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BOOK OF ABSTRACTS

Committees

Organization committee:

Maria Chatzaki
maria.chatzaki@gmail.com

Katerina Spiridopoulou
aikspiridopoulou@gmail.com

Iasmi Stathi
iasmi@nhmc.uoc.gr

Secretary:
Kyriakos Karakatsanis
Eleni Panayotou
Aggeliki Paspati

Scientific committee:

Miquel Arnedo
Maria Chatzaki
Christo Deltshev
Victor Fet
Peter Jäger
Dimitris Kaltsas
Aristeidis Parmakelis
Emma Shaw
Iasmi Stathi

Organizers:

DEMOCRITUS UNIVERSITY OF THRACE
DEPARTMENT OF MOLECULAR BIOLOGY & GENETICS
6th km Alexandroupoli-Komotinh,
Dragana, 68100
ALEXANDROUPOLI
GREECE

NATURAL HISTORY MUSEUM OF CRETE
UNIVERSITY OF CRETE
PO BOX 2208
71409 Irakleio
CRETE
GREECE

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ABSTRACTS

O

POPULATION STRUCTURE OF *Pardosa sumatrana* (ARANEAE: LYCOSIDAE) IN THE WESTERN GHATS OF INDIA INFERRED FROM MITOCHONDRIAL DNA SEQUENCES

Ambalaparambil V. S.[1], F. Hendrickx[1], L. Lens[1] and A. S. Pothalil[2]

[1]Terrestrial Ecology Unit, Department of Biology, Ghent University, K. L. Ledeganckstraat 35 B-9000 Ghent, Belgium. avsudhi@rediffmail.com. [2]Division of Arachnology, Dept. of Zoology, Sacred Heart College, Thevara, Cochin, Kerala, India – 682013. drpothalil@rediffmail.com

The Western Ghats, one of the "biodiversity hot spots" of the world, is home to large numbers of arachnids of which spiders have a huge share. However, compared to other hot spots of the world, spiders of the Western Ghats are a poorly worked out group. Biota of this area is the product of drastic climatic, ecological and biogeographical history. A few studies are conducted to reveal the faunal affinity of the Western Ghats with other regions of the world. Unfortunately there are no studies focused on spiders. In this study, we attempt to expose the population structure of *Pardosa sumatrana* (Thorell (1890) (Araneae: Lycosidae) distributed along the Western Ghats based on mitochondrial DNA sequence data.

To study the genetic structuring of this wolf spider species, specimens were collected from 15 locations of the entire Western Ghats. A total of 55 (three individuals from 5 sites each in Northern Western Ghats (NWG) and Central Western Ghats (CWG), five adult female individuals from five sites of Southern Western Ghats (SWG) were subjected to genetic analysis. Mitochondrial DNA (mtDNA) from 1-2 legs was extracted with CTAB protocol and cytochrome *c* oxidase subunit I (COI) gene region analysed to find the haplotype diversity across the Western Ghats. The resulting sequences were edited using BioEdit and then aligned using ClustalW with default parameters. Nucleotide diversity and a minimum spanning tree were calculated using ARLEQUIN with uncorrected p-distances. ARLEQUIN was also used to test the significance of hierarchical structure using analysis of molecular variance based on 1000 permutations of p-distances and a priori division of the sample into two populations, from NWG-CWG (samples 1–10) and SWG (11–15) of the Palghat Gap, a potentially important biogeographic barrier. PAUP was used to infer most parsimonious trees and their bootstrap support, as well as to determine the permutation tail probability of the data in order to test for significant hierarchical structure.

Seven mtDNA haplotypes were observed among the 55 *P. sumatrana* sampled from 15 sites in the Western Ghats. Among this, 3 haplotypes were present in both CWG and NWG and 4 were present in SWG, and it is the first time this much variation has been found in any of the organisms studied so far in the Western Ghats. The observed seven haplotypes differed by between one and 25 substitutions, corresponding to 0.3–6.5% estimated sequence divergence. The neighbour-joining tree of the seven

haplotypes identified two distinct clades of haplotypes: clade 1 (CWG and NWG together) and clade 2 (SWG).

Tests for population differentiation were estimated using Wright's fixation index based on haplotype frequency. Comparisons between the 2 parts of the Western Ghats were highly significant. There is also a significant difference within SWG population. But all comparisons among the NWG and CWG samples were not significant. So two genetic stocks in the Western Ghats are recognized, a NWG-CWG combined and a separate SWG. Estimates of gene flow show that there is little exchange between SWG and the rest of the Western Ghats. Among populations of NWG and CWG regions exchange is evident. The resulted MP tree shows two monophyletic groups: one SWG group and CWG-NWG combined.

So this mtDNA based genetic analysis shows high levels of genetic variability within this species between SWG population and other parts of the Western Ghats. mtDNA has proved particularly effective for detecting population structure in spiders, and several studies have successfully used mtDNA variants to resolve population boundaries among spiders. The maternal inheritance of mtDNA also tends to accentuate genetic difference among populations compared to nuclear genes because it has smaller effective population size. In many circumstances, female inherited markers offer a distinct advantage because they provide perspective on female reproductive behaviour. This pattern of mtDNA is used to define groups that comprise discrete genetic populations and investigate patterns of dispersal and population subdivision in this region.

The consideration of local population differentiation is important in deciding how to conserve a fragmented population. High values of a local distinctiveness measure suggest that we should monitore a population more closely and attempt to find what factors are causing any disturbance the population may be undergoing. Most measures of local distinctiveness will predominantly reflect genetic variation between populations. Such variation can be regarded as indicating a departure from an ideal panmictic system, although it may also reflect long-term evolutionary processes as well as recent disturbance.

O

WHEN ARACHNE MET PROSPERO: BIOGEOGRAPHY AND EVOLUTION OF SPIDERS ON ISLANDS

Arnedo M. A.

Biodiversity Research Institute & Department of Animal Biology, Universitat de Barcelona, Av. Diagonal 645, 08028 Barcelona, Spain. marnedo@ub.edu

Islands are the test tube experiments of evolutionary biologists. The 200th celebration of Darwin's birth, also 150th anniversary of the publication of the *Origin of species*, and an arachnology congress hosted by the country of the thousand islands, provide an ideal framework to overview how island spiders have contributed to improve our knowledge on evolution.

Silk-mediated airborne dispersal and generalist predatory habits make spiders formidable pioneers. Aerial dispersal allows spiders to be among the first inhabitants of devastated or newly formed islands and colonize even the most remote archipelagoes.

Native spider faunas on remote islands are impoverished and disharmonic due to geographic, mechanical and ecological constraints upon dispersal. The chances of arriving to an island will ultimately depend on the distance from the source of colonization. Intrinsic biological factors, however, are also important, and medium-sized and large ground-dwelling spiders have most likely colonized oceanic islands by rafting on logs or other vegetal debris washed by rivers and waves. Unlike oceanic islands, the presence of spiders on continental or fragment islands is mainly the result of vicariance in response to a changing geography rather than chance dispersal. Plate tectonics and eustatic sea level changes have isolated spider communities formerly continuously distributed along large continental areas.

Ample opportunities for geographic isolation are a major force driving speciation in several spider lineages on islands. In other groups, however, local diversification has been most likely triggered by ecological factors or sexual selection. Adaptive radiations are trademarks of oceanic islands. Spider adaptive radiations have illustrated the deterministic nature of community assembly and the role of extinction in shaping island communities. Unlike oceanic islands, the main ongoing evolutionary processes associated to continental islands are those of relictualization and the formation of paleo-endemics.

Because of their generalist predatory habits, introduced spiders may pose a serious threat to island's native fauna. Conversely, island native spiders evolved in the absence of other aggressive predators, and thus lack effective defense and are themselves under threat by invasive species. Unfortunately, a complete assessment of the conservation status of island native spiders is seriously hampered by the lack of taxonomic knowledge, and many endemic spiders have probably already gone extinct as a result of habitat destruction without even noticing.

In this talk I will examine several examples of the topics outlined above and will further discuss the role of island spiders as models for the study of the evolutionary and ecological underpinnings of biodiversity as well as conservation issues.

