymy suspicions). Of particular interest is the finding that some species pairs of common wolf spiders with discrete morphological differences were not separable by their COI barcodes, including *Alopecosa cuneata/pulverulenta* and *Pardosa prativaga/riparia*. This discrepancy may be caused by the complex visual courtship behaviour in these wolf spiders and constitutes a promising subject for evolutionary and behavioural studies. Species with deep intraspecific clustering include *Aelurillus v-insignitus*, *Mitopus morio*, *Phalangium opilio*, *Steatoda bipunctata*, *Tmarus piger*, *Clubiona corticalis*, *Nemastoma lugubre*, *Micaria pulicaria* and *Diplocephalus latifrons* (in order of descending intraspecific distance maximum). These taxa deserve thorough taxonomic and biogeographic reconsideration.

Poster presentation

Histological study on venom gland apparatus in *Odontobuthus doriae* (Scorpiones: Buthidae), *Scorpio maurus townsendi* (Scorpiones: Scorpionidea) and *Hemiscorpius lepturus* (Scorpiones: Hemiscorpidea) from Iran

Shahrokh Navidpour[1],Mohammad Mehdi Gharagozloyan[1] & Iraj Pousty[2]

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Histological investigations were carried out on the venom gland of *Hemiscorpius lepturus*, *Scorpio maurus townsendi*, and *Odontobuthus doriae*, respectively. The results revealed the walls of the poison sacs of Hemiscorpius lepturus were single folded. The walls on poison sacs of *Scorpio maurus townsendi* and *Odontobuthus doriae* were complexly folded and the number of folds was higher in *Scorpio maurus townsendi*. It is notable in *Odontobuthus doriae*, there were two parts of the group of cells in the poison sac. The venom-producing cells were more on one side and the mucosal cells than on the other side. The mucus cells in Masson trichrome staining were darker at the base of the cell than the apex.

Poster presentation

World Spider Catalog

Wolfgang Nentwig[1], Daniel Gloor[1,2] & Christian Kropf[1,2]

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From 2014 on, the World Spider Catalog (WSC) is run by the Natural History Museum Bern, Switzerland. After an internal test phase, from summer 2014 it became available on-line for the broad public and shows increasing usage frequencies. The data of the new catalog are hosted in a database, allowing users to conveniently search for taxa (incl. old combinations, synonyms, etc.), authors, LSIDs and bibliographic information. Furthermore, we offer a simple web service through which users can retrieve modified and new taxon names for their own databases. The catalog is run by an organising board for technical issues (3 members), an editorial board to manage the scientific content (5 members), an expert board (7 members) to solve critical taxonomic and nomenclatural cases. Country coordinators support WSC by providing publications from their countries. The scientific community collected so far more than 80 % of the taxonomic spider literature and this is made accessible through the World Spider Catalog Association to its members.

Oral presentation

Epigaeic invertebrate composition and distribution patterns in two sub-tropical nature reserves, Eastern Cape, South Africa

Augustine Niba[1] & Inam Yekwayo[2]

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The impact of alien plant invasions on native biodiversity has become a global concern, but little attention is directed at this phenomenon locally. Soil-surface dwelling (epigaeic) invertebrates were sampled at non-invaded ('Indigenous Forest' and 'Indigenous Grassland'), and alien-invaded ('Eucalypt' and 'Mixed alien') sub-sites in Nduli and Luchaba Nature Reserves, respectively, using pitfall traps. A total of 2054 specimens belonging to three phyla (Arthropoda, Mollusca and Annelida) were caught and sorted into 7 orders, 18 families, 47 species and 20 morpho-species. Higher species richness occurred in 'Indigenous Forest' and 'Mixed alien' sub-sites while higher specimen counts were made in invaded (Mixed alien' and '*Eucalyptus*') sub-sites during summer months, peaking in January. CCA results showed that some measured site variables e.g. litter depth, grazing intensity, % alien vegetation cover, grass height and soil chemical properties were important in determining species composition and distribution trends. Conservation Implications: Three invertebrate species were widespread and abundant, needing no conservation attention. Twenty-one species were moderately dispersed, and present in most sampling units, worthy of conservation attention not only for their intrinsic value but also as potential indicators for assessing the conservation value of such habitat patches in the reserves during the months of November to March. Fifteen and eight species were recorded in low number (1-5 individuals) at non-invaded and invaded sub-sites, respectively. These sub-sites can be managed in a manner that caters for rare/habitat-specific invertebrate species.

Poster presentation

Sublethal effect of agronomical surfactants on spider *Pardosa agrestis*

Jana Niedobová[1], Vladimír Hula[1] & Radek Michalko[2,3]

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Besides active ingredients, pesticides contain also additives – surfactants. Surfactants increase the diffusion rates for the agrochemical compounds through the plant cuticle and reduce the surface tension of insect exoskeleton. The consumption of agrochemical surfactants rapidly increased during the last decade but the impact of pure surfactants on non-target organisms is largely understudied. Spiders belong to the most abundant natural enemies of pests in agroecosystems and the application of pesticides can disrupt their predatory activity and so reduce their biocontrol potential. Here we studied the impact of agrochemical surfactants on predatory activity of subadult *Pardosa agrestis* in the laboratory. Spiders were sprayed directly by three different non-ionic surfactants: Šaman, Trend, and Wetcit. These surfactants are commonly used in agroecosystems as additives for herbicides. We investigated the differences in short-term, long-term and overall cumulative predatory activities. Fruit flies were used as prey. We found that the surfactants significantly affected the short-term predatory activity. Spiders in Saman and Trend treatments killed significantly less flies than those in control. Males in Wetcit killed significantly more flies than males in control while females from Wetcit and control killed similar number of flies. The surfactants did not influence the long-term predatory activity of *Pardosa* spiders. The surfactants significantly influenced the cumulative number of killed prey. The cumulative number of killed prey increased significantly slower in spiders treated by Saman and Trend than control. The cumulative number of killed flies increased significantly faster in males from Wetcit treatment than control while females did not differ from control. This is the first study dealing with sublethal effect of surfactants on spiders. Despite the wide usage of the agronomical surfactants, information of their effect on the predatory potential of natural enemies is completely lacking. Therefore, more knowledge is needed about the action of these compounds on agrobiont arthropods.

Student - Oral presentation

Characterising and assessing the adaptiveness of diel rhythm in behaviours of two orb-weaving spiders

Sara Normark, Madeleine Miller, Rebecca McCloud & Thomas C. Jones

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The overall objective of this project is to evaluate the adaptiveness of temporal scheduling of aggressiveness/wariness and foraging behaviour in two species of forest-dwelling orb-weaving spiders. We predict that diel patterns of rhythmicity in aggression and wariness reflect the spiders' foraging schedule (nocturnal, diurnal, or continuous), in that they are more aggressive when actively foraging. We also predict that these patterns balance the rewards and risks of temporal fluctuations of predator and prey densities. Ecological factors will be quantified to interpret the adaptiveness of the spiders' behavioural schedules, including timing of behaviours, descriptions of prey capture events, and periodicities in foraging aggression and antipredator behaviour. It is also imperative to describe the ecological backdrop, which is composed of these fluctuations in predator and prey densities. Attempts to coax the two chosen species into building their webs in the lab have been unsuccessful, so this study will be entirely field-oriented. 16 surveillance cameras will record the 24-hour behavioural schedule for both *Micrathena gracilis* (Walckenaer) (Ananeae: Araneidae) and *Verrucosa arenata* (Walckenaer) (Araneae: Araneidae) for approximately two weeks. Artificial stimulus trials will assess responses to predator and prey cues. Insect traps will quantify fluctuations in predator and prey densities over the course of the day. As part of a larger project, this study will provide important information that can ultimately be used to understand how the circadian clock, varying levels of neurohormones and changes in selective environmental pressures interact to yield a spider's behavioural schedule.

Oral presentation

Not as far as it seems: phylogeographic patterns of phoretic pseudoscorpions from the family Chernetidae (Chernetidae, Pseudoscorpiones)

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Dispersal capacity plays a key role in the current distributions of organisms. The ability to respond to ecological changes at the currently inhabited location, and colonise a new one if necessary, is particularly important for the organisms inhabiting temporary habitats. There are several means by which organisms with low dispersal capability can be passively transported. One of them is "phoresy", a phenomenon that involves attaching of the non-vagile individual to a selected carrier of different species. Phoresy is used by a wide variety of taxa, among the arachnids it is well known from ticks, mites and pseudoscorpions, but surprisingly there is little information about the phylogeographic patterns in phoretic groups that would allow evaluating the actual efficacy of this manner of dispersal. In order to tackle this question, we use pseudoscorpions from the family Chernetidae as our model group. The family Chernetidae has cosmopolitan distribution and belongs among the most diversified pseudoscorpion families. Its representatives can be found practically in all types of terrestrial habitats and many species specialise in temporary habitats, such as tree hollows. In this study, we use molecular methods to reconstruct the phylogeographic patterns of several widely distributed chernetid taxa. The complete lack of geographic structure in our results indicates that phoresy is indeed very efficient manner of dispersal. Shared haplotypes were detected across Europe, in some cases over very long distances involving the crossing of substantial barriers such as large water bodies or mountain ranges.

Poster presentation

A new species in the genus *Mermessus* O. Pickard-Cambridge (Araneae, Linyphiidae) from South Dakota, USA

L. Brian Patrick

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A new species in the genus *Mermessus* O. Pickard-Cambridge 1899 is described based on the embolic division and other characteristics of the male, and on the epigynum and other characteristics of the female. This new species is miniscule (0.9 mm total length) and resembles *Mermessus jona* (Bishop & Crosby, 1938). The new species was collected in portions of the Fort Pierre National Grassland, South Dakota, USA.

Oral presentation

Biological control in winter: Novel evidence for the importance of generalist predators

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The role of generalist predators in pest control has been neglected because generalists are not able to track pest populations. Generalist predators are suggested to be important in spring before specialist predators become active. Here, we show that some generalist predators are important even during winter, when the majority of arthropod pests and their enemies are dormant. We quantified the role of winter-active generalist predators on the suppression of pear psylla during winter using a discrete non-linear model of an intraguild predation system. To parameterise our model, we conducted a series of experiments on (1) functional responses; (2) prey preferences; and (3) ontogenetic development; and made observations on the population densities of spiders and potential prey. We ran the model for different winter scenarios, i.e. for very cold and very warm winters. We found that winter-active predators considerably suppressed the pear psylla population. Predators exerted a stronger effect in a warmer winter than in a colder one. Orchard growers thus should avoid use of non-selective pesticides during this period and instead aim to support the community of generalist predators. Our results suggest more attention should be given to encouraging generalist predator populations in other systems, even in periods when crops are not producing.