O

WHERE DO THESE GOBLIN SPIDERS BELONG, OR THE *Camptoscaphiella* ISSUE (ARANEAE: OONOPIDAE)

Baehr B. C.[1], M. S. Harvey[2], C. Kropf[3] and Y. Kranz-Baltensperger[4]

[1]Queensland Museum, P.O.Box 3300, South Brisbane, Queensland 4101, Australia. BarbaraB@qm.qld.gov.au. [2]Western Australian Museum, Locked Bag 49, Welshpool DC, WA 6986, Australia. mark.harvey@museum.wa.gov.au .[3, 4]Natural History Museum Bern Bernastrasse 15, Bern, Switzerland CH-3005. Christian.kropf@zos.unibe.ch; yvonne.kranz@nmbe.ch

Caporiacco (1934) described a new Goblin Spider genus with the type species *Camptoscaphiella fulva* Caporiacco, 1934 from Pakistan. To date five species are known but the type species is classified as a nomen dubium by Platnick (2009) as the specimen is a juvenile female which Brignoli (1976) called "a classic example of a species inquirenda". Nevertheless the heart shaped sternum and the spination of the first 2 legs (tibia I and II with 4 pairs of long spines and metatarsi I, II with 2 pairs of long spines) are suggested to be good characters to separate this genus from most of the other Goblin Spider genera. Brignoli (1976) retained the genus, composed an emended generic description containing the weak dorsal and ventral scutes as important additional characters, and described two new species based on females, *C. strepens* Brignoli 1976, *C. silens* Brignoli, 1976 from Nepal. The first male of this genus was described in 1978 as *C. hilaris* Brignoli, 1978 from Bhutan; the enormous male palpal patella and the well separated cymbium and bulb were thought to be special features of this genus. A male from Sri Lanka misidentified by Simon as *Ischnothyreus peltifer* Simon, 1891 is actually an undescribed *Camptoscaphiella* species. The blind troglobites *C. sinensis* Deeleman-Reinhold 1994 from China and *C. infernalis* Harvey & Edward 2007 from Australia, were later added. Whereas *C. sinensis* shows the typical spination of the first 2 legs, the extremely large palpal patella, and the well separated bulb and cymbium, *Camptoscaphiella infernalis* lacks the leg spination and the palpal patella is only slightly enlarged. As part of the Goblin Spider PBI revisionary work it turned out that *Opopaea fosuma* Burger, Nentwig, and Kropf 2002 from Sumatra shares most of the special features with *Camptoscaphiella infernalis* but the eyes are well developed.

As the lectotype of *C. fulva* Caporiacco, 1934 deposited at the Museum Mailand is juvenile, shrunken and without any legs (Brignoli, 1976) it is very fortunate that there are 3 vials containing 3 males from the Natural History Museum in Geneva collected very close to the type locality. *Camptoscaphiella fulva* was collected in Pakistan, Karakoram near Askole 35°59'N, 75°49'E (coordinates derived from Google Earth) at an altitude of 3100 m, and the 3 new males were collected in Pakistan, Hazara district, Kaghan Valley 35°07'N, 73°59'E. We describe the male of *C. fulva* for the first

time. *Camptoscaphiella infernalis* and *Opopaea fosuma*, will be transferred to a new genus.

O

STUDIES ON SPIDERS IN TURKEY

Bayram A., K. B. Kunt, T. Danişman and Z. Sancak

University of Kirikkale, Faculty of Sciences and Arts, Department of Biology, TURKEY.
abdbayram@yahoo.com

The spider check-list for Turkey contains a total of 690 species in 234 genera and 44 families. Among the families, most species were recorded in Gnaphosidae (80 species), Salticidae (73), Lycosidae (72), Linyphiidae (61) and Thomisidae (59). Since 1846, many arachnologists -such as Rossi, Simon, Kulczyński, Nosek, Reimoser, Bonnet, Roewer, Brignoli, Karol, Wunderlich, Bayram and Topçu- made contributions to the Turkish araneo-fauna. Turkey is located at a point where the three continents meet, making up the old world. Quite possible that arachnid elements belonging to Asia, Europe and Africa can be seen in Turkey. Also, Turkey is divided into seven different geographical regions. So, it is an important country in terms of biogeography. To me, the species richness potential of spiders of Turkey is higher than 3000. On the orher hand, about 110 species (16%) are endemic for Turkey. In Turkey, in araneology, studies on taxonomy, systematics, ecology, SEM+TEM, toxicology and molecular biology are going on with an increasing trend.

P

THE COMPARATIVE CHELICERAL MORPHOLOGY OF THE MALE *Biton zederbaueri* AND *Gluviopsilla discolor* (SOLIFUGAE: DAESIIDAE) THROUGH SCANNING ELECTRON MICROSCOPY

Bayram A., N. Yiğit, M. Erdek, H. Koç, A. Melekoğlu, Z. Sancak and I. Çorak Öcal

University of Kirikkale, Faculty of Sciences and Arts, Department of Biology, TURKEY.
abdbayram@yahoo.com

Solpugids are carnivorous and have powerful chelicerae for feeding. The chelicerae are located in front of the head, consist of two main parts and carry variable number of teeth, spines, setae and hairs. Detailed morphology of the chelicerae in two male solpugids (*Biton zederbaueri* (Werner, 1905) and *Gluviopsilla discolar* (Kraepelin, 1899), Daesiidae, Solifugae) are described and illustrated in this study. The study is performed by employing light and scanning electron microscopy (SEM), and it is the first study on solpugids in Turkey. Morphology of the cheliceral teeth, spines, setae, hairs, flagella and some other organs, such as stridulation organs, are important elements for the description and species identification. This kind of studies will probably illuminate the phylogeny of these taxa.

P

PHYLOGEOGRAPHY OF *ANDROCTONUS* SPECIES (SCORPIONES: BUTHIDAE) IN TUNISIA: RELATION TO VENOM TOXICITY

Ben Othmen A.

Faculté des Sciences de Gabès, Tunisia. benothmen_tn@yahoo.fr

A fragment of the mitochondrial (mt) 16S ribosomal RNA gene was amplified by PCR and sequenced from individual adult scorpions of the genus *Androctonus*, which were sampled from central and southern Tunisia and identified using an explicit set of morphological characters. Phylogenetic analyses placed the mtDNA haplotypes in three well-supported monophyletic lineages, corresponding to the morphospecies *Androctonus aeneas*, *A. amoreuxi* and *A. australis*. The latter species was the most abundant and widespread, and it was characterized by two mtDNA sub-lineages each of which predominated only north or south of the Chott el Jerid, a seasonally-flooded saline depression that divides non- Mediterranean Tunisia. The divergence of the two mtDNA lineages was dated by mtDNA molecular clocks, indicating that the formation of the Chott el Jerid is unlikely to have been the barrier generating the vicariant evolution of the two lineages of *A. australis*, although it may have impeded their mixing following secondary contact. Both regional mtDNA lineages were found in *A. australis hector* and *A. australis garzonii*, indicating that these two morphological forms are neither monophyletic nor geographically isolated and, therefore, should not be treated as species or subspecies. It is recommended that no subspecies of *A. australis* should be recognized in North Africa and toxicologists should cease the taxonomic error of referring to a species "*Androctonus australis* Hector". This morphological form has no proven association with an increased risk of envenomation or death. However, it might be prudent to produce anti-venom in Tunisia by using both morphological forms of *A. australis* collected from both sides of the Chott el Jerid, because of the evidence for regional variation in toxins. The highest risk for scorpion stings occurs in the central region north of the Chott el Jerid, where both morphological forms of *A. australis* predominated in the current samples of *Androctonus*.

P

SUCCESSION OF HARVESTMAN COMMUNITIES (ARACHNIDA: OPILIONES) IN PLANTED FIELD HEDGES OF UPPER AUSTRIA: 1993-2008

Bergthaler G. J.

Elisabethstr. 43a, 5020 Salzburg, Austria. gjbergthaler@gmail.com

The colonisation of four planted field hedges in an intensively managed agricultural landscape north of the Austrian Alps was studied with pitfall traps. The sites vary in age, shape, adjacent cultivation, and locality. Hedgerows Schwand A and B were planted in the autumn 1992 and studied from this point. A comparative study was conducted between 1996 and 1998, in Schwand A, B, C and in Pilgersham, as well as in Schwand A, B and C from the end of 2006 until the beginning of 2008.

Its aim was to observe the changes in species community structure, and to determine the differences in species communities as well as the number of species between the centre and the edges of the field hedges. Here only the data from the harvestmen are discussed, although spiders were also trapped. An analysis of the stages of secondary succession and of the spatial and seasonal distribution of the harvestman species is given. Special attention is given to the different results for females, males and juveniles.

Phalangium opilio (Linnaeus, 1761) was the first species found in Schwand A and B, followed by *Oligolophus tridens* (C.L. Koch 1836), *Nelima semproni* Szalay 1951, *Rilaena triangularis* (Herbst 1799) and *Leiobunum rotundum* (Latreille 1798). *Lacinius ephippiatus* (C.L. Koch 1835), *Lophopilio palpinalis* (Herbst 1799) and *Paranemastoma quadripunctatum* (Perty 1833) enriched the harvestman community in Pilgersham, where *Mitopus morio* (Fabricius 1799) was decreasing in the number of specimens until 1998. Schwand C - with a very low leaf litter build-up - was the poorest in number of species. But what changes were observed after 15 years of colonisation in the field hedges of Schwand A, B and C?