Oral presentation

Discovery of a monophagous true predator, a specialist termite-eating spider (Araneae: Ammoxenidae)

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True predators are characterised by capturing a number of prey items during their lifetime and by being generalists. Some true predators are facultative specialists, but very few species are stenophagous specialists that catch only a few closely related prey types. A monophagous true predator that would exploit a single prey species has not been discovered yet. Representatives of the spider family Ammoxenidae have been reported to have evolved to only catch termites. Here we tested the hypothesis that *Ammoxenus amphalodes* is a monophagous termite-eater capturing only *Hodotermes mossambicus*. We studied the trophic niche of *A. amphalodes* by means of molecular analysis of the gut contents using Next Generation Sequencing. We investigated their willingness to accept alternative prey and observed their specific predatory behaviour and prey capture efficiency. We found all of the 1.4 million sequences were *H. mossambicus*. In the laboratory *A. amphalodes* did not accept any other prey, including other termite species. The spiders attacked the lateral side of the thorax of termites and immobilised them within 1 min. The paralysis efficiency was independent of predator:prey size ratio. The results strongly indicate that *A. amphalodes* is a monophagous prey specialist, specifically adapted to feed on *H. mossambicus*.

Student - Poster presentation

From past to future: the response of *Troglohyphantes* to climate change dynamics

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Spiders of the genus *Troglohyphantes* (Linyphiidae) are generally found in cool and humid places such as caves and other subterranean habitats with peculiar microclimatic conditions and low climatic variability. All species of *Troglohyphantes* show small distribution ranges, in some cases point-like. Given their poor dispersal ability, the narrow ecological requirements and the peculiarity of their distribution, they can be considered valuable species-models for biogeographical studies focusing on the effects of past and future climate changes. On the basis of 10-years field data, we generated a dataset comprising more than 350 localities in the Western Italian Alps. We generated a climatic profile for each locality and related it to presence/absence data of *Troglohyphantes* species via Ecological Niche Modeling (ENM), generating a current potential distribution of the genus in the study area. On the base of the model result, we estimated the probability surface of the genus *Troglohyphantes* in the past (Last Glacial Maximum, Pleistocene) and in the future, by projecting the present-day model into three different global warming scenarios predicted by the International Panel on Climate Change (IPCC). Given the colder climatic condition in the Pleistocene, the potential past distribution was found to be wider than today. The present model is congruent with the known distribution range in the Western Italian Alps, and predicts the most suitable conditions in cold mountainous areas. Moreover, the higher suitability corresponds to the limits of the Pleistocene glaciers, in areas that were devoid from ice. We hypothesise that several populations underwent local extinctions during Pleistocene and the range of distribution successively contracted as a consequence of the temperature increase. Future forecasts based on different temperature scenarios shows a general trend of decline of suitable areas all over the study area. In light of our results, we discuss how temperature increase due to Global Warming may affect *Troglohyphantes* species causing potential local extinctions.

Student - Oral presentation

Cytogenetics is not dead! What kind of important information could bring us cytogenetic data in the century of progressive molecular studies?

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Cytogenetics is basically concerned with the study of numbers and morphology of chromosomes of various organisms. Studies that described characteristic karyotypes of closely related taxa have preceded the molecular phylogenetic ones. In several cases it has been shown that karyological data can form a useful tool for solving problematic taxonomy, especially in morphologically uniform sibling species. However, with the onset of molecular methods the conventional cytogenetic approaches were considerably overshadowed by new progressive studies. Despite this fact, cytogenetics can still play an important and key role especially in taxonomic studies which use and combine several methodical approaches. In this presentation we will discuss and demonstrate the utility of cytogenetic methods in the complicated taxonomy of the scorpion genus *Euscorpius*, their crucial contribution in revealing cryptic species and the beneficial importance of complex taxonomic studies employing morphological, molecular phylogenetic and cytogenetic approaches.

Oral presentation

Spider communities in managed steppe ecosystems: how to survive burning, mowing, grazing or 'absolute non-disturbance'?

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My survey was based on personal and literature data on spider communities in various types of steppe ecosystems within the East European Plain. Virgin steppes have been preserved in conservation areas only, with a regime of periodical mowing or strict protection. Steppe gullies were under grazing pressure, while uncontrolled burnings periodically affect nature reserves and pastures. Spider post-disturbance recovery depended on ecological guilds, factor intensity and frequency, site relief position and refuge proximity. Herb-dwelling spiders recovered almost completely within the two-three years after mowing or burning. In pastures, they were less numerous than on undisturbed plots. Cursorial spiders did not show a single tendency depending on disturbance. In some cases they were less diverse and abundant in strictly protected steppes, in the other cases in the mown ones. Dominant complexes on the adjacent mown/unmown plots were always different. Depending on grazing pressure, xerophilous species preferred grazed plots while mesophilous species dominated in non-disturbed gullies with meadow vegetation. In this case the spider community lost its steppe character. Extensive summer fires resulted in species number decrease and activity density increase in the first post-fire year. One or two generalists dominated all relief positions, and species were distributed more or less evenly. In the third year, the species composition was enriched with xerophilous species, dominant complexes changed on behalf of steppe species, and spider assemblages reflected habitat diversity. In cases of patched fires on small areas, there was either no significant change in cursorial spider assemblages, or the changes disappeared on the second post-fire year. Low mobile epigeic spiders were the most sensitive to all kinds of disturbance. Fires affected them dramatically, destroying litter as a microenvironment. Within three-five years, spider assemblages did not recover in both species and numbers. They needed more time to recovery after mowing, however in moister conditions the process was going faster. On pastures they aggregated in grass turfs. In general, spider communities were more diverse and abundant in the non-disturbed steppes. However species composition was enriched with the forest-edge species in the forest-steppe zone and with meadow species in the steppe zone, while many xero- or photophilous species disappeared from strictly protected steppes.

Student - Poster presentation

Phylogenetic studies of *Eresus* species in Central Europe

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Perhaps the most attractive European spiders are ladybird spiders (Eresus spp.) Among the presently known *Eresus* taxa *E. hermani* (Kovács et al., 2015) is a newly described species from Central-Europe. Beside the classical taxonomic characterisation we provide new genetic data to the *E. sandaliatus* (Martini & Goeze, 1778), *E. kollari* (Rossi, 1846), *E. moravicus* (Rezác, 2008), and *E. hermani* species. Samples were collected from fresh or preserved material and stored frozen in alcohol. Just one piece of a leg segment was used to isolate total DNA with the modified Engel's protocol. Standard mitochondrial and nuclear primer pairs were used in PCR to amplify the desired mitochondrial and nuclear markers (part of 16S rDNA-ND1, 28S rDNA non protein coding and the COX-1 protein coding genes). After bidirectional sequencing distance and likelihood based methods were conducted to build alignments, nucleotide diversity matrices and phylogenetic trees. 16S-ND1 new DNA sequences were obtained successfully from our collection and we hereby present the first COX-1 and 28S rDNA sequences of *E. sandaliatus*, *E. moravicus*, *E. kollari*, and *E. hermani*. The analysed part of 28S ribosomal gene has not provided enough phylogenetic signals, therefore these sequences were omitted in the analysis. Alpha diversity of 16S-ND1 and COX-1 sequences gave diverse character changes in the alignments. Mean sequence divergence distance was higher in the case of *E. sandaliatus* and *E. hermani* group as compared to other members of the *E. sandaliatus* group of species. Out-groups used in different combinations did not affect the structure of phylogenetic trees, where the main topology was uniform among 16S and COX-1 generated trees of *E. sandaliatus* group s.l. *E. kollari* and *E. moravicus* samples shared the same branch, while *E. hermani* samples were situated as a sister group of *E. sandaliatus* samples on the inferred tree and one of the *E. sandaliatus* sample shared some characters with *E. hermani*. COX-1 sequences of *Eresus* taxa translated in silico illustrated a congruent tree topology with the phylogenetic tree of COX1-1 DNA sequences and it was also supported by high bootstrap scores. Haplotypes of *E. hermani* belong to the Ed linage (Rezac *et al.*, 2008) of Central-European *Eresus* spp., shared with some Danish and Czech *E. sandaliatus* populations (other, much more widespread populations of *E. sandaliatus* carry mtDNA belonging to the very distant Ea linage, which is also passed to E-European *E. kollari* via introgression). These haplotypes occupy nested positions on trees constructed from 16S, suggesting the possibility of an introgression of *E. sandaliatus* by *E. hermani*. However, this possibility is not supported by trees constructed using COX-1 haplotypes, since *E. sandaliatus* COX-1 sequences occupy more basal positions than do *E. hermani* sequences. While the latter supports the notion of an introgression event from *E. sandaliatus* to *E. hermani*, other possibilities, such as incomplete linage sorting or inadequate sampling of the two species are more likely explanations.

Oral presentation

From individuals, to populations, to communities, to extinction: when does animal personality matter?

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Consistent individual differences in behaviour are present in almost any animal species. In humans, we call these characteristic differences "personality". In animals, they are referred to variably as "behavioural syndromes", "temperament", "behavioural types", or "animal personality". Although numerous studies have linked animals' personalities with their individual survivorship or reproductive success, virtually no studies have considered whether personalities matter for higher-order ecological or evolutionary phenomena. Using social spiders from around the world, I explore how variation in groups' personality shape virtually every aspect of societies' existence.

Oral presentation

Bringing forgotten predators into the picture of Himalayan biodiversity conservation

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Spiders are good bio-indicators of ecosystem health and habitat modification due to their life history traits (small body size, short generation time) and high sensitivity to habitat micro-climate. Additionally, they also provide important ecosystem services and play important roles in forest management practices. Although they are highly diverse and abundant in various natural ecosystems and play important regulating roles in ecosystem function, they have been largely ignored in biodiversity conservation. The knowledge of Himalayan spider biodiversity is sparse as compared to other regions in India, because of its difficult terrain and harsh climatic condition. Himalayan spider fauna is diverse, but effective conservation is impeded by lack of taxonomic and ecological knowledge. Inaccessibility and remoteness coupled with a short working season make any research initiatives difficult in this area. We have conducted thorough field surveys on the Himalayan spider fauna from four protected areas (Nanda Devi Biosphere Reserve, Milam Glacier, Kedarnath Wildlife Sanctuary and Askot Wildlife Sanctuary). Each survey was conducted along an elevation gradient (1200-4500 m asl) and spiders were collected systematically from sampling plots covering all niches using five methods: pitfall trapping, sweep netting, ground hand collection, aerial hand collection and litter sampling. Specimens were identified up to genus/morphospecies level. During the survey in NDBR, a total of 244 species belonging to 108 genera and 33 families were recorded. Using the estimator Chao1, the expected species richnesses for the three sampling sites in NDBR were 153.43 ± 0.9 (Lata Kharak), 162.75 ± 1.24 (Malari), and 206.43 ± 0.9 (Bhyundar Valley). While a total of 86 morphospecies under 39 genera and 16 families were recorded in Milam Glacier. In Kedarnath Wildlife Sanctuary, a total of 64 morphospecies (40 genera and 19 families) were recorded. The outcome of the study conducted in the Himalayan landscape provides significant scientific information on spider diversity. This study is of paramount importance for better understanding of this long neglected group. As natural programmes a comprehensive documentation of conservation of Himalayan biodiversity and livelihoods are being drawn. Spider diversity with appropriate baseline information on status, distribution and abundance of key species is crucial, for improving our understanding management, and productivity of these ecosystems.