O

PHYLOGEOGRAPHY OF HIGH-ELEVATION SPECIES FROM THE SOUTHERN EUROPEAN GLACIAL REFUGIA: THE CASE OF THE PYRENEAN ENDEMIC SPIDER *Harpactocrates ravastellus*

Bidegaray-Batista L.[1], N. Macías-Hernández [1,2] and M. A. Arnedo [1]

[1] Biodiversity Research Institute & Department of Animal Biology, Av. Diagonal 645, 08028 Barcelona, Spain. [2] Department of Animal Biology, Universidad de La Laguna, 38206 La Laguna, Tenerife, Canary Islands. letigaray@yahoo.com

The Mediterranean basin is one of the 25 biologically richest hotspots on Earth. Tertiary tectonics and climatic oscillation have been identified as causal agents of the generation of this outstanding biodiversity. The role of climatic oscillation, especially during the Pleistocene glaciations, in shaping species distributions and promoting speciation is a matter of intense research and debate. To date investigations on the effects of glaciations on European fauna have mostly focused on central and northern European species. The dysderid spider *Harpactocrates ravastellus* Simon, 1914 provides an excellent model to test scenarios for the role of glacial cycles on shaping diversity in southern European refugia. This species is endemic to the Pyrenees, where it is widespread at elevations above 1000 m. asl, which suggests adaptations to cold conditions. We hypothesize that during cooler periods the species underwent population range expansion, whereas at interglacial periods the species retreated to high elevation or northernmost refugia, which led to population fragmentation. To test this hypothesis, 150 individuals were sampled from 26 localities on an east-west transect across the Pyrenees, including localities from the northern and southern slopes of the massif. Population and phylogeographic analyses were conducted on DNA sequences from 4 mitochondrial markers (*cox1*, *16S*, *L1* and *nad1*) and 1 nuclear intron (srp54). To set up the temporal frame of divergence among populations we used a mitochondrial substitution rate estimated from a previous phylogenetic study of the genus. Our results reveal a deep population structure, and identify three mitochondrial lineages in the Pyrenees. One lineage groups the western populations of the Pyrenees, another groups the central populations and the third lineage groups the eastern populations. Two of these lineages coexist in at least two populations in the central Pyrenees. The nuclear intron yielded two main haplotypes, one is present in the western and central populations and the second one is restricted to the eastern populations. The two coexists in the same populations that share more than one mitochondrial lineage. Moreover, the only heterozygous individuals come from these same populations. A relaxed molecular clock analysis suggests a time of divergence among the three main lineages around 2 Mya. Our results indicate that Pleistocene glacial cycles played a main role in structuring populations on a high-elevation ground-dweller spider from southern Europe and suggest the existence of independent glacial refugia in the Pyrenees.

O

SPIDERS ON TREE TRUNKS IN GERMAN FORESTS (ARACHNIDA, ARANEAE)

Blick T.

Senckenberg, Forschungsinstitut und Naturmuseum, Projekt Hessische Naturwaldreservate, Senckenberganlage 25, DE 60325 Frankfurt am Main, Germany. theo.blick@senckenberg.de. * (Research was conducted in cooperation with and financially supported by "Landesbetrieb Hessen-Forst")*

Trunk eclectors in about 2-4 meter height on living trees were used in different regions of Germany (SW-Bavaria, Hesse, Brandenburg) in the last two decades. In Hesse eclectors were also used on dead beech trees (standing and lying). The data from May to October are compared – only from Hesse there are data from the whole year (incl. winter). Most data sets are from beech (*Fagus sylvatica*) and spruce (*Picea abies*).

A total of 355 spider species has been recorded from these bark traps, i.e. more than 1/3 (35%) of the spider species known from Germany. The characteristics of the spider fauna of the trees are described and analysed: species composition; diversity; different classifications of the species, like "forest retention", "originality of the spiders' habitats", etc.; similarity of the fauna in different regions and on different tree species, comparison with pitfall trap data.

Only few species are common on bark in each region of research (e.g. *Amaurobius fenestralis, Drapetisca socialis, Moebelia penicillata, Xysticus audax, X. lanio*). Most species are only highly abundant on bark in a single region (e.g. *Diplocephalus cristatus, Hahnia pusilla, Lathys humilis, Pelecopsis elongata, Walckenaeria cuspidata*). No spider species seems to be restricted to a single tree species or even to a type of tree (e.g. needles, leaves), but most spider species are more abundant on one type of tree, for instance *Xysticus lanio* on broadleaf – *X. audax* on conifers. Also some species thought to be rare and with a restricted distribution (i.e. only small parts of Europe, and also outside of the high mountain systems) have been recorded in high numbers (e.g. *Kratochviliella bicapitata* and *Oreonetides quadridentatus* in SW-Bavaria, *Monocephalus castaneipes* in Hesse).

The diversity and importance of the spider fauna on bark in Central Europe is still underestimated.

O

SPIDERS OF LESBOS

Bosmans Robert [1], L. Baert[2], J. Bosselaers [3], H. De Koninck[4], J.-P. Maelfait[†] and J. Van Keer[5]

[(1)] Terrestrial Ecology Unit, Ledeganckstraat 35, B-9000 Gent, Belgium. [(2)] Koninklijk Belgisch Instituut voor Natuurwetenschappen, Vautierstraat 29, 1000 Brussel. [(3)] Rerum Novarumlaan 2 B, 2340 Beerse. [(4)] Smalvoortstraat 47/2, 2300 Turnhout. [(5)] Bormstraat 204 bus 3, 1880 Kapelle-op-den-Bos

The most recent and complete listing of spiders from Greece is the catalogue of Bosmans & Chatzaki (2005). In this catalogue, all distribution data of Greek spiders are presented. This includes a total of 856 spider species of which 213 are currently considered to be endemic to the country.
Data from Lesbos are very scarce and until now, the arachnofauna of the Eastern Aegean Island Lesbos is very poorly known. Only a few scientists observed spiders on this island and there is only one paper in the literature dealing with the arachnofauna of that part of Greece.
The other citations from Lesbos are included in a small number of revisions of genera or families.
This results in a total of 43 species that are actually known from the island Lesbos.
Members of the Belgian Arachnological Society ARABEL visited the island Lesbos three times. The results of their investigations are presented.

BOSMANS, R. & M. CHATZAKI 2005. A Catalogue of the spiders of Greece. A critical review of all spider species cited from Greece with their localities. *Arachnological Contributions. Nieuwsbrief van de Belgische Arachnologische vereniging* 20: 1-124.

O

THE ROLE OF VEGETATION STRUCTURE AND PLANT DIVERSITY IN AN *Argiope bruennichi* - PREY SYSTEM IN WILDFLOWER STRIPS

Bruggisser O. T.[1]; G. Blandenier[2] & L.-F. Bersier[1]

[1]University of Fribourg, Unit of Ecology & Evolution, ch. du Musée 10, CH-1700 Fribourg, Switzerland. [2]Centre Suisse de Cartographie de la Faune (CSCF), Passage Max-Meuron 6, CH-2000 Neuchâtel, Switzerlan

In this study we were interested in the role of plant diversity and vegetation structure for the abundance and trapping efficiency of *Argiope bruennichi*.
The experiment was conducted in artificially-established wildflower strips in Swiss ecological compensation areas, situated in a region of intensive farmland. Spider webs were observed in 12 different wildflower strips. Each strip was composed of twelve subplots differing in plant diversity (2, 6, 12, 20 species). Webs of *A. bruennichi* were counted and measured along transects through the strips, all prey items collected, and plant cover, diversity and vegetation height measured in all subplots.
Plant diversity neither had an effect on the number of *A. bruennichi* webs nor on trapped prey diversity and abundance. Our results highlight, however, the importance of vegetation structure. More spider webs could be observed with increasing vegetation cover, while vegetation height had a negative effect. These factors did not influence the abundance and diversity of prey items caught, but interestingly, the size of trapped prey species decreased with increasing vegetation cover.
Our experiment shows that the choice of sites for web construction by the spider *A. bruennichi* in wildflower strips is largely determined by plant architecture. This indicates that trophic interactions between higher trophic levels can be mediated by the architecture of the first trophic level (plants). Moreover, *A. bruennichi* seems to face a trade-off between the optimal site for web construction and the prey biomass available.

P

SPIDER COMMUNITIES IN COASTAL HABITATS OF A MEDITERRANEAN DELTA REGION (NESTOS DELTA, NE GREECE)

Buchholz S.

Department of Community Ecology, Institute of Landscape Ecology. University of Münster, Robert-Koch-Str. 26, 48149 Münster, Germany. saschabuchholz@uni-muenster.de

Within Mediterranean ecosystems habitat zonation and ecology of spider assemblages have been poorly studied. A first analysis of spider assemblages in coastal habitats in the east Mediterranean area is presented here. The study area is the 250 km² Nestos Delta, located in East Macedonia in the North-East of Greece. It is part of the EastMacedonian-Thracian belt of wetlands, providing a variety of different habitats. This and the influence of three biogeographical regions (central-European, Mediterranean, Pontic) entail great species diversity. Spiders were caught in pitfall traps in the period from the beginning of April to the end of June 2004 at 17 sites. Nonparametric estimators were used to determine species richness and alpha diversity. Ordination analysis (Redundancy Analysis) indicated four spider species groups (salt meadows, dunes, meadows, floodplain forests), which were clearly separable along a soil salinity and moisture gradient. Based on this, statements concerning habitat preferences of spiders are presented, including first ecological remarks on several species.

P

DO COVERS INFLUENCE THE CAPTURE EFFICIENCY OF PITFALL TRAPS?

Buchholz S.

Department of Community Ecology, Institute of Landscape Ecology. University of Münster, Robert-Koch-Str. 26, 48149 Münster, Germany. saschabuchholz@uni-muenster.de

Pitfall traps are widely used in terrestrial ecology to capture ground-dwelling arthropods. In order to find out the potential influence of pitfall roofs on capture efficiency of spiders, four pitfall treatments were installed in five dry grassland sites (Corynephoretum) of Northwest Germany: three pitfall traps remained unsheltered, three were sheltered with white, three with green and three with black plastic roofs. Thus, four treatments with five replicates were compared. The total catch was 9,364 spiders from 127 species. Neither the distribution of spider species nor the total catch of spider individuals differed significantly among the four treatments. Therefore no impact of roofs on the capture efficiency of pitfall traps could be determined. Nevertheless, this study also hints that roofs above pitfall traps may have a certain influence on the spider species inventory since forest species were more frequent (though not significantly) in sheltered traps.