Student - Poster presentation

Heterospecific sexual interactions among *Nephila* species

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Closely related species occurring in sympatry are expected to have evolved mechanisms for species recognition, enabling them to avoid futile copulation attempts with heterospecific mates, which are costly and non-adaptive. Nevertheless, our fieldwork in South Africa (Simangaliso Wetlands Park, Ndumo Game Reserve, and Tembe Elephant Park) yielded observations of heterospecific sexual interactions among several co-occurring *Nephila* spp: *N. inaurata* (Walckenaer, 1841), *N. fenestrata* (Thorell, 1859), *N. komaci* (Kuntner & Coddington, 2009), and *N. senegalensis* (Walckenaer, 1841). These interactions include male visitations, copulations, and guarding behaviours of heterospecific females. Males of *N. inaurata* were found guarding (N = 7) and kleptoparasitizing (N = 1) *N. fenestrata* females in Simangaliso (N = 16 adult and subadult webs). In Ndumo, males of *N. komaci*, N. senegalensis, and N. inaurata were found on webs of heterospecific females (57 % of webs with males). In the field we also observed two mating events between *N. inaurata* males and *N. komaci* females. In the laboratory, we then conducted mate choice experiments (N = 21) where *N. inaurata* males had to choose between a conspecific female and a heterospecific – *N. komaci* female. Our preliminary data show a stronger preference of *N. inaurata* males for conspecific females (57 %), yet unexpectedly high percentage of males favoured a *N. komaci* female (24 %), and 19 % of the males did not make a choice. In addition, we staged mating trials between heterospecific couples (*N. komaci* and *N. inaurata*) in the laboratory (N = 7). Two copulations occurred between *N. komaci* males and *N. inaurata* females, while *N. inaurata* males courted *N. komaci* females but did not copulate. Our puzzling data needs further investigation of heterospecific sexual interactions in sympatric species that could shed light on mechanisms for species recognition, mating strategies, and species barriers.

Student - Oral presentation

Spider perception of aposematism and mimicry

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Aposematism (i.e. warning signalisation) doesn't include only conspicuous colouration, but also other signals, such as warning sounds, odours, or distinctive behaviour. These signals show that their producer is protected against predators. As such, they are often mimicked by other species, whether protected or unprotected. However, they may only function if a particular predator is able to perceive them. Aposematism and mimicry are studied almost exclusively in birds while other predators are largely ignored. This bias may lead to a limited understanding of many aspects of aposematism and mimicry. Here we provide a review on the topic, emphasising spider perception of signals from potential prey. 1) Aposematic colouration, the most frequently studied type of warning signalisation, can't be seen by spiders from most families. However, data obtained on insect predators show that the contrast itself may serve as an aposematic signal. With the exception of jumping spiders, the research in spiders is limited by the lack of knowledge of spider vision. 2) Vibration and sound reception is the most important sense in spiders, so this type of signals is likely to be used by their potential prey. Unfortunately, this aspect of aposematic signalisation is little studied and our knowledge is limited to anecdotal observations and indirect evidence. 3) In spiders, the use of olfactory (i.e. non-contact) chemoreception during predation is mostly unknown. Although it is likely that they can perceive warning odours (at least in high concentration), no clear evidence has been provided to support this hypothesis. 4) Spiders are able to perceive contact chemical signals, the most direct and universal type of aposematic signalling. Many defensive chemicals act against both vertebrates and arthropods, differing in efficiency against particular taxa. 5) Effects of behavioural aposematism on spiders are hard to study as it is difficult to isolate them from effects of other types of signals. A few available studies suggest that some mimics of dangerous prey are able to confuse their spider predators and avoid being attacked. Spiders are among the most important predators in nature. Still, this review provides more questions than answers about their perception of aposematism and mimicry. Further data are required for almost all aspects of these phenomena, particularly for vibration signals produced by protected prey and its mimics, and non-contact perception of defensive chemicals.

Student - Poster presentation

First data on karyotypes and nucleolar organiser regions of solpugids (Solifugae)

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Solpugids are a diversified arachnid order with 1075 described species placed into 12 families. They emerged during the Upper Carboniferous. These arachnids are known from America, Africa, and Asia, mostly from desert areas. Phylogenetic relationships of solpugids are unresolved. Some studies consider solpugids as a sister group of pseudoscorpions, whereas some other analyses relate them to acariform mites. Cytogenetics of solpugids is unknown. To obtain basic information about their karyotypes, we determined the diploid numbers, chromosome morphology as well as pattern of constitutive heterochromatin and nucleolar organiser regions (NOR) in representatives of the families Daesiidae, Eremobatidae, and Galeodidae. Preparations were obtained from gonads by a spreading technique. NORs were visualised by fluorescence in situ hybridization (FISH) using an 18s rDNA probe. The examined solpugids exhibited low chromosome numbers. Their diploid numbers were as follows: *Eberlanzia flava* 22, *Gluvia dorsalis* 10 (Daesiidae), *Eremobates similis* 22 (Eremobatidae), and *Paragaleodes pallidus* 12 (Galeodidae). Karyotypes of these species were predominated by acrocentric chromosomes except for *Paragaleodes*, which showed metacentric chromosomes. Two prominent acrocentric pairs of *Gluvia* have possibly evolved by tandem fusions. A prominent pair was also found in *Eberlanzia*. In contrast to *Gluvia*, it showed metacentric morphology, which probably arose by a centric fusion. Blocks of AT-rich constitutive heterochromatin were detected by DAPI staining during FISH experiments in *Eberlanzia* and *Paragaleodes*. Solpugids did not exhibit morphologically differentiated sex chromosomes. Location of NORs was determined in *Eberlanzia* and *Eremobates*, which exhibited a single NOR pair. This pattern is probably ancestral in arachnids. To determine the basic trends of karyotype evolution in solpugids, it is necesary to analyse more clades. Our data do not support a close relationship of solpugids and pseudoscorpions. Solpugids are characterised by low diploid numbers and absence of heteromorphic sex chromosomes. By contrast, pseudoscorpionid karyotypes contain differentiated sex chromosomes. Furthermore, most pseudoscorpions possess much higher diploid numbers than solpugids and a predominance of biarmed chromosomes.

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Oral presentation

Do the proportions of the spinning duct influence the material properties of major ampullate fibers?

Milan Řezáč

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Spider major ampullate fibres exhibit high strength, and, because they are also highly elastic, exceptional toughness (total energy that a fibre absorbs before breaking). High performance of this material is based on both the chemical composition and the configuration of molecules given by the conditions inside the spinning duct. The spinning duct of the major ampullate gland is a hyperbolically tapering tube that starts with highly sclerotised funnel and continues in the form of three parallel limbs enclosed in a common shield. It secures reabsorbtion of water from silk precursor, and, by means of shear forces, it elongates the silk protein molecules and aligns them parallel to the fibre axis. The length of the duct determines duration of elongation and alignment and the tapering of the duct determines its intensity. When protein molecules are more elongated and better aligned, more regions can come close to each other and zip into the beta sheet crystals, the structures that make fibres stronger. When the molecules are more elongated, there is no more potential to elongate further, which make fibres stiffer. In this study we tested the hypothesis that the glands with longer, more tapering and narrower ducts should produce stronger and stiffer fibres. In order to minimise the chemical variation of studied silk Ichose a group of phylogenetically related species from the families Araneidae and Tetragnathidae. These spiders produce high performance major ampullate silk used for construction of orb webs, dragline or ballooning fibres. I expected various selection pressures in this group, which might have initiated differentiation of duct morphology. Fourteen species representing the diversity of orb web shapes and sizes were studied, in particular *Araneus* (three species), *Caerostris*, *Cyclosa*, *Larinioides*, *Mangora*, *Micrathena*, *Neoscona* (two species), *Nuctenea*, *Zygiella*, *Leucauge* and *Tetragnatha*. We used the length of the carapace as a measure of body size.The material properties of the fibres (Young's modulus, yield strength, strength, strain, toughness) were taken from Sensenig *et al*. (2010). To ascertain the morphology of the ducts, we dissected and analysed the glands under a light microscope. In particular, we measured the length of the duct (each of the three limbs separately), initial and final width of the funnel and the final width of the duct. Then we looked for correlations between these morphological parameters, and the quality of the silk.

Poster presentation

Branched spider silk glands - enlargement of the secretory zone an alternative to simple elongation?

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Spiders exhibit a great variety of silk glands. These glands produce materials of various properties, that help spiders in different aspects of their life. The amount and properties of the material produced are determined by the size and morphology of the gland. The glands that produce large amounts of silk dope usually have an elongated secretory zone. But in some spider groups, the secretory zone is branched instead of being simply elongated. We studied the morphology of silk glands across the spider phylogeny in order to map the presence of branched secretory zones and to deduce the functional significance of this feature. We found ramified secretory zones in both major and minor ampullate glands of some Agelenidae. Furthermore, some other families of the superfamily Amaurobioidea (Amaurobiidae, Titanoecidae, Desidae, and Amphinectidae) possess bifurcated minor ampullate glands. Lobated secretory zones were found in aggregate glands and in flagelliform glands in Nephilidae. Some Gnaphosidae (for example, the genus *Gnaphosa*) possess a unique long branched gland that opens on the posterior lateral spinnerets and is probably responsible for the production of glue for immobilising prey.

Student - Poster presentation

The genus *Ischnothyreus* (Araneae, Oonopidae) in Java and Sumatra

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As part of the ongoing goblin spider PBI project (Planetary Biodiversity Inventory), the principal author revises the genus *Ischnothyreus* SIMON, 1893 from Java and Sumatra with descriptions of seven new species from Java and eight from Sumatra. This is the first record of this genus from the island of Java. Furthermore the male of *I. serpentinum* Saaristo, 2001 is described for the first time. Most of the males of the newly described species possess conspicuous apophyses on the cheliceral fang base, assumed to be used during courtship. Probably they interact with grooves on the female postepigastric scutum connected to apodemes underneath. Special morphological features of *Ischnothyreus* males are described and discussed, such as peculiar trochanter apophyses and partially fused pedipalp segments.