O

COURTSHIP BEHAVIOUR IN SYNTOPIC AND CRYPTIC SPECIES: THE CASE OF *Pardosa vljimi* (ARANEAE: LYCOSIDAE), A NEW RECORD FOR THE ITALIAN FAUNA.

Chiarle A., Isaia M., Castellano S.

Università degli Studi di Torino. Dipartimento di Biologia Animale e dell'Uomo. Via Accademia Albertina, 13 10123 Torino. alb.chiarle@gmail.com

According to morphological traits, the species belonging to the genus *Pardosa* (Araneae: Lycosidae) can be split into several groups. In several cases the identification could be hard and often (especially for females) remains doubtful. Moreover, species belonging to the same group, may be syntoptic and may also have intra-specific or intra-populational high variability. Despite morphological and auto-ecological similiarities, the male of the different species performs a species-specific courtship behaviour that involves the movement of several parts of the body (i.e. legs, palps and abdomen). The courtship display could be considered as diagnostic and could be particularly useful in the identification of cryptic species.
In 1974, *P. vlijmi* den Hollander & Dijkstra, 1974 was described, twin species of *P. proxima* (C. L. Koch, 1847), on the basis of the male courtship display. Up to present times, the species was only recorded in France. By means of the observation of courtship display, we recorded for the first time *P. vlijmi* in Italy (province of Cuneo). In order to study its courtship behaviour, we compared it with two other species belonging to the same group, *P. hortensis* (Thorell, 1872) and *P. proxima*, by performing different types of analysis, including optical flow and analysis of the sequences. Results showed clearly that in order to avoid hybridization within the same group, species found in syntopy show clear ethological barrier. These premises show that, in this genus, the evolution is acting primarily in the definition of behavioral pre-zygote barriers and only afterward tends to stabilize the morphological traits.

P

PRELIMINARY MOLECULAR DETECTION OF PREDATION BY SOME SPIDERS ON APHIDS

Danişman T., N. Yiğit, S. N. Korkmaz, A. B. Yildiran, A. Melekoğlu, A. Bayram

University of Kirikkale, Faculty of Sciences and Arts, Department of Biology, TURKEY.
tarikdanisman@yahoo.com.tr

The most important group that damages agriculture products which comprise 45-50% of the Turkish economy is aphids. They are characterized by the spreading around broad areas and by being resistant to chemicals. At the same time, when we consider the damages of these chemicals to the environment and human health, the biological control agents become more important as an alternative way of striving with these harmful animals. In this study, the feeding regime between the dominant predatory spiders and aphid species ranging on the area is detected by using SDS-PAGE and PCR analysis method. The feeding relationship between the predator *Pardosa proxima* (Araneae, Lycosidae) and the pest *Aphis fabae* (Homoptera: Aphididae) was determined by use of the SDS-PAGE method. The proteins of aphids and spiders consuming aphids are being extracted. The available protein samples are put through an analytical research with SDS-PAGE method. Specific proteins of aphids are determined and these proteins are studied to be found in the spiders' gut content. When the bands belonging to aphids and spiders are examined carefully, one common band is observed. Also, the feeding relationship between some spiders and *Rhopalosiphum maidis* (Homoptera: Aphididae) were determined by use of the PCR. In this method which is effective in the detection of discard of prey in the predator's gut content, the DNA of aphid and the spider consuming the aphid are isolated. The available DNA fragments after the isolation are amplified by putting through a series of chain reactions. The length of the amplicon is determined by comparing with the references detect bands which are obtained after agarose gel electrophoresis. This study is irradiating the role of the spiders as natural control agents on striving with aphids to protect ecological balance.

O

GEOGRAPHICAL VARIATION WITHIN THE TRAPDOOR SPIDER GENUS *Cyrtocarenum* Ausserer, 1871

Decae A. E.

Terrestrial Ecology Unit, Department of Biology, University of Ghent, Ledeganckstraat 35, B-9000 Gent, Belgium. arthur.decae@ugent.be

The trapdoor spider genus *Cyrtocarenum* is endemic in the Aegean region where it is very common and widespread. Only two species - *C. cunicularium* (Olivier, 1811) and *C. grajum* (C. L. Koch, 1836) - are currently known. Geographically the two species appear to be largely separated with *C. cunicularium* in the east and *C. grajum* in the west. In central Greece the distributions of the two species overlap although further research into the detailed composition of mixed populations is necessary. Some occurrences, such as that of the eastern species *C. cuninularium* on Corfu, in the far northwest, await explanation. Notwithstanding their morphological homogeniety both *Cyrtocarenum* species show remarkable differences in local behavior. *C. grajum* on the Ionian island of Zakinthos for example constructs a very different burrow than its conspecifics on the nearby Peloponnissos. Similar differences in burrow structure exist between *C. cunicularium* populations on eastern Crete and the Cyclade Islands. It remains to be investigated if these local differences in behavior reflect evolutionary relevant cryptic diversity within *Cyrtocarenum*.

O

A REVIEW OF FAUNISTIC DIVERSITY OF CAVE-DWELLING SPIDERS OF GREECE (ARACHNIDA, ARANEAE)

Deltshev C.

Institute of Zoology, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd; 1000 Sofia, Bulgaria. cdeltshev@zoology.bas.bg

A total of 118 species from 28 families of Araneae have been established in the caves of Greece so far. The species are distributed in the different territories in the following way: Attiki-Saronic Islands – 30; Central Greece -3; Cyclades -1; Dodecanese -5; Eastern Aegean Islands -3; Epiros -2; Evvoia-Voroies Sporades -1; Ionian Islands -21; Kriti -109; Macedonia - 22; Peloponnisos -16; Thessalia -5; Thrace -6. The largest fraction of troglobits was encountered mainly in the territories of Kriti – 17 (5 blind), Ionian Islands – 5 (8 blind), Macedonia – 4 (1 blind), Thessalia – 3 species. The richness of troglobitic spiders in these regions leads to the assumption that these were major centers of speciation and evolution of species. According to their current distribution, the established 118 species can be classified in to 14 zoogeographical categories, grouped into 4 complexes (Widely distributed, European, Mediterranean, Endemics). The largest number of species belongs to the Balkan endemics (43.2 %), Species within this category also present the most characteristic features and this reflects the local character of the fauna. Thus the Balkan Peninsula can be considered as a main center of speciation for the European cave fauna.

P

FAUNISTIC DIVERSITY OF SPIDERS OF GALICHITSA NATIONAL PARK FYR MACEDONIA (ARANEAE)

Deltshev C.[1], M. Komnenov[2], E. Stojkoska[2], M. Naumova[1]

[1] Institute of Zoology, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd; 1000 Sofia, Bulgaria. cdeltshev@zoology.bas.bg, munny@abv.bg. [2]Macedonian Museum of Natural History, 86 Ilinden Blvd; 1000 Skopje, FYR Macedonia. emastojkoska@yahoo.com, mkomnenov@yahoo.com

A total of 271 species from 31 families (Atypidae – 1, Scytodidae – 1, Pholcidae – 4, Segestriidae - 1, Dysderidae - 6, Mimetidae - 1, Eresidae - 1, Uloboridae - 1, Nesticidae – 1, Theridiidae - 23, Linyphiidae - 31, Tetragnathidae - 12, Araneidae - 26, Lycosidae - 42, Pisauridae - 2, Oxyopidae – 2, Agelenidae - 8, Cybaeidae - 2, Dictynidae - 6, Amaurobiidae - 3, Titanoecidae - 1, Liocranidae - 3, Miturgidae – 6, Clubionidae - 5, Corinnidae - 5, Zodariidae - 2, Gnaphosidae - 25, Zoridae - 2, Sparassidae – 1, Philodromidae - 11, Thomisidae - 19, Salticidae - 18) have been found in Galichitsa National Park. 42 species are new for the spider fauna of the mountain and 8 are new also for the FYR Macedonia. New localities for 45 species are also presented. High species richness is presented within the families: Lycosidae – 42 species, Linyphiidae - 31 species, Araneidae – 26 species, Gnaphosidae - 25 species and Theridiidae - 22 species. The degree of exploration of the group in the park is about 50 %. The group of the endemics consists of 15 species: Local endemics – 2, Balkan endemics - 13. The local endemics: *Zora prespaensis* and *Xysticus tenebrosus ohridensis,* are mountain elements and can be regarded as derivatives of Middle European or Mediterranean species obtained as a consequence of disjunction of their areas of distribution during the glaciation and interglaciation periods.

P

LONG AND CLUMSY OR SHORT AND SMART – COPULATORY MECHANISM OF SPIDERS OF THE GENUS *Cheiracanthium* (ARANEAE, MITURGIDAE)

Dolansky J.

East Bohemian Museum in Pardubice – Czech Republic

Male spiders of the genus *Cheiracanthium* have unusual morphology of the copulatory organs. The presence of a spur on cymbium is unique among spiders. I studied the mechanics of the copulatory organs of several species (*C. campestre, C. erraticum, C. effossum, C. mildei, C. oncognathum, C. pelasgicum, C. punctorium, C. striolatum, C. virescens*).

The couples were put into glass vials and observed by stereomicroscope. Despite artificial conditions, the spiders usually copulated readily.

The partners touch each other by the first pair of legs. The female calms down and draws her legs bellow her body. The male pats the female's abdomen by fast tips of cymbia and seeks after the ventral side of the female's abdomen. Then the male pushes out a hook-shaped median apophysis from its bulbus and he tries to hook it to the front rim of the epigynal fovea. After hooking the median apophysis, he inserts the spur into the copulatory duct on the retrolateral side of the epigynal fovea. He inserts his embolus through the spur (the spur forms a braced pipe). Then follows the long phase, when the male rhythmically turns its tegulum by pressure of hemolymph and inserts embolus deeper into the copulatory duct. The described mode is characteristic for *Cheiracanthium punctorium* and is similar in most of other European *Cheiracanthium* species (with the exception of *Cheiracanthium mildei*).

The other species insert the spur quickly after hooking the median apophysis. But this is not true for *Cheiracanthium effossum*. The female of *C. effossum* has extremely long copulatory ducts and the male has a very long spur. The extremely long spur causes obstacles during the copulation. The median apophysis hooked onto the rim of epigynal fovea restricts movement of the male palpal tarsus. The attempt to reach the copulatory opening often fails; the male usually has to repeat the trial. The obstruction with too long spur is compensated by strong pushing out of the bulbus from the alveolus and by flexibility of the thin tip of the spur. However, the flexible tip of the spur can be disadvantageous during insertion to the copulatory opening.

The elongation of copulatory ducts is probably a consequence of sexual selection, particularly male-female arms race. The spur of *Cheiracanthium effossum* reached the maximum length, while keeping the potency of the copulatory mechanism present in *Cheiracanthium*.

O

COURTSHIP AND COPULATION OF *Tricca lutetiana* AND *Arctosa lamperti* (ARANEAE: LYCOSIDAE)

Dolejš P., L. Kubcová & J. Buchar

Department of Zoology, Faculty of Science, Charles University, Viničná 7, CZ – 128 44 Praha 2, Czech Republic. dolejs@natur.cuni.cz

Tricca lutetiana (SIMON, 1876) is a European, extra-mediterranean wolf spider that dwells namely on forest steppes. It is a burrowing species. Until pitfall trapping was used in the 1950s, only a few specimens were known from collections. Thus, the species was believed to be rare. *Arctosa lamperti* DAHL, 1908 is a rare European wolf spider occurring in mountain peat bogs. It seems to be a vagrant species and is considered as a subspecies of *Arctosa alpigena* (DOLESCHALL, 1852).

Wolf spiders are proverbial due to their courtship behaviour. There are many papers dealing with this phenomenon. On the other hand, there are only few descriptions of details occurring during the copulation itself. Thus the objective of this study is to fill in basic information about courtship and copulation of these two species.

In order to obtain living males of *T. lutetiana*, dry pitfall trap sampling (n = 48) was used. Juveniles and females were collected from burrows under stones. The study took place in localities Dřínová hora (Karlštejn NNR) and Koda (Koda NNR) in the Czech Republic. The research in National Nature Reserves was permitted by the decree of the government of the Czech Republic no. 1159/07. Living males, females and juveniles of *A. lamperti* were obtained using dry pitfall trap sampling (n = 31). The study took place in the locality Zadní mlynářská slať (Šumava NP) in the Czech Republic. The research in the National Park was permitted by the decree SZ NPS 03028/2007/3 – NPS 04091/2007. Courtship and mating were observed in a Petri dish. The trial lasted at usual 15 minutes or until the copulation finished. A digital Panasonic NV-GS400 video camera was used to record the spider's activity.

When courting, *A. lamperti* male provided palpal drumming and vibrated his opisthosoma and legs I. These legs were stretched forward and oriented parallel with the surface. When coming near the female, he started to vibrate his legs II too. During these vibrations, the male provided jerking movements with the whole body. Afterwards, the male contacted the female's carapace using his legs I. As a result of his action, the female gathered her legs up and allowed the male to climb on her (akinesis). The copulation lasted on average 34 minutes and mostly consisted of four or five palpal insertions. During copulation, the male was wagging opisthosoma and cleaning his palps using chelicerae.

Courtship of *T. lutetiana* was poorer. The male was only drumming with his legs I, II and opisthosoma. Then he turned jerkily towards the female. She shifted her legs I so they were oriented parallel with the surface. The male immediately contacted them using his legs I. Afterwards, both spiders were touching each other using their leg

pairs I and II. The male climbed on the female directly from this position, she did not gather her legs up. However, copulation of this species was surprisingly dynamic. When mating with right palp, the male was stroking the female's opisthosoma in the area of the spinnerets using his right leg I. Simultaneously, he was stroking the female's right leg III using his left leg II. The male waggled with his opisthosoma up and down during copulation. The akinesis of the female was not recorded. The copulation lasted on average 4,4 minutes and mostly consisted of five or six palpal insertions.

Courtship and mating of these two species were studied for the first time. Their behaviour corresponds with their lifestyle. The one of *T. lutetiana* bases on a vibratory way of communication, reflecting its subterranean lifestyle. Entirely unique movements of the mating male's legs have not been described in any other lycosid yet. On the other hand, courtship of *A. lamperti* contains elements typical for vagrant species; however, duration of mating is much longer than in other *Arctosa* species studied so far.

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O

THE FIRST FOSSIL CYPHOPHTHALMID (OPILIONES) FROM BALTIC AMBER, WITH REMARKS ON HARVESTMAN PALAEONTOLOGY

Dunlop J. A.[1] and P. Mitov[2]

[1]Museum für Naturkunde, Leibniz Institute for Research on Evolution and Biodiversity at the Humboldt University Berlin, Invalidenstraße 43, D-10115 Berlin, Germany. jason.dunlop@mfn-berlin.de. [2]Department of Zoology and Anthropology, Faculty of Biology, University of Sofia, 8 Dragan Tsankov Blvd., 1164 Sofia, Bulgaria. mitovplamen@gmail.com

A new fossil cyphophthalmid harvestman (Opiliones: Cyphophthalmi: Sironidae) is described from the ca. 45–50 Ma (Palaeogene: Eocene) Baltic amber. This is only the third published palaeontological record of this basal harvestman lineage and the first example for the Baltic amber fauna. The specimen is incomplete, but it is unequivocally a female and can provisionally be assigned to *Cyphophthalmus* sp.; a genus restricted today to a Balkans radiation. Its presence in Baltic amber is thus interesting in biogeographical terms. Further recent progress in the study of fossil harvestmen is reviewed. The first Jurassic examples have been discovered in Daohugou, Inner Mongolia, China (ca. 160–180 Ma) and include material assignable to the extant eupnoid family Sclerosomatidae. From the Early Cretaceous comes another cyphophthalmid, this time in the ca. 100 Ma Myanmar (Burmese) amber. Finally, a series of harvestman have been described from the Palaeogene (?Oligocene, ca. 25 Ma) Bitterfeld amber of Germany. Some taxa match records from Baltic amber, some are new species and one appears to be indistinguishable from a living harvestman from the Caucuses.

O

ARACHNIDA OF AIN GUDEIRAT (SINAI) WITH NOTES ON FAMILY TITANOECIDAE IN EGYPT

El-Hennawy H. K.

41 El-Manteqa El-Rabia St., Heliopolis, Cairo 11341, Egypt. el_hennawy@hormaul.com

The region of Ain Gudeirat lies in the eastern side of mid Sinai, Egypt. It is almost a small oasis irrigated by a natural spring in this arid desert. During two short fieldtrips, on April and June 2004, to the region of Ain Gudeirat, 84 specimens of four arachnid orders were collected. The collected material contained 1 scorpion species, 1 sun-spider species, 1 pseudoscorpion species, and 72 spiders of 12 families. The majority of spiders belong to two families, i.e. Lycosidae (43.05%) and Titanoecidae (29.17%). The situation of the family Titanoecidae in Egypt is discussed. This preliminary study is the first arachnological study of the region of Ain Gudeirat, which is proposed to be a protected area.

O

MINIMALLY INVASIVE SAMPLING METHODS AND DNA BARCODING OF CITES-LISTED SCORPIONS

Esposito L. A. and Prendini L.