Student - Oral presentation

These legs were made for walking ... - Evolutionary morphology of the walking appendages in arachnids (Chelicerata; Arthropoda)

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Arachnids possess four pairs of appendages primarily used for locomotion. Phylogenetic analyses point towards monophyletic Arachnida, meaning that their common ancestor already possessed these four pairs of locomotory appendages. Nonetheless, when the appendages are compared in recent taxa, a broad morphological disparity is apparent, with structural differences observable at a number of different levels. Although the way in which arachnid locomotory limbs are used, i.e. for walking, has not changed significantly during arachnid evolution, two different methods of leg extension are found. While some taxa extend major joints hydraulically and lack the muscles to do so otherwise, others extend their major joints using muscles. The structural basis of neither mechanism is well understood. What is clear, however, is that since hydraulic pressure is generated in the prosoma and the movement of the legs against the body is performed by extrinsic muscles, comparative morphological studies of arachnid legs must also take the prosoma into account. Another major factor which makes this survey necessary is that the complex three-dimensional structures in question have so far been exclusively visualised two-dimensionally severely limiting the comprehensibility and reproducibility of the studies concerned. Here we want to present our upcoming study which sets out to three-dimensionally analyse the complete set of prosomata and locomotory appendages of representatives of all major chelicerate lineages. These features will be studied with regard to the exoskeleton, muscles and tendons using MicroCT. The innervation of legs will be explored using immunolabeling combined with confocal laser-scanning-microscopy. For the purposes of data communication, all studied structures will be documented using interactive virtual 3D formats in combination with linguistic description based on ontologically structured vocabularies. On the basis of these descriptions, combined hypotheses for the homologisation of the listed leg features will be formulated, permitting a detailed analysis of the structural evolution of walking legs and prosomata in arachnids, the group of chelicerates that most probably conquered land as early as around 420 Ma ago.

Poster presentation

Catching of spiders in shallow subterranean habitats in the Czech Republic

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Spiders occurring in soil and fissured rock up to the depth of 70-140 cm were investigated by pipe traps with a set of cans. Three traps were installed in sandy marlite terrains, two traps were installed in alluvial soil in lowland forest. The depth occurrence of spiders is documented at 10 cm intervals. In total, we captured 231 spiders belonging to 26 species. *Cicurina cicur* was the most numerous species. Three microphthalmous species, viz. *Hahnia microphthalma*, *Porrhomma microps*, and *Porrhomma cambridgei*, were collected. *Hahnia microphthalma* was reported from the Czech Republic for the first time. The importance of fissure network and soil formed from sandy marlite bedrock, and of alluvial soil for the life of subterranean spiders is documented.

Oral presentation

Ancient spiders and Salt Lakes

Paul A. Selden & Matt R. Downen

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The Green River Formation crops out over 25,000 square miles of Wyoming, Colorado, and Utah, averages 2000' in thickness, and represents one of the world's longest-lived Great Lakes systems, lasting approximately 17 million years. Spider fossils are abundant in some horizons but, until recently, only a single specimen (*Linyphia byrami* Cockerell, 1925) had been described. In the first part of this talk, a sample of spiders from the families Uloboridae, Hersiliidae, Selenopidae, and Thomisidae are described. Such diversity represents a variety of life modes, and habitats; it is suggested that storms and flash flooding were the likely mechanisms for transporting the spiders into the lake. In the second part of this talk, we compare the spider fauna of Green River with those of two other paleolake deposits, and demonstrate how spider leg flexure can serve as a proxy for the paleosalinity of ancient lakes.

Student - Oral presentation

Efficacy of mate plugging is a result of an interplay between male and female behaviour in *Philodromus cespitum* (Philodromidae)

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In species with polyandrous mating systems, males have evolved various strategies to cope with or avoid sperm competition. To protect their sperm investment they often try to physically impede access to the female, either by guarding her or by blocking her genitalia by means of a mating plug. The strategies are determined by female morphology and the life history of the particular species. We investigated behavioural and morphological aspects of the plug production and function in a promiscuous spider, *Philodromus cespitum* (Philodromidae). In this species, the plugs are made of an amorphous material and are placed into the atrium of the epigyne. We performed mating trials in the laboratory with virgin males and females to investigate plugging rate and factors affecting plug production and efficacy. The copulation in the species is brief and it is terminated by the female. It consists of one or several insertions and already a single insertion may result in a complete plug (i.e. covering whole genital atrium). During the trials, the plug material was produced nearly in all cases but it covered the female atrium to various extents. The amount of the plug material was affected by male courtship behaviour during which male tapped the female body with his forelegs. Mating trials with females with a complete plug revealed that plugs can be partly or entirely removed. The extent of plug removal was again affected by male courtship. Moreover, the plug was removed to a larger extent if the femur of the first leg of the second male was longer than the femur of the first male who produced the plug. Our results demonstrate that plug production is a general component of mating in *P. cespitum* that can effectively avoid sperm competition. However, male plugging success seems to be strongly influenced by female decisions as well as physical characteristics of the subsequent male.

Poster presentation

On the recent synonymy in orb-web genus *Larinioides* (Araneae, Araneidae)

Anna Šestáková[1,2], Yuri M. Marusik[2] & Mikhail M. Omelko[3,4]

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Larinioides sclopetarius (Clerck, 1757) was described in the same paper as *sericatus*, which was accepted as its junior synonym after Westring's revision (1851). However, using of these two names was almost equal in taxonomy references: *L. sclopetarius* (32 entries in the World Spider Catalogue) and *A. sericatus* (9 in the WSC, and 31 in Bonnet). Our previous study revealed that the original figure by Clerck depicts typical characters for male of *L. cornutus* (Clerck, 1757). Clerck (1757) described spiders only from Sweden, where there are known only three *Larinioides* species. From them only *L. cornutus* has a terminal apophysis long and tapered as Clerck illustrated. After the principle of priority, the synonym *L. sericatus* is revalidated and is the accepted name. Although the original description of *L. sclopetarius* characterised *L. cornutus*, only a few arachnologist made the same mistake. So almost all published *L. sclopetarius* are not *L. cornutus*, but *L. sericatus*. Clerck's figure has unfortunately one problematic imperfection, the "missing median apophysis". This could lead to misinterpretation that the drawing could have been mixed up and did not belong to any *Larinioides* at all. A recently published revision considers it as misplaced figure of male palp of *Araneus angulatus* Clerck, 1757. But unlike *A. angulatus*, the male palp of *L. cornutus* has a terminal apophysis upwards (not downwards), moreover the male of *A. angulatus* has distinct humps on the opisthosoma, massive tibia II with strong spines and a visible big spur on coxa II. It is hard to believe Clerck did not mention such conspicuous characters. In addition he noticed that after final moult subadult males did not change their general appearance, which did not fit these adult males. This is strong evidence Clerck did not describe any adult male of *A. angulatus* in his book, thus the figures cannot be mixed up. The question is, where is the disappeared median apophysis? It is a historical fact Clerck pinned his spiders as is used for insects, and dry specimen are fragile, so the apophysis could be broken off during examination. The aim of this report is to support our study adding historical facts and demonstrating morphology characters in detail.

Poster presentation

Spider assemblages on Scots Pine (*Pinus sylvestris* L.) in Borská nížina lowland (W-Slovakia)

Katarína Hollá[1], Anna Šestáková[2], Milada Holecová[1] & Miroslava Kupková[1]

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Spider communities of Scots pine monocultures of the Borská nížina lowland were investigated, as these are predators of several forest invertebrate pests. This report represents partial results of two (SP 5 and 6) out of seven localities. During 2014 a total of 90 species of 18 families were collected (5986 ex.) using the beating method. An investigation of quantity showed that the most abundant were Araneidae (24.91 %), Philodromidae (24.87 %) and Theridiidae (15.27 %), and qualitatively the most diversified were Araneidae (17 spp.), Linyphiidae (15 spp.), and Thomisidae (12 spp). The most abundant spiders on SP 5 were Araneidae with the eudominant species *Araneus sturmi*, and Philodromidae on SP 6 with the eudominat *Philodromus collinus*. Although both localities had five dominant species in common, they differed in two additional dominant species, *Xysticus audax* on SP 5 and *Dendryphantes rudis* on SP 6. Exclusively *Oxyopes ramosus* (34 ex.) and *Pistius truncatus* (4 ex.) were found only on SP 6, and *Walckenaeria* sp. (35 ex.; only subadults), *Trichoncoides piscator* (8 ex.) and *Araneus angulatus* (5 ex.) on SP 5. These values could be explained by different microhabitats caused by the dissimilar age of trees of the localities. The maximum density of spiders were observed in September on both studied places. Whereas adult abundance balanced on both studied places with one indistinct population peak (from May to June), juveniles showed two obvious peaks (in April and September). Analysis of feeding guild pointed on species belonging predominantly to web-builders, and from April to August increased abundance of ambushers (especially on SP 6). In general stalkers lacked during the winter season with the exception of a few specimens, which could be caused by unusually mild temperatures. According to hierarchical clustering analysis using complete linkage method, the most similar communities were in January, and they were the closest to the cluster of spiders collected in February (SP 5, 6) and March (SP 5).

The research was supported by grants VEGA č. 1/0066/13 and 2/0035/13.

Poster presentation

Spiders (Arachnida, Araneae) in steppe ecosystem of Central Russian Upland North

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"Oka flora" is a unique phenomenon evolved in the Oka river valley in the south of Moscow Area in particular. Within the Forest Zone are situated small steppe patches (about 1.5 ha) in which typical steppe plants grow: feather-grass *Stipa joannis*, fescue *Festuca sulcata*, *Frutillaria ruthenica*, etc. separated from their main habitats by many hundreds of kilometers (the most northern locality on the Central Russian Upland). So small plant populations in the alien surroundings are extremely vulnerable, and it is not surprising that they survived mainly in protected areas (e.g. Doly tract in the Prioksko-Terrasny Nature Reserve, our study site). The steppe spider community has specificity, and it is interesting how it manifests itself in the little steppe plots inside a real forest landscape. For comparison, we studied two other meadow formations in the neighbourhood by sweeping and pitfall trapping in 2014. The spider composition of the steppe meadow was found to be most similar to the lowland one (the second river terrace). A half of their species were shared in common, with a Jaccard's coefficient of community of 0.54, whereas with the upland meadow it was only 0.329. The "steppe" yielded a species richness of 46 species against 52 and 56; Margalef index 7.1 against 7.7 and 9.0 in lowland and upland, respectively. The general differences in dominance structure came from the presence or absence of groups, which were typical or atypical for the Steppe Zone, which is remarkable. Thus, Linyphiidae – a hygrophilous family unrepresented in arid zones – were practically lacking in the steppe ecosystem (both herpeto- and hortobiontous). In opposite, xerophilous Oxyopidae were rare in the forest zone butwere ten times more abundant in "steppe" than in other habitats. Salticidae, widespread in different nature zones, were about equally distributed among grasslands. Gnaphosidae were less active in steppe sites and vice versa for Lycosidae (70 % of pitfall catch against 60 % in other habitats). Xerophilous lycosids were dominant; hygrophilous species were absent (e.g. *Piratula hygrophila*, prevailed in upland meadow, and *Trochosa terricola*, quite frequent in lowland). In early May, different species of Alopecosa predominated in steppe (e.g. *A. cuneata*, *A. inquilina*) and lowland meadows (e.g. *A. pulverulenta*) unlike the uplands where *Pardosa* spp. (e.g. *P. fulvipes*) prevailed. But in both ecosystems *Pardosa* (e.g. *P. palustris* and *P. riparia* respectively) as a dominant changed to Alopecosa by the end of month.

Poster presentation

A contribution to araneofauna of western Bosnia and Herzegovina

Nataša Sivec

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The spider fauna of Bosnia and Herzegovina is very poorly investigated. The purpose of this short survey was therefore to obtain more faunistic data on spiders of western Bosnia and Herzegovina. The survey was conducted in spring 2014 in areas of Duvanjsko polje and Livanjsko polje, karst fields of high karst in Bosnia and Herzegovina. During 4 days of field work, the spiders were sampled on 8 localities using selective and non-selective methods (litter sifting, sweep neting, hand collecting with forceps and aspirator, and beating). Due to continental climate and higher elevations of sampling sites, only 19 species from 17 genera and 8 families were represented with adult specimens during the time of sampling, nevertheless the results of this survey provide new faunistic data for one of the least investigated araneofauna in Balkans.

Student - Poster presentation

Demons from the depths: Evolution of troglomorphy

Zdeněk Škopek[1], Roman Ozimec[2] & František Šťáhlavský[1]

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Since the dawn of men, underground habitats lured people's curiosity. Their fantasy inhabited caves and various environments with a lot of mythical creatures and gods. In 1768, these legends became true when *Proteus anguinus* (Amphibiae: Proteoidea) was discovered. On the first sight it really looked like something from a different world. Since then, plenty of cave organisms were discovered. Their most visible, and the most interesting common feature is their morphological adaptation to an underground environment. This complex of adaptations, such as loss of eyes, pigmentation and elongated appendages, is called troglomorphy. It reflects extreme underground conditions: lack of light and primary producers, scarcity of food, constantly high humidity and limited annual thermal fluctuation. The need for classification of cave fauna led in the first quarter of twentieth century to establishment of three groups of cave organisms. Currently, these categories are based on their ecological status and life-histories. These groups are represented by: troglobiont – obligate cave dweller, troglophile – facultative cave inhabitant, and trogloxene – accidental visitor of underground environment. They display different levels of troglomorphy, that can be used for determination of undreground animals. The aim of our current project is to examine and describe cave adaptations in specimens of the pseudoscorpion family Neobisiidae from Dinaric karst. The family Neobisiidae is a logical choice due to its abundant occurence in the cave environment in Dinaric karst. In our project we are willing to study several species with different levels of troglomorphy. During our work we will examine, which part of their body was adapted most. It seems that in pseudoscorpions, unlike other cave inhabitants, the level of troglomorphy can become a reliable factor in determining the group (troglobiont, etc.) of cave specialisation.

Student - Poster presentation

The Carpathian scorpion: *Euscorpius carpathicus* (Scorpiones: Euscorpiidae): Prey selection and capture behaviour

Alexandru Sotek[1], Iulian Gherghel[2] & Alexandru Stugariu[1]

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This is the first study to focus on feeding behaviour on a species belonging to the *Euscorpius* genus. Prey selection and capture behaviour of the Carpathian scorpion *Euscorpius carpathicus* (Scorpiones: Euscorpiidae) was observed in the lab over a period of 24 weeks. The behavioural components involved in prey capture were identified and an ethogram was generated. We analysed the occurrence of prey acceptance in three different types of prey as well as the occurrence of different prey capture components used after the acceptance phase. The Carpathian scorpion is nocturnal and hunts prey by the use of a sit and wait strategy, where prey is either located in the opening of the scorpion's burrow/hiding place or, on some occasions, actually bumps into the scorpion. Like most members of *Euscorpius* genus the Carpathian scorpion relies mostly on its strong pedipalps to capture prey whereas the sting is seldom used and for defense purposes.

Student - Poster presentation

The distribution specificity of some European spider species near the eastern limits of their ranges

Artem Sozontov

Department of Ecology of Animals, Udmurt State University, Izhevsk, Russia

The ecological-faunistic researches of the spiders of the eastern part of the Russian Plain began during 2007. As a result of long-term studying I found more than 40 species that have here an eastern edge of their ranges. A species general distribution analysis shows dependence between spider species affinity to natural zones and a peculiarity of a longitudinal component of their distributions. In particular, the shapes of the eastern borders of the ranges are different between boreal, temperate, subboreal, and steppe species. In my opinion, observed individualities are explained by the interactions of a complex of zonal-climatological and historical factors. The data received can be used in a diagnostic analysis of the zoogeographical individualities of the studied region and the reconstruction its faunogenesis.

Work supported by RFBR, project # 14-04-31178.

Poster presentation

Pseudoscorpions of the Czech Republic

František Šťáhlavský

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Despite of the fact that the pseudoscorpions represent small animals (app. 2 mm body length), they represent a generally known group of arachnids even to the public. However, their small size together with the morphological similarity of many taxa may be the cause of a weak interest in studying this group. All this is a reason why many taxonomic tasks have remained unsolved and we only have a fragmentary knowledge about their ecology, distribution and phylogenetic structure of most of the taxa even within the reasonably well-studied Europe. The pseudoscorpions from the Czech Republic are an exemplary proof of this limited knowledge. From the end of the 19th century, pseudoscorpions had been intensively studied by Stecker, who described many new species from Bohemia, few of which appeared later to be synonyms. After this initial interest there is rather scarce faunistic data for the next 100 years, and the situation was not changed either even after the publication of a key for European pseudoscorpions (Beier 1963) or its Czech version for the former Czechoslovakia (Verner 1971). The breaking point happened after the Czech and Slovak separation when the intense study of pseudoscorpions started thanks to the field work of Dr. Ducháč (who wrote over twenty faunistic papers). During the next fifteen years, the study of pseudoscorpions became focused on a more complex analysis of fauna of this order within larger geographical units (the region of Prague, Dolní Povltaví and Podřipsko, Litovelské Pomoraví, Břeclavsko, National Park of Podyjí, Třeboňsko, Kokořínsko, Czech Karst). This approach enables us to better understand the ecological demands of individual species. There are 38 species from seven families well documented from the Czech Republic. However, the abundant material shows a need to revise some taxa and checking of previous determinations. Moreover, the Czech Republic seems to to be an important point where the eastern European species meet up with the western European ones, which is known in other groups of organisms. Comparing our knowledge about pseudoscorpions from the Czech Republic with surrounding countries clearly shows that we are still lacking complex data on this group and some additional research is required.

Oral presentation

Karyotype evolution of scorpions from the family Buthidae (Arachnida: Scorpiones)

František Šťáhlavský[1], František Kovařík[1], Petr Nguyen[2,3], Jana Plíšková[1], Petra Režňáková[1], David Sadílek[1] & Peter Vallo[4,5]

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The family Buthidae has 92 genera with more than a thousand species and currently it is the most diverse and most basal group of scorpions. From a cytogenetics point of view, their unique status within scorpions is caused mainly by the presence of holokinetic chromosomes. This family has been studied very intensively, so more than a half of the cytogenetically analysed scorpions belong to the Buthids. Although the total number of chromosomes in Buthids is lower (2n = 5-56) compared to the other scorpions (2n = 28-175), a significant intraspecific variability was found in some buthid species (e.g. *Tityus bahiensis* 2n = 5-19). The explanation for this variability may be the possible fisions and fusions of holokinetic chromosomes. On the other hand, some genera from this family seem to be rather uniform. The understanding of karyotype evolution of this family is rather difficult due to the fact that holokinetic chromosomes are often uniform and possible differences have not been compared with genetics or phylogenetics of analysed taxa. Therefore, we analysed various representatives of Buthids from different geographical regions and compared them with their known phylogeny. Additionally, we provided the data with FISH for 18S rDNA that enabled us to track changes in the number and localisation of NORs. We found significant differences in the rate of karyotipic differentiation of Buthids and it seems that the fisions and fusions are not as frequent as the published results imply within the *Tityus* genus. On the contrary, the rate of the genetic variability can be considerably effected by vastly present reciprocal translocations.

Poster presentation

The level of energy resources in *Steatoda grossa* female spiders exposed to food contaminated with cadmium and copper

Monika Stalmach, Anna Kajdaszuk, Michał Dudek, Justyna Kuczek, Elżbieta Szulińska, Magdalena Skowronek & Grażyna Wilczek

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Exposure of animals to environmental stressors, including metals, may result in changes to their energy balance. This situation is related to allocation of a part of the energy derived from the basic components of the energy budget (i.e. energy originating from the production – growth and reproduction – or/and costs of organism's maintenance) to repair processes, including detoxification and bioelimination. In this work, we evaluated the effect of oral administration of cadmium (Cd) and copper (Cu) to sexually mature *Steatoda grossa* (Theridiidae) spiders in a simple food chain model (medium with metal → *Drosophila hydei* fly → spider) on changes in biomass yield and the level of lipids, carbohydrates and proteins. The length of exposure to metals was two and four weeks. Measurements of the concentration of energy and building resources were performed using spectrophotometric methods. The content of Cd and Cu was analysed using atomic absorption spectrometry (AAS). The content of Cd in spiders from the groups fed with contaminated metal for two and four weeks was two- and four-fold higher, respectively, compared to spiders from the control group. The average Cu concentrations were higher in spiders from Cu-groups than in the control groups by about 7 %. Spiders maintained on a diet contaminated with Cu and Cd were characterised by a decrease in biomass yield by 10 % and 20 %, respectively, compared to control animals after two weeks of exposure to medium with metals. The decrease in the biomass yield was 24 % and 27 % for Cd and Cu, respectively, after four weeks of exposure to medium with metals. The protein level was the lowest in spiders administered with Cu for two weeks and differed from the control values by 27 %. No significant differences were observed in the glucose and glycogen levels between control spiders and spiders on a diet containing metals. Spiders fed with specimens contaminated with Cu for 2 weeks had more lipids by 33 % compared to the control group, whereas after 4 weeks this difference increased up to 45 %. Cadmium exhibited weaker effects, because the concentration of fat in the organism has increased to a level that was 25 % higher compared to the control group, regardless of the length of the exposure period. The results obtained in this study indicate the possibility of increasing the energy reservoirs in the organism in response to food contaminated with metals, ensuring a better tolerance towards environmental stress factors.

Student - Oral presentation

Neuroplasticity in a jumping spider

Philip O. M. Steinhoff[1], Jannis Liedtke[2], Andy Sombke[3], Steffen Harzsch[3], Jutta M. Schneider[2] & Gabriele Uhl[1]

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Behavioural plasticity is usually associated with neuroplasticity, as changes in brain anatomy can be necessary for an organism to cope with changes in the environment. In some hymenopteran species, volume changes in specific brain areas have been found that are linked to learning, experience and formation of memory. Jumping spiders are known for a wide array of complex behaviours. Previous studies have shown that salticids possess extraordinary cognitive abilities including planning, learning and reversal learning. However, the underlying brain structures which enable them to exhibit such flexible behaviours are basically unknown. We explored the nervous system of the jumping spider *Marpissa muscosa* and compared the volumes of higher integrating brain structures of individuals that grew up in four different environments: (1) wild-caught spiders, (2) spiders reared alone in a deprived setup, (3) spiders reared alone in an enriched setup, and (4) spiders reared in groups of several siblings. Our results demonstrate that neuroplasticity occurs in spiders and that brain structures in *Marpissa muscosa* plastically respond to the environment the individual is confronted with.