Scorpion Systematics Research Group, Division of Invertebrate Zoology, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024-5192, USA

Many habitat-specific and range-restricted scorpions risk extinction due to human activities. Few scorpions receive formal protection despite the increasing threat of habitat destruction and harvesting for the souvenir and exotic pet trades. At least 50 scorpion species, originating from various African, Asian, and American countries, are offered for sale on the exotic pet market; the most sought after fetch up to $300 each. Three species currently receive formal protection under CITES Appendix II: *Pandinus dictator*, *Pandinus gambiensis* and *Pandinus imperator*. However, species determination is difficult for the novice. Protected species are easily traded under the pseudonym of unprotected *Pandinus* or morphologically similar species from other genera such as *Heterometrus*, commonly offered in the pet trade. Customs officials have few tools for correctly identifying scorpion species. We present the first DNA barcodes for several common scorpion species in the exotic pet trade, and demonstrate their utility for rapid identification. Additionally, we present a method to extract DNA with minimal harm to the animal: a small quantity hemolymph is drawn from the live animal using a hypodermic syringe, and placed onto Whatman FTA Cards. Traditional methods of DNA extraction require the entire animal or part thereof to be preserved in high quality ethanol or other appropriate fixative, followed by refrigeration. Such extraction methods are problematic for protected species both in terms of obtaining the required permissions and in the potential effect on natural populations. As DNA stored on Whatman FTA cards is stable for long-term storage at room temperature, the method presented can be used in field settings where access to molecular-grade ethanol and cold-storage of specimens can be difficult. It will be useful in population-level studies or for general DNA vouchering of scorpions in the field.

P

MATING BEHAVIOR OF *Grammostola doeringi* HOLMBERG 1881 (ARANEAE: THERAPHOSIDAE), A BUROWING SPECIES FROM ARGENTINA

Ferretti N.[1], S. Copperi [2], G. Pompozzi [2] and F. Pérez-Miles [3]

[1]Centro de Estudios Parasitológicos y de Vectores CEPAVE (CCT- CONICET- La Plata) (UNLP), Calle 2 Nº 584, (1900) La Plata, Argentina, nelsonferretti@hotmail.com.
[2]Departamento de Biología, Bioquímica y Farmacia, Universidad Nacional Del Sur, San Juan 670 (8000) Bahía Blanca, Argentina. sofia_copp@hotmail.com, gabrielpompozzi@hotmail.com.
[3]Facultad de Ciencias, Sección Entomología, Iguá 4225, 11400 Montevideo, Uruguay, myga@fcien.edu.uy.

The Theraphosidae are widely distributed in tropical and subtropical regions of the world, but their biology is poorly known. Due to theraphosid basal phylogenetic location among spiders, the studies of their biology can provide important perspective for evolutionary hypotheses. Studies on the mating behavior of this family have been limited to a few species, namely *Acanthoscurria suina, Aphonopelma chalcodes, Brachypelma klassi, Catumiri uruguayense, Eupalaestrus weijenberghi, Grammostola mollicoma, Grammostola schulzei, Plesiopelma longisternale* and *Sickius longibulbi.* A common pattern emerges from the available literature on theraphosids: male courtship includes body vibrations and palpal drumming, usually followed by clasping, hooking female´s fangs with the male tibial apophysis. Mating always occurs with the male located in front of the female, and raising the female´s body. In this position, the male is able to reach the genital opening with his palpal organs. *Grammostola doeringi* is a large and burrowing tarantula that lives in the suburbs of Bahía Blanca, Buenos Aires province, Argentina. This species make their burrows always in meadows and males can be seen seeking for females at late spring (October). Here we describe the mating behavior of *Grammostola doeringi* heretofore unknown in laboratory conditions based on 11 successful matings. Six males and eight females were collected by hand during October – November 2008 at the locality of Bahía Blanca (38º 42´ 2.77" S, 62º 16´ 9.21" W), Buenos Aires, Argentina. A total number of 30 encounters were carried out in rectangular cages of 30 x 35 and 30 cm high. The cages had a substrate of 10 cm and a burrow was excavated simulating natural conditions and allowing for observation of female´s behavior. All interactions were videotaped and analyzed. All males initiated courtship when they touched the female´s silk over the substrate. The courtship involved palpating as the first unit registered, that consisted in the two palps moving up and down in an alternating phase hitting the soil at constant velocity, quite different from palpal drumming where the bout started at low velocity and increased sequentially. Males made a mean number of 30.72 ± 29.74 SD, being highly variable with a range of 2 to 114 bouts per courtship and had a mean duration of 1.46 s ± 0.57 SD. He also made body vibrations

caused by the contraction of the third pair of legs. The mean number of this unit per courtship was 15.66 ± 28.65 SD (range = 2 – 117) and the mean duration was 1.88 s ± 0.36 SD. The male sometimes beat the substrate with legs I, that consisted in elevating a leg, extended it and lowered rapidly over the soil. Males made a mean number of 24.57 ± 21.79 SD (range = 2 – 71) bouts. The courtship duration in minutes was 12.64 ± 15.76 SD (range = 1.89 – 56.3). Then, the male approached the female, touching her with the first pair of legs and beating spasmodically with legs II over the female´s body. In *G. doeringi*, when the female raised her body and opened fangs, then the male clasped onto her fangs using the tibial apophysis and legs III and IV were maintained over the substratum. After the contact, latency was observed, where the pair stayed motionless. Then, the male pushed the female to reach an angle of 80° approximately and began a series of palpal insertions on the female genital opening. The mean number of insertions was 11.45 ± 8.72 SD (range = 3 – 26). The mean duration of each insertion was 11.89 s ± 5.65 SD. Palpal insertions usually were difficult to see, but seemed to occur with many fail insertions, where the bulb tried to enter and undo. The mean duration of copulation in minutes was 5.65 ± 3.20 SD (range = 2.13 – 11.88). Afterwards the male unclasped beating spasmodically and moved away from the female. The mean number of spasmodical beats during clasping and unclasping was 13.25 ± 9.54 SD per courtship. For several minutes, the female stayed totally immobile. Afterwards, she recovered and walked into the burrow. The mean duration in minutes of this immobile condition was 33.39 ± 14.36 SD (range = 6.96 – 48.52). The mating took place at the burrow entrance. Females accepted males by leaving the burrow because mating does not occur inside it. Moreover, males tried to take out females entering the burrows and courting inside. In conclusion, the mating behavior of *G. doeringi* was similar to the prevalent theraphosid pattern. Males of *Grammostola doeringi* made a large number of insertions as other species of theraphosids. The failed insertions were also observed in *Grammostola mollicoma*. The duration of copulation of *G. doeringi* was short even with fail insertions that consumed time, but that was related with shorter duration of each effective insertion.

P

ETHOLOGICAL REPRODUCTIVE ISOLATION BETWEEN TWO POSSIBLE SYMPATRIC SPECIES OF *Grammostola* (ARANEAE: THERAPHOSIDAE) IN BUENOS AIRES, ARGENTINA.

Ferretti N.[1], S. Copperi [2], G. Pompozzi [2] and F. Pérez-Miles [3]

[1]Centro de Estudios Parasitológicos y de Vectores CEPAVE (CCT- CONICET- La Plata) (UNLP), Calle 2 Nº 584, (1900) La Plata, Argentina, nelsonferretti@hotmail.com.
[2]Departamento de Biología, Bioquímica y Farmacia, Universidad Nacional Del Sur, San Juan 670 (8000) Bahía Blanca, Argentina. sofia_copp@hotmail.com, gabrielpompozzi@hotmail.com.
[3]Facultad de Ciencias, Sección Entomología, Iguá 4225, 11400 Montevideo, Uruguay, myga@fcien.edu.uy.

At the south of the Buenos Aires province are present two species of tarantulas, *Grammostola doeringi* Holmberg 1881 and *Grammostola schulzei* (Schmidt, 1994). *Grammostola schulzei* is a spider that inhabits burrows made always under stones in rocky hills, in Sierra de la Ventana (38º 07' 63" S 61º 47' 30" W), Ventania, while *Grammostola doeringi* is present at the outskirts of Bahía Blanca (38° 44' 30" S 62° 12' 31" W), where it lives in burrows made in open field at the pampas. Recently, some individuals of *Grammostola schulzei* were found living near Bahia Blanca and individuals of *Grammostola doeringi* in Sierra de la Ventana. These findings suggested that an overlapping zone could exist in which the species are sympatric. In addition, the reproductive period of these species overlaps in time; walking males can be found during October – December (late spring and early summer in South Hemisphere). Reproductive isolation mechanisms are especially important in sympatric and synchronic species since they provide insights into the speciation process in singular conditions. Moreover, differences in reproductive isolating traits are expected to be greater in sympatry than in allopatry. This pattern of sympatric divergence arises from selection against the adverse consequences of hybridization between sympatric species. In Theraphosidae, the reproductive isolation was examined under laboratory conditions for three populations of *Grammostola mollicoma* and *Grammostola iheringi* occurring in Uruguay, where no isolation was found on *G. mollicoma* due to their poor knowledge on distribution of these populations, whereas *G. iheringi* showed an effective ethological reproductive isolation. The main objective of this work is to test if the species mentioned have ethological mechanisms of isolation under laboratory conditions. We studied male's courtships and females' responses in conspecific and heterospecific encounters. We used five males and eight females of *G. doeringi* and four males and ten females of *G. schulzei*. Individuals were randomly assigned to pairs. So, males of the two species were in contact with conspecific and heterospecific females in all possible combinations. The interactions between individuals were carried out in cages of 30 x 35 and 30 cm high, with a layer of soil of 10 cm deep and a burrow was excavated against the glass wall allowing for

observation. Encounters were videotape and analyzed. Males courted on silk tracks of conspecific and heterospecific females. Both males of *G. doeringi* and *G. schulzei* showed approximately same frequencies of bouts in all interactions during courtship. However, *G. schulzei* displayed palpal drumming and palpate, while *G. doeringi* only palpated. *Grammostola doeringi* performed more leg tapping and palpating with conspecific than with females of *G. schulzei*. On the other hand, *G. schulzei* courted more vigorously to females of the other species than conspecific. None of the females called males, and the acceptation of males for mating was given by the female leaving the burrow, raising her body and opening fangs. Usually mating takes place outside the burrow due to spatial constrains. When heterospecific males entered the burrow, females beat them with the first pair of legs and males escaped without injuries. Moreover, sometimes females leaved their burrows when confronting a heterospecific male; then females raised their bodies but didn´t open their fangs, so that males failed to clasp and moved away. On those cases, females didn´t reach the immobile condition and usually attacked males (3 females of *G. schulzei*) and even predated them (2 females of *G. schulzei*). Females of *G. doeringi* were more passive and didn´t show aggression. We registered one interspecific mating, with a male of *G. doeringi* and a female of *G. schulzei*, with regular posture and insertions. Usually an ethological isolation mechanism operated after physical contact, although it could exceptionally fail. In this case, the cost in energy, time and risk is high for the couple and especially for female. An alternative interpretation of this failure could be a female strategy for predation on heterospecific males.