Student - Oral presentation

Karyotype evolution of harvestmen (Arachnida, Opiliones)

Hana Svojanovská[1], Axel L. Schönhofer[2] & František Šťáhlavský[1]

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Harvestmen (Opiliones) represent a cytogenetically diverse order of arachnids. Currently it is known that considerable interspecific and, in some cases, also intraspecific variation in chromosome numbers (2n = 10-109), in some species there were detected specific hybrid zones of chromosomal races, presence of B chromosomes and variable degrees of morphologically differentiated sex chromosomes. Our knowledge about their cytogenetics come from the analysis of 85 species. However, in many species we only have available information from the diploid number, mainly from the suborder Eupnoi and species from Japan (see www.arthropodacytogenetics.bio.br/harvestmendatabase). For this reason, we analysed karyotypes and the course of meiosis of other phylogenetic lineages of harvestman from other geographic regions in more details. Our current results support previous knowledge about the karyotype diversity of harvestmen. However, we rather suggest the correction of the previous hypothesis about the karyotype evolution in some cases. Our detailed data show different rates and mechanisms of karyotype evolution within this order in studied groups. Owing to these differences, the cytogenetic method may help us to solve the phylogenetic or the taxonomic questions with different successin the various groups of harvestmen.

Oral presentation

Molecular analysis of prey choice by spiders

William O. C. Symondson

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My research is focused on predator-prey interactions and trophic relationships, involving both vertebrates and invertebrates. A major theme has been spiders which, like most predators, are not automata that eat prey at random. Certainly when prey are scarce they will eat whatever is available but at other times most species exercise some prey choice. Molecular diagnostics provide the opportunity to analyse such choices and to study how the relative abundance and diversity of different prey affects the choices spiders make. Here I will review my work revealing how non-pest prey can affect spiders feeding on pests in wheat, predation by spiders on pests in apple orchards, intraguild predation by spiders on other spiders, spiders using prey vibrational courtship signals to track prey down and the first use of next generation sequencing to analyse the complete dietary ranges of specialist and generalist species of spiders. I have also shown how molecular diagnostics can measure predation on spiders by other generalist predators, such as carabid beetles, and demonstrate the enormous potential of this technology to investigate trophic relationships involving spiders in future.

Poster presentation

Back to square one: Secondary succession from different starting points. Reconstruction of sandy grasslands within the framework of the 'Kisalföldi Homokpuszta' LIFE project (LIFE08 NAT/H/000289)

Csaba Szinetár[1], Péter Kovács[2], Péter Molnár[1] & Gábor Takács[3]

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The aim of the 'Kisalföldi Homokpuszta' LIFE project is the preservation and restoration of the natural habitats of the calcareous, sandy plains in Kisalföld which were previouslyin military use. In particular, one of its most important nature conservation objectives is to increase the area of sandy grasslands. After the initial survey, the actual interventions were started which were monitored (among other methods) with the examination of the ground-level spider fauna. Comparative investigations were performed in the winter of 2013-14 and in the spring of 2014-15 on grassland reconstruction areas which were aimed to reach the same goal, but had different original states and received different treatments. The reconstruction projects started either from wooded areas (not native forests) or from degraded grasslands. Both areas (woodland or degraded grassland) received two different treatments (four parallel experimental groups in total). After complete land-remodeling (removal of old vegetation including the roots of the trees) and relief formation (liquidation of former military artificial terrain elements) in one case, the areas were left bare for spontaneous formation of grasslands, whereas in the other case the areas were re-cultivated with a special mixture of grass seed. The ground-level spider fauna was comparatively studied on the four reconstruction areas. According to expectations, early results showed that the repopulation of the surfaces started very fast. The tolerant, widely adaptable species of naturally or artificially disturbed habitats dominated the temporary landscape wounds. Primarily they were spiders adapted to disturbed habitats such as agricultural areas (agrobiont, *Pardosa agrestis*, *Tenuiphantes tenuis*, *Erigone dentipalpis*, *Porrhomma microphthalmum*). Up to now we measured a higher number of species and individuals on the grass-seed re-cultivated areas, but the difference was statistically not significant, because of the high variance of the sampling. Based on the species-composition and structure of the samples the two habitats were moderately distinct. The appearance of some sand-specialist and rare species (*Improphantes geniculatus*, *Bromella falcigera*, *Canariphantes nanus*) indicated that colonisation by those species has also begun, which permanent settlement, or, in the case of more common species, the increase in their number are desirable and hoped in the future.

This study was supported by the LIFE08 NAT/H/000289 grant.

Oral presentation

Cinderella and the sleeping beauty: phylogenetic placement of the subfamily Sulsulinae (Oonopidae)

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Sulsuline spiders are characterised by the capsulated tarsal organ (hence well fitting the name, *Cinderella* spiders), which is practically visible through SEM images only. We present the first morphology based phylogeny, to test their current placement, and to find new characters, which are easier to examine, helping their placement. New taxa are described and new genera are introduced to accommodate those. Additionally, African members of Orsolobidae are studied, especially a female specimen collected in Kenya showing the northernmost occurrence of the family in Africa.

Oral presentation

Bio-pesticidal potential of selected protein fractions of jumping spiders (Araneae: Salticidae)

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The present study was designed to evaluate the effectiveness of selected protein fractions of *Plexippus paykulli* (Audouin 1826) and *Thyenes imperialis* Rossi 1846 against *Rhopalosiphum erysimi* (Hemiptera: Aphididae). Live spiders were collected from citrus orchards and shrubs located in the vicinity of University of Sargodha, Sargodha (Pakistan). Spiders were immobilised by keeping them in the freezer at 3 °C for 5-7 minutes. Venom glands of spiders were separated following the method described by Guerrero (2009). The protocol described by Sambrook & Russle (2001) was used to separate protein fractions from the venom. One protein fraction (25-30 kD), from the venom of each spider, was selected for the study based on the literature. The mortality rate of *R. erysimi* was 79.5 % and 90 %, respectively, against protein fraction of *P. paykulli* and *T. imperialis*. It is concluded that both protein fractions could be considered for further studies for bio-pesticide production.

Student - Poster presentation

Group selection harvesting supports the diversity of ground-dwelling spider assemblages

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Timber-oriented forest management alters heavily the environment and threatens the survival of many native species. Recognition of the scale and the effects of forest loss have resulted in a considerable degree of interest in reforestation. During reforestation, even-aged (modified clear-cutting, seed tree method and shelterwood harvesting) and uneven-aged regeneration methods (group selection and single tree selection) are recommended, because these sylvicultural practices could be less intensive and harmful than the conventional clear-cutting method. We investigated ground-dwelling spider assemblages in windthrows (size of 0.005 ha), gaps harvested by group selection (size of 0.05 ha), clear-cuts (size of 1 ha) and natural mature oak forest stands (size of 5 ha) in the Nagyerdő Forest Reserve Area (Debrecen, Hungary). Spiders were collected by litter-sifting from spring to autumn every fourth week during 2014. We assumed that group selection harvesting did not cause considerable changes to the environment and mimics the natural processes (windthrows), while clear-cutting altered drastically the original environmental characteristics. Therefore, we hypothesised that (i) the species richness of forest associated spiders is the lowest in the clear-cuts, compared to the gaps harvested by group selection, the windthrows and the natural forest stands; moreover (ii) the open-habitat species and light-preferring species are the most diverse in the clear-cuts. Our results showed that the species richness of forest associated spiders was the lowest in the clear-cuts confirming our hypothesis. The open-habitat and light-preferring species were the most diverse in the clear-cuts, also supporting our hypothesis. Our results demonstrated that group selection harvesting supports the diversity and composition of ground-dwelling spiders, therefore we recommend this method for forest management.

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Oral presentation

Optimal mating in *Pisaura mirabilis* females

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In species where females gain a nutritious nuptial gift during mating, the balance between benefits and costs of mating depends on access to food. Mating costs in *Pisaura mirabilis* include reduced fecundity, reduced egg hatching success and smaller young. Therefore, if foraging costs are low females maximise their reproductive success by rejecting males, but they should accept them if they are food limited. This means that there is not one optimal number of matings for the female but a range of optimal mating numbers. With decreasing food availability the optimal number of matings for a female should vary from the number necessary only for fertilisation of her eggs to the number needed also for producing these eggs. We tested quantitative predictions for the relationship between optimal mating numbers and prey availability in laboratory experiments.

Student - Poster presentation

Systematics and biogeography of *Cytaea* Keyserling 1882 (Araneae: Salticidae), preliminary results

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On the basis of morphological and molecular data, the genus *Cytaea* is placed in the Euophryinae subfamily and consists of 39 nominal species, distributed in Australia, Papua New Guinea, Indonesia and in SW Pacific islands. Most old descriptions are not sufficient to indentify the species and the redescriptions, meeting current standards, are necessary. At this stage it is obvious that some species will have to be synonymised or transfered to other genera. The study is based on type and new material; the latter comprises hundreds of samples and specimens collected during vast biodiversity surveys conducted all over Australia and Papua New Guinea. The data also include habitat/microhabitat preferences and detailed GPS co-ordinates, which will enable distributional analyses and bioclimatic modeling, both for individual species, species groups, the genus as such and its closest relatives (e.g. *Charippus*, *Euryattus*). During the project 70 species altogether of *Cytaea* have been identified. Their taxonomic analysis, based on morphological characters, especially on genitalic structures, allowed distinguishing eight groups of species; for them the molecular tests are going to be performed, to verify morphology-based classification. The distributional analysis of the genus shows distinctive biodiversity hotspots, located in the N of Western Australia, the tropical NW Queensland and in the S of Papua New Guinea. The final goal of the project is to find the correlations between the evolution of *Cytaea*, its distribution and bioclimatic history.

Oral presentation

Importance of post-industrial sites for threatened spiders in the Czech Republic

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Recently, various post-industrial sites have been revealed as important secondary refuges for many threatened arthropods, including spiders. Simultaneously, it is already apparent that these human-made habitats are not suitable for all declining species as some of them have never been found to colonise any secondary habitat. Although a lot of arachnological data from various post-industrial habitats already exists, we are not aware of any review and/or meta-analysis of the real potential of such sites for conservation of threatened spiders. We collated all available records of nationally threatened spiders, including our intensive surveys from the past decade, in various human-made sites in the Czech Republic and analysed this dataset, focusing on threatened species. In our presentation, we will review our results, in particular compare the importance of different post-industrial habitats as refuges. Furthermore, we will reveal the spider guilds for which post-industrial sites have the highest and lowest conservation potential. Based on our previous applied studies, we will also summarise rules of successful restoration considering the needs of threatened spiders.

Student - Oral presentation

Density-dependent fitness and dispersal in a colonial spider, *Cyrtophora citricola*

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Density-dependent dispersal is a common dispersal strategy in nature, mainly as a mechanism of escaping the decrease in fitness associated with high intra-specific competition. However, in group-living species it is expected that living in high densities will be beneficial for the individual – at least until reaching a certain threshold. Colonial spiders are an interesting example of group-living animals, often reaching high densities but also capable of solitary living. Despite the lack of direct cooperation between individuals in prey capture or in raising offspring, previous studies have shown that other, indirect benefits may arise from colony-living; e.g. increased prey capture by a "ricochet effect" – bouncing of insects between the highly dense webs. Thus in group-living species, a possible mechanism for maintaining optimal densities and for increasing individual fitness is negative density-dependent dispersal at low densities. In order to examine this hypothesis we studied the effect of colony density on fitness and dispersal in the colonial spider *Cyrtophora citricola*. In laboratory experiments we found that individual body mass was higher in juvenile spiders living at higher densities, suggesting an increased fitness. Spiders captured prey more quickly at high densities and the frequency of aggressive interactions was low in all densities, both implying low interference between spiders. In order to assess dispersal propensity, we used the spiders' pre-dispersal „tip-toe behaviour" that can be studied in laboratory conditions. A trend of decreased dispersal was indeed found at high densities. In addition, the site-tenacity of spider hatchlings on trees containing adult female colonies of different densities was examined in semi-natural conditions, revealing a positive effect of conspecific presence on site tenacity. The results of this study suggest an intriguing interplay between Allee effect and dispersal strategy, which may have an important role in the life history and distribution of colonial spiders and group-living species in general.

Poster presentation

Feeding behaviour of the spider *Lycosa poliostoma* (Araneae: Lycosidae) on different soybean pests from Uruguay

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The soybean has become the most common crop in Uruguay during the last 10 years. Because of this, the use of pesticides and other agrochemicals to provide pest and weed control has increased dramatically during the same period of time. Additionally, the use of biological control agents in Uruguay is very poor in comparison with the traditional methods which employ both selective and non-selective insecticides. Although spiders are considered the most abundant group of predators found in several soybean systems in Uruguay, and therefore are potentially useful as biological control agents, the studies about feeding preferences and predatory behaviour in this group are scarce. The aim of this paper was to analyse the predatory behaviour and feeding preferences of the most common spider found in Uruguayan soybean crops, *Lycosa poliostoma* on the most common pests, such as the ant *Acromyrmex lundii*, the cricket *Anurogryllus muticus*, and the lepidopteran larvae *Anticarsia gemmatalis*. In order to do this, we offered all the prey randomly to 30 spiders of *L. poliostoma* and recorded the acceptance rate, immobilisation time and feeding strategy. We found that the crickets were the most accepted prey type followed by larvae and ants. The immobilisation time showed a different pattern, where the shortest times were found for larvae followed by ants and crickets. The predatory sequence was different for all the prey types and some behavioural units were exclusively found in some prey types like the leaps used by the spiders to capture the crickets. These results suggest that the feeding versatility of this species, might allow it to control pests which attack different stages from the soybean crop like the ants and larvae. Further studies should contrast these results with the natural diet of *L. poliostoma* and also evaluate its feeding preference over non-perjudicial arthropods such as other natural enemies found in the soybean crops.

Poster presentation

Facultative sexual cannibalism in apparently monogamous spider *Alpaida veniliae* (Araneidae)

Carmen Viera[1,2] & Marco Benamú[2,3]

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We conducted behavioural assays in controlled laboratory conditions to test the predictions that male *Alpaida veniliae* (Keyserling, 1865) with larger absolute and relative size in relation to their mate and those having longer courtship and copulation duration would have a lower probability of being cannibalised by females after a sexual encounter. We performed a set of mating trials exposing males of different sizes to virgin females. We observed copulation in 88.8 % of mating trails; its duration was very brief compared to courtship. Only a few attempts (16.7 %) of recopulations with the same female were recorded, and in all these cases the first copulation was significantly shorter than the mean copulation duration of those who had only one mate. All the females were fed ad libitum to avoid the influence of hunger on cannibalism occurrence. The percentage of postcopulatory cannibalism was 47.6 %. There was no correlation between the relative and absolute male size and duration of courtship and copulation. Postcopulatory cannibalism was independent of courtship and mating durations but was affected by absolute and relative male size. We found a clear correlation to the size of males that were cannibalised. Smaller males were more frequently cannibalised than large ones. However, it remains unclear whether sexual cannibalism in A. veniliae may be explained by female mate choice or whether smaller males are less able to escape or defend themselves, over the amount of food provide. More studies on reproduction success are needed to understand the underlying factors of postcopulatory cannibalism of *A. veniliae*, as well as to elucidate their possible ecological and evolutionary implications to understand this facultative cannibalism.

Poster presentation

Spermatic induction behaviour of the Uruguayan spider *Anelosimus vierae* (Theridiidae)

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Spiders are predators, cannibals and intolerants, so they are mostly solitary. However, a few species have developed some degree of social behaviour. Most work in social spiders are about cooperative aspects of the construction of a communal nest, prey capture and care of the young, falling behind studies on sexual behaviour. The aim of our study was to describe the courtship, mating and sperm induction of the Uruguayan subsocial spider *Anelosimus vierae*. We recorded and analysed the behavioural units involved, and the duration and frequency in 30 male-female dyads for two hours. The male courtship included the units: walk, turn, vibration and groping with front legs and palps. Once the female accepted the courtship, the male made several attempts to insert, tapping with the palps the female epigyne, until the introduction of one of them, with which he performs multiple ejaculations. Later the couple separated, and the male inserted the other palpus. The total duration of copulation was 1h 18 m 54s ± 16m 53s, and ended when the female turned his body, or when the male withdrew the palpus. Then the male performed abdominal movements setting forth silk threads at certain points, building sperm web with a few threads and hourglass shape. This activity lasted 35.47 ± 7.13s. Immediately, he performed abdominal movements up and down until a drop of sperm emerged that he deposited on the sperm web, this process lasted 35.58 ± 11.42s. Then they placed the tip of one palp into the semen drop and moved it performing fast vibratory movements, and after that they did the same with the other palp. The total duration of the induction was 3m 22s ± 1m 5s. Males performed sperm induction after copulation and within the two hours of experience, there was no re-mating. Studies on the reproductive mechanisms of this species are essential, not only to learn how the sexual selection operate, but also to understand the evolution of sociality in spiders.

Oral presentation

Latrodectus hasseltii - another unwanted Australian in New Zealand

Cor Vink

Canterbury Museum, Christchurch, New Zealand

Latrodectus hasseltii, the Australian redback, is an invasive spider that has been established in New Zealand since 1980. As well as its medical importance, *L. hasseltii* is a conservation threat to threatened endemic chafer beetles, skinks and New Zealand's endemic widow spider, *Latrodectus katipo*. This unwelcome Australian spider has the capability to spread further than its current range in New Zealand and can also spread to other parts of the world. However, there is hope for controlling it biologically using pheromones.

Poster presentation

Revision of the spider family Dysderidae in Albania (Araneae)

Blerina Vrenozi[1] & Christoph Hörweg[2]

[1] Museum of Natural Sciences, Research Center of Flora and Fauna, Faculty of Natural Sciences, Tirana, Albania; [2] Museum of Natural History, Vienna, Austria

The dysderids of Albania from the collections of the Museum of Natural Sciences in Tirana and the Museum of Natural History in Vienna are reviewed in this paper. The material was collected from several areas of Albania, mostly by Arnold Penther and the first author. The results showed four new species of dysderids for Albania: *Dasumia laevigata*, which is newly recorded for the Balkan Peninsula, *Dysdera enguriensis*, *Dysdera longirostris* and *Harpactea doblikae*. Several specimens of the genera *Dasumia*, *Dysdera*, *Dysderocrates*, and *Harpactea* with respectively one, six, one and two species were re-identified from the museum collections. This contribution also includes previously identified dysderids from Tirana district and a revision of the scarce literature on the dysderids of Albania. Detailed information on and photos of the new species and some of the Balkan endemics are provided.

Poster presentation

Proteomic explanations for the adaptive significance of kin recognition in the subsocial spider *Stegodyphus lineatus* (Latreille, 1817) (Eresidae)

André Walter[1], Kristian Wejse Sangaard[2], Jesper Smærup Bechsgaard[1] & Trine Bilde[1]

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Kin selection theory predicts that cooperation should evolve among kin to reduce the costs of helping and the incentive to cheat. As a necessary prerequisite, individuals need to recognise kin to direct their help towards them. Thus, kin recognition is a key feature of many social animals. We investigate the adaptive significance and the mechanisms of kin recognition in the subsocial spider species *Stegodyphus lineatus*. These spiders cooperate in hunting and feeding, and they preferably associate with kin. Moreover, cooperation amongst kin increases foraging efficiency compared to groups of unrelated individuals. However, intra-specific aggression is low and un-related individuals are also tolerated when social groups are formed, and competition seems equally pronounced between kin- and non-kin -members of a group. Thus, it is unknown why and how kin recognition is maintained. Apart from visible interactions, competition may take place at the digestive level. We explore the possibility that a kin-specific extra oral digestion is responsible for the better performance of related spiders in communal feeding. We hypothesise that differences in feeding efficiency between kin- and non-kin-groups derive from either predefined amounts of released enzymes depending on the relatedness of co-foragers or compatibility problems of enzymes of un-related individuals. Thus, rather than showing aggressive behaviour towards non-kin individuals, which would oppose the general benefit of group living, spiders may compete at a molecular level. We sampled digestive fluids of individuals from different nests of *S. lineatus* and, for comparison, from the social sister species *S. mimosarum*. We present the results of proteomic analyses which reveal low variation in the protein, and in particular enzymatic, composition between nests and between species. This result highlights that the digestive enzymes are highly conserved within the genus, probably due to a high specifity to their targets. Thus, it is unlikely that molecular competition explains the importance of maintaining kin recognition in *S. lineatus*. Future investigations will therefore concentrate on quantitative differences in individual digestive fluid release between kin group and non-kin group communal feeding. Cheating may be an alternative explanation for the maintenance of kin recognition in our study species as it may be increased when feeding occurs with unrelated individuals.

Poster presentation

Diet influences female signal reliability for male mate choice in *Argiope trifasciata* (Forsskål, 1775) (Araneidae)

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Pheromones, arguably the most ubiquitous mode of animal communication, are determined by both genetic and environmental factors. Recent evidence suggests that diet may be an important determinant of pheromone variation, which may both enhance and reduce the reliability of the chemical signal. We investigated experimentally the impact of population origin and diet on chemical signals used in mate assessment by monogynous males of the banded garden spider, *Argiope trifasciata*. Initial mate preference experiments revealed environmentally determined fine scaling of male mate choice: shortly after their introduction into the laboratory, male *Argiope trifasciata* spiders preferred females from either their own or a nearby population rather than females from a distant population, suggesting male choice is driven by phenotype matching, ensuring correct species identity. However, when diet was controlled, males preferred females originating from a distant rather than the same population, allowing males to choose a mate with the most potential genetic benefits. A second set of experiments clearly demonstrated that diet affected the chemical compounds on the surface of the silk threads produced by females, and that males prefer females that have experienced a similar diet. We suggest that phenotype matching strongly influences broad-scale male mating preferences, but it remains to be seen how a combination of genetic and environmental (e.g. dietary) factors influence the relative abundance of these, and perhaps other, mate-choice relevant, silk-bound chemical cues.