O

SCORPIONS OF GREECE AND ADJACENT LANDS: CURRENT ADVANCES IN SYSTEMATICS

Fet V.

Department of Biological Sciences, Marshall University, West Virginia 25755-2510, USA

Scorpion systematics is undergoing an exciting time. Our understanding of traditional taxa at all levels is changing rapidly and considerably due to introduction of modern methods of analysis (both morphological and molecular), discovery of new important characters, intensive new collection and study of old museum material. From Aristotle (ca. 350 BC) one jumps to Brullé (1832) to discover a few Greek scorpions; while already C. L. Koch (1837) ingeniously outlines local species such as *Euscorpius tergestinus, E. sicanus* and *E. naupliensis*, the lumping trend prevails. From Kraepelin (1899) to Kinzelbach (1975), Greece along with the adjacent Balkans and Anatolia, does not enjoy overly diverse scorpion fauna: a toxic buthid *Mesobuthus gibbosus*, two relict monotypic iurid genera *Iurus* (Greece and Turkey) and *Calchas* (Turkey), and a couple of widely ranging *Euscorpius* (*E. italicus, E. carpathicus*) (Euscorpiidae) were identified from the region, known for its amazing diversity in other animal groups. Are scorpions special? Why are not they diverse? But they are. As indicated early by a record number of *subspecies* in the Mediterranean *Euscorpius* (Hadži, 1930; Caporiacco, 1950), this genus indeed contained a not-so-hidden diversity. Analyzed with modern DNA techniques, and given more attention to its morphology, *Euscorpius* underwent major splitting since 1999, a trend started by Bonacina (1980) who isolated *E. mingrelicus*. At least five species of *Euscorpius* inhabit Greece alone, often sympatrically; the collaborative international work is under way to obtain a detailed molecular and morphological phylogeny of these species and their populations, including many island groups. We rediscovered the forgotten Peloponnese endemic *E. naupliensis*, a sister group to a possibly glacial bottleneck survivor *E. italicus* (Gantenbein et al. 2003; Fet et al. 2006), both in subgenus *Polytrichobothrius.* We outlined related species *E. hadzii* and *E. sicanus* as separate from the main "carpathicus" complex (Fet & Soleglad 2002; Fet et al. 2003), which also likely includes several species, some undescribed. *E. carpathicus* does not live here any more; we restrict it to the type populations in Romania. At least three *Euscorpius s. str.* species live in Bulgaria, where northern and southern "carpathicus" complex members are not closely related (Fet & Soleglad 2007); we project more than one *Euscorpius* species inhabiting Greek islands (e.g. Thasos) and isolated peninsulas (e.g. Mt Athos, Peloponnese). Human introduction likely plays role for many *Euscorpius* (Fet et al. 2006) and *Mesobuthus* (Gantenbein & Largiadèr 2003). The Western Balkans and the Anatolian Peninsula have relict and diverse populations of subgenus *Alpiscorpius* (="mingrelicus" complex), absent from mainland Greece (exept maybe northern Epiros) and Aegean islands (except Samos). Attention to a relatively

uniform *Mesobuthus* yields an endemic species on Cyprus (Gantenbein et al. 2000); and the Anatolian fauna of *Mesobuthus* is addressed in detail, including recently restore *M. nigrocinctus* (Karataş & Karataş 2001, 2003, Karataş 2007; etc.). Other buthids (*Hottentotta, Compsobuthus*) are recorded as new for SE Anatolia. Based on 16S mitochondrial rRNA markers, introduced by Gantenbein et al. (1999) for *Euscorpius*, the first DNA phylogeographies are published for the region both for *Mesobuthus* and *Iurus* (Parmakelis et al., 2003, 2007). Monotypic, relict genera of Iuridae, often collected but ignored for decades, yield new insights as well as unexpected and diverse neobothriotaxy of *Iurus* is discovered (Soleglad et al., 2009), and more surprises are in store for fascinating iurid relicts (Soleglad et al., in progress). A picture that emerges of scorpions in Greece and adjacent lands is that of a diverse and rich group. They are also a promising group for speciation studies, employing character sets from new morphology (e.g. constellation sensory array; Fet et al. 2006, in progress) to karyotypes (first steps now attempted by F. Stahlavsky in Prague) to detailed, multiple DNA markers, both mitochondrial and nuclear. Scorpion biology and ecology in the region, studied by the Italian and Greek authors since 1980s, still is in its infancy. All this cannot be done alone, and I thank all colleagues from many countries and museums for their enthusiastic collaboration.

P

INSIGHTS INTO DNA CONTENTS AND BASE COMPOSITION OF ARACHNID GENOMES

Forman M.[1], P. Bureš [2], L. Horová [2] and J. Král [1]

[1]Laboratory of Arachnid Cytogenetics, Department of Genetics and Microbiology, Faculty of Science, Charles University in Prague, Viničná 5, Prague 2, CZ-128 44, Czech Republic. [2]Plant Biodiversity and Biosystematic Group, Department of Botany and Zoology, Faculty of Science, Masaryk University, Kotlářská 2, Brno, CZ-611 37, Czech Republic. formivelkejpan@seznam.cz

Genome sizes of arachnids are poorly studied. Moreover, published data do not reflect the considerable diversity of this class. Currently, genome sizes of 21 species of Acari and 122 species of spiders havs been studied only with the majority of examined spiders belonging to the most derived lineage - entelegyne spiders. Using flow cytometry with human leukocytes for standard, we estimated C-value (DNA content of haploid genome) in selected spiders that represent major evolutionary lineages (Mesothelae – Liphistiidae; Mygalomorphae – Atypidae, Ctenizidae, Nemesiidae; haplogyne spiders – Dysderidae, Filistatidae, Sicariidae; entelegyne spiders – Agelenidae, Eresidae, Hersiliidae, Oecobiidae, Phyxelididae, Pisauridae, Sparassidae, Uloboridae, Zodariidae) as well as in representatives of other arachnid orders (Amblypygi, Opiliones, Pseudoscorpiones, Scorpiones, Solifugae and Uropygi). Our study included 23 species of spiders and 10 members of other arachnid orders. Spider *Vidole* sp. (Phyxelididae) from South Africa exhibits the largest genome found in arachnids so far (C = 9.96 pg). High C-values were observed also in Amblypygid *Damon medius* (Phrynichidae, C = 8.26 pg) and *Uroctea durandi* (Oecobiidae, C = 7.58 pg). In contrast to *U. durandi*, *Oecobius* sp. (Israel) from the same family has a much smaller genome (C = 1.62 pg). Low genome sizes were found also in representatives of pseudoscorpiones (*Chtonius tetrachelatus*: Chtonidae: C = 0.79 pg, *Neobisium erythrodactylum*: Neobisiidae: C = 1.53 pg) solpugids (*Gluvia dorsalis*: Daesiidae; C = 1.01 pg), scorpion (*Buthactus leptochelys*: Buthidae; C = 1.05 pg), and in the basal mygalomorph spider, *Atypus affinis* (Atypidae; C = 1.18 pg). Suprisingly, downsizing chromosome number in the social spiders´ genus *Stegodyphus* (Eresidae) is not accompanied by reduction of DNA content. The presence of double number of sex chromosomes in females of most spiders and pseudoscorpiones allows to determine sex of immature individuals, by estimating their accurate DNA content. Furthermore, we have obtained first data regarding the base ratio in arachnid genomes. Determination of DNA content using two fluorochromes of different specificity to AT and GC base pairs (DAPI – AT specific, propidim iodide – without specificity) allows to estimate the base ratio of genomes. Our data indicate that arachnids have often AT rich genomes; AT content varied from 59.28 to 71.94 % in genomes of studied arachnids. Interestingly, representatives of groups with holocentric chromosomes (scorpions of the family Buthidae and spiders of the family

Dysderidae) display also AT rich genome. Our research was supported by Grant Agency of the Czech Academy of Sciences (project No. IAA601110808), Grant Agency of the Czech Republic (project No. 206/08/0813), and by Czech Ministry of Education, Youth and Sports (projects no MSM 00216208287, MSM 0021622416, LC 06073).

P

KARYOTYPE EVOLUTION OF SPIDERS OF THE SUPERFAMILY ERESOIDEA

Forman M. and J. Král

Laboratory of Arachnid Cytogenetics, Department of Genetics and Microbiology, Faculty of Science, Charles University in Prague, Viničná 5, Prague 2, CZ-128 44, Czech Republic.
formivelkejpan@seznam.cz

Recent schemes of spider´s phylogeny suppose, that the superfamily Eresoidea (comprising three families: Eresidae, Hersiliidae, and Oecobiidae) forms the most basal branch of the entelegyne spiders. Despite the key position in evolutionary scheme, the karyotypes of this superfamily are poorly known. Currently, six species of the genus *Stegodyphus* (Eresidae), two oecobiids and one hersiliid have only been studied. In order to complement the study of the karyotype evolution of the superfamily, we present karyotypic data of ten more representatives. Chromosomes of all analysed species exhibit acrocentric morphology as is the case in most entelegyne spiders studied so far. Concerning eresids, male karyotype of *Dresserus kannemeyeri* is formed by 40 chromosomes including, two X chromosomes, $X_1$and X_2. Two analysed species of the genus *Gandanameno* exhibit the same karyotype ($2n♂ = 38$, X_1X_20) but differ in the size of the autosome pairs. Our data suggest that the ancestral male karyotype of the genus *Stegodyphus* was formed by 30 chromosomes including X_1X_20 system; social species show tendency to reduce 2n. Remarkably, karyotype of *S. lineatus* ($2n♂ = 43$, $X_1X_2X_30$) is very different from chromosome complements of other species of the genus. This difference indicates probably paraphyly of the genus *Stegodyphus*. Interestigly, our preliminary data indicate the same karyotype in African genera *Paradonea* and *Seohyra* which allows us to speculate about a separate eresid branch being formed by *Seothyra*, *Paradonea*, and *S. lineatus*. Family Hersiliidae was represented by two species of the genus *Hersiliola* genus that show the same karyotype ($2n♂ = 35$, $X_1X_2X_30$). According to recent schemes, this genus is supposed to be basal in the Hersiliidae. In contrast to this, *Hersilia savignyi* (karyotyped by Bole Gowda, 1952) showed $2n♂ = 30$ including system X_1X_20. We found karyotypes similar to primitive hersiliids including the same sex chromosome system in two representatives of oecobiid spiders of the genus *Uroctea* (*U. durandi* $2n♂ = 37$, *Uroctea* sp. from Israel $2n♂ = 39$) which is the first evidence of $X_1X_2X_30$ system in this genus. In contrast to *Uroctea*, representatives of the genus *Oecobius* shows lower 2n and unusual variability in sex chromosome systems (*Oecobius* sp. from Israel, $2n♂ = 23$, $X_1X_2X_30$, *Oecobius* sp. from Greece $2n♂ = 22$, X_1X_20, *O. navus*, $2n♂ = 19$, X_10) our data support previously reported lower chromosome count in *O. putus* ($2n♂ = 25$, $X_1X_2X_30$, Mittal 1983). Our results are favoring the hypothesis of Kral et al. (2006) showing that the ancestral karyotype of males of entelegyne spiders was composed of 42 chromosomes including X_1X_20 system. During the karyotype

evolution, chromosome number decreased in all families of Eresoidea as is the case in most enetelegynae lineages examined so far. Considerable reduction of 2n is apparent in the genera *Stegodyphus* and *Oecobius.* Several groups of Eresoidea show $X_1X_2X_30$ system that has been derived probably from X_1X_20 system by nondisjunction. At present, it is impossible to determine if the ancestral status for the Eresoidea karyotypes was two or three X pairs due to frequent presence of $X_1X_2X_30$ system in this superfamily; study of more species is necessary to solve this problem. Our research was supported by Grant Agency of the Czech Academy of Sciences (project No. IAA601110808) and by Czech Ministry of Education, Youth and Sports (project no 00216208287).

O

PHYLOGENY OF THE *Savignia*-GENUS GROUP (LINYPHIIDAE).

Frick H., W. Nentwig and C. Kropf

Species from the *Savignia*-genus group are very homogenous considering the male and female copulatory organs. Inclusion of most of these species into *Savignia* was therefore suggested several times. The current preliminary analysis includes nearly half out of approximately 140 species of this group. Based on morphological data the parsimony analysis suggests a paraphyletic *Savignia*-genus group. While especially *Diplocephalus* is highly paraphyletic we found several synapomorphies for *Araeoncus* and *Savignia*.

Transition series including changes in cephalic lobe and tibial apophysis morphology are discussed and comments on biogeography are given.

P

CONTRIBUTION TO THE SCORPION KNOWLEDGE OF IRAN

Garkheloo M. M.[1], A. Karataş[2] and M. Uçak[3]

[1]Zenjan University, Department of Biology, Zenjan, Iran. [2]Niğde University, Faculty of Science and Arts, Bilogy Department 51200 Niğde Turkey. leiurus9@hotmail.com [3]Ankara University, Science Faculty, Biology Department, Ankara, Turkey.

Sixteen (16) species belonging to three families were determined from Iran. *Mesobuthus eupeus* (C.L. Koch, 1839), *Mesobuthus caucasicus* (Nordmann, 1840), *Androctonus amoreuxi* (Audouin, 1826), *Androctonus crassicauda* (Olivier, 1807), *Compsobuthus matthiesseni* (Birula, 1905), *Compsobuthus kaftani* Kovarik, 2003, *Hottentotta saulcyi* (Simon, 1880), *Hottentotta schach* (Birula, 1905), *Hottentotta zagrosensis* Kovařík, 1997, *Odontobuthus bidentatus* Lourenço et Pézier, 2002, *Odontobuthus doriae* (Thorell, 1876), *Razianus zarudnyi* (Birula, 1903) from the Family: Buthidae; *Scorpio maurus townsendi* (Pocock, 1900) and *S. m. kruglovi* Birula, 1910 from the family Scorpionidae and *Hemiscorpius lepturus* Peters, 1862, *H. persicus,* Birula, 1903, *H. acanthocercus* Lorenco & Monod, 2005, from the family Hemiscorpiidae. Photographs and distributional records are given in maps for each species.

O

ADVANCES IN SYSTEMATICS OF ZYGIELLIDAE

Gregorič M. [1]and M. Kuntner[1,2]

[1]Institute of Biology, Scientific Research Centre, Slovenian Academy of Sciences and Arts, Novi trg 2, P. O. Box 306, SI-1001 Ljubljana, Slovenia. [2]Department of Entomology, National Museum of Natural History, Smithsonian Institution, NHB-105, PO Box 37012, Washington, D.C. 20013-7012, USA. matjaz.gregoric@gmail.com

Zygiella, *Parazygiella*, *Leviellus* and the monotypic *Stroemiellus*, the genera classically known as *Zygiella* s.l., contain mostly widespread Holarctic species. *Zygiella* s.l. has traditionally been placed in Araneidae, but was transferred to Tetragnathidae, then back to Araneidae, and most recently into its own family, Zygiellidae. While the new genera have been catalogued, the family Zygiellidae has not been generally accepted, and remains controversial. However, new molecular phylogenetic analyses establish a clade that unites *Zygiella* s.l. with Australasian leaf-curling spiders (genera *Phonognatha*, *Deliochus*) and the enigmatic bark spiders of the Old world tropics (genus *Caerostris*), exclusive of araneids, and thus find preliminary support for Zygiellidae. We tested such zygiellid placement by adding six species of *Zygiella* s l. (*L. thorelli*, *P. montana*, *S. stroemi*, *Z. atrica*, *Z. keyserlingi* and *Z. x-notata*) to the morphological and behavioral matrix of Kuntner et al. (2008) with additional characters. The analysis recovers the clade with *Zygiella, Parazygiella, Leviellus* and *Stroemiellus*. However, it does not resolve unequivocally its sister group, which may involve nephilid or araneid representatives. We thus find preliminary phylogenetic support for Zygiellidae, but its exact composition remains to be established in future combined phylogenetic analyses.

O

RESOURCE PARTITIONING AMONG FIVE AGROBIONT SPIDERS OF RICE ECOSYSTEMS

Hafiz M. T. and A. Butt

Department of Zoology University of Punjab Lahore, Pakistan. tahirvector@hotmail.com, abdajawed@yahoo.com

Present study was conducted to investigate the possible factors responsible for the coexistence of three hunting spiders (viz., *Lycosa terrestris, Pardosa birmanica* and *Oxyopus javanus*) and two orb web spiders (i.e., *Tetragnatha javana* and *Neoscona theis*) in the rice ecosystems of central Punjab, Pakistan. Both guild members feed on the same prey orders but in different proportions. Both guild members also differed in their reproductive period, abundance of young and adults and in the prey size selection. Prey size taken by each of the spider species was correlated to the carapace width and increased with the increase in carapace width. Niche breadth values of five species recorded during two separate years did not differ. Values of resource overlap indicated that species as a whole were utilizing time, habitat and prey resources differently. Discriminant function analysis also clearly separated the five species in three-dimensional space. It is concluded that separation of guild members in time, microhabitat and prey niche dimensions reduce competition, thus allowing coexistence. Coexistence of spider guilds whose niche axis vary, may enhance their biocontrol potential