Student - Oral presentation

Investigating temporal patterns of neurohormonal levels associated with aggression and wariness in orb-weaving spiders

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While it is widely assumed that circadian rhythms benefit organisms by allowing them to anticipate changing conditions, only a few studies have directly tested this. Being both predator and prey, orb-weaving spiders offer a novel, tractable model system to test whether circadian rhythms are adaptive due to their variety of temporal foraging strategies across species. Previous work suggests that spiders modulate their aggression/wariness over the 24-cycle and that aggression and wariness are modulated by biogenic amines (neurohormones). In this study, we analysed temporal changes in catecholamine levels in three orb-weaving species with differing temporal foraging strategies. *Larinioides cornutus* (nocturnal), *Micrathena gracilis* (diurnal), *Verrucosa arenata* (continuous forager), were collected from sites in northeast TN. After a 7-day entrainment period, spider cephalothoraxes were dissected and haemolymph was collected at 4 different time points over a 24-hour cycle. We measured neurohormone levels in lymph and cephalothoraxes using high-performance liquid chromatography with electrochemical detection. Levels of catecholamine neurohormones did change over the 24-hour period with all three species, however the patterns found were not uniform. Like brain-reward pathways in many other taxa, dopamine levels did rise during foraging periods in the two non-continuous foraging species (*L. cornutus*, *M. gracilis*). Patterns among the three species could be due to alternate activity patterns, however more research must be done to determine how these specific catecholamines are being used physiologically.

Student - Oral presentation

Spider assemblages of mountainous mires and adjacent habitats

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The main aim of this research was to investigate the similarity of spider assemblages on mountainous mires and in the habitats that surround them. This study supplements the previous one, of which the main purpose was to compare the assemblages on different types of mires. From the great diversity of these habitats, four have been chosen: two raised bogs, surrounded by mountain pine and grasslands (one in the subalpine zone of the Giant Mountains 1410 m asl, the second one in the Izera Valley 830 m; SW Poland) and two transitional mires surrounded by a spruce forest. Pitfall traps and sweep net were used to collect spiders in these habitats and their nearest vicinity. Moreover, canopy cover and soil humidity were measured. The studied localities were checked approximately every 3 weeks, during one season (2012). On the basis of some previous research, I hypothesised that spider assemblages of mires would be largely isolated from those in neighbouring habitats, however the extent of isolation might also vary depending on the habitat characteristics. The results confirm most of my expectations, spider assemblages of mires were considerably isolated from the assemblages of neighbouring habitats. However, there were still many species in common, including a few dominant species. The diversity of spiders on mires was not the highest, but rare and characteristic species might have been found only there. Furthermore, there were differences in the grade of isolation between the assemblages of various mires, which related also to the habitats of the same type, i.e. the two raised bogs differed from each other, so did the transitional mires. I suggest a few possible explanations of this phenomenon. Finally – based both on my research and the literature – I propose the division of spiders according to their affinity to mires, and show its utility in comparing spider assemblages of these habitats. This study provides new information on spiders living in the habitats that are considered as valuable and endangered, it enables also a good comparison with already published data.

Student - Oral presentation

Diversity of the cave spider fauna in Chonduea Mountain, Nakhon Sawan, Thailand

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The study of the spider fauna in caves has not been comprehensively carried out. Our present work has been an attempt to provide relevant information regarding spiders, which would be the baseline documentation for the future studies in Thailand. A survey was carried out during June 2013 to December 2014 in five caves of Chonduea Mountain, Takli district, Nakhon Sawan, central Thailand. A total of 1,016 specimens, representing 24 families, 76 genera, and 116 species, were sampled during the whole study. Ochyroceratidae was the most dominant family and comprised 15 % (6 species) of the total catch, followed by Pholcidae (14 %) and Theridiidae (10 %). Numerically the most abundant species in the samples was Uloboridae (12 %) followed by Oonopidae (11 %), Filistatidae (7 %). The results of the present study indicate that ground hunting spiders (Pholcidae, Ctenidae, and Oonopidae) can be adequate bioindicators of cave ecosystem disturbance.

Oral presentation

Ecological distribution of Turkish scorpions

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The ecologically diverse, large territory of Turkey represents transitions between different geographic regions and ecozones, exhibiting habitats from humid seacoast to arid steppes and high mountains. The purpose of this study is to give concise ecological characteristics of Turkish scorpions. The ecology of all species of Turkish scorpiofauna (29 species belonging to 13 genera and 4 families) is addressed here for the first time, based on field work across all regions of Turkey. *Androctonus crassicauda*, *Buthacus macrocentrus*, *Compsobuthus matthiesseni*, *Hottentotta saulcyi*, *Leiurus abdullahbayrami*, and *Mesobuthus phillipsii* were common in arid steppes under stones (up to 1535 m). Among these, lithophilic *A. crassicauda* and *H. saulcyi* preferred to hide in rock crevices and stone walls and were anthropotolerant. *M. caucasicus* also hid in rock crevices in sandy areas. At the same time, *C. schmiedeknechti*, *M. nigrocinctus*, and *M. gibbosus* preferred humid and hot areas and did not exceed 1800 m. *M. eupeus* lived in both cool and hot conditions, at low or high altitudes (up to 2553 m). *Orthochirus zagrosensis* was found in scrub and steppe habitats. *Scorpio kruglovi* (Scorpionidae), the only burrow-making scorpion in Turkey, was active all year long except cold times. Three Anatolian endemics of Iuridae (*Calchas birulai*, *C. kosswigi*, and *C. anlasi*) were active at a cool time of spring in dry steppes, which may have included Quercus scrub, not higher than 1303 m. The Black Sea area relict *C. nordmanni* preferred humid microhabitats where it was active in spring and summer. The endemic of southwest Anatolia, *Neocalchas gruberi* was active in both spring and summer in pine forests along the Mediterranean coast. Other iurids also preferred humid pine forests: *Iurus kinzelbachi*, *Protoiurus asiaticus*, *P. kadleci* and *P. kraepelini* were found there under stones and in rock crevices. *P. kumlutasi* and *P. kadleci* were found in caves. The widespread *P. kraepelini*was distributed from sea level up to 2000 m, while *P. asiaticus* and *P. kadleci*were found at altitudes of 200-1700 m. Among Euscorpiidae, *Euscorpius avcii*, *E. gocmeni*, *E. italicus*, *E. lycius*, *E. mingrelicus*, and *E. rahsenae* inhabited humid habitats at low altitudes (below 1500 m). They especially preferred pine forests. *E. rahsenae* and *E. italicus* were anthropotolerant. *E. m. ciliciensis* was found at high altitudes (up to 2700 m, the highest record for scorpions in Turkey and for the genus).

Student - Poster presentation

The spider family Filistatidae (Arachnida: Araneae) in Iran

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Filistatidae is a relatively small, globally-distributed family currently comprised of 119 species placed in 19 genera. Taxonomically, the Filistatidae of Iran has been dealt with in three publications only: the first paper was published by Brignoli (1982), in which he reviewed the Western Palaearctic Filistatidae, recorded the family from Iran for the first time by describing three new species of *Zaitunia* and recording *Filistata insidiatrix* (Forskal, 1775). The second paper was published by Marusik & Zonstein (2014), where they synopsized the Middle East Filistata, described a new species from Azerbaijan, and provided taxonomic and faunistic data regarding *F. insidiatrix* in Iran. The third paper was published by Marusik *et al.* (2014), in which the genus Sahastata was recorded from Iran for the first time, and a new species was described on the basis of female specimens collected in southern Iran. Also, three faunistic papers have been published which provided some information regarding the distribution of *F. insidiatrix* in Iran (Ghahari & Marusik 2009; Ghahari & Tabari 2012; Tabrizi *et al*. 2014) and one recent publication provided the first Iranian record of *F. lehtineni* Marusik & Zonstein, 2014 (Moradi *et al*., in press). Our further studies resulted in the finding of three more new species of the genera *Filistata*, *Pritha* and *Zaitunia*, and the undescribed male of *S. sinuspersica*; according to these data, the number of Iranian filistatid genera and species are raised to four and nine, respectively, which indicates the highest species-richness of this family in the Western Palaearctic, and its highest genera-richness in the Palaearctic.

Student - Oral presentation

Biodiversity of epigeic spider communities in different managed non-forest habitats in the Eastern Carpathians

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We present results of the research of epigeic spider communities of non-forest habitats in the Slovak part of the Eastern Carpathians (model area Poloniny National Park). For the last few decades the studied territory came through significant political and economic changes that left traces on the country. The model area consists of an area of the Horná Cirocha Catchment which was evicted in the 1970's due to construction of a water reservoir and the Uličská Valley where the majority of agricultural land was abandoned after 1989. The accession of Slovakia into the EU (2004) is associated with the restoration of support for preserving typical landscape characters of this region (application agro-environmental programmes) using many of the abandoned agricultural parcels. Spider research was carried out in 20 study plots in 2011-2013 by using the pitfall trap method. Selected investigated plots represent six characteristic types of non-forest ecosystems, namely mountain meadows, wetlands, mesophilic meadows, abandoned grasslands, nitrophilous ruderal communities and permanent grasslands and mesophilic meadows with specific management. During the research period more than 47000 spider specimens belonging to 246 species were captured. Of the identified species, 29 species are listed in the Carpathian Red list in different categories of threat. Also finding one new species (*Micaria coarctata*) for the Slovak fauna is an important result of our research. We evaluated the composition and diversity of the studied communities, their changes in two annual periods of research and altitudinal gradient effect. From evaluated habitat types, the mountain meadows were the most important for the composition of spider communities concerning their biodiversity and zoological aspect. Differences in the composition of the studied communities were influenced by many factors and on the basis of the direct linear gradient analysis (RDA) it was verified that the factors moisture, mowing, coverage E1, altitude, nutrients in the soil, solar power and light were statistically significant. Also we analysed the spider fauna of the habitats which were selected as the important sites from a nature conservation viewpoint (different subsidies and special management). The results of this analysis confirm that special management has a positive influence on biodiversity and can be taken into account in the agro-environment schemes Common Agricultural Policy.

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Poster presentation

Blood coagulation disorder in rabbits produced by scorpion (*Mesobuthus eupeus*) venom.

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Stings from scorpions (*Mesobuthus eupeus*) produce disseminated intravascular coagulation and can result in death in humans. Acute myocarditis was induced in rabbits by intravenous injection of 2 mg/kg scorpion venom (*Mesobuthus eupeus*). Blood was collected before and 30 minutes after venom injection and processed for clotting time, platelet count, thrombin time and prothrombin time. The clotting time, prothrombin time and thrombin time were increased in venom treated animals. The platelet count was decreased after venom injection. These results suggested that the scorpion (*Mesobuthus eupeus*) venom can produce disseminated intravascular coagulation (DIC) in venom treated animals.

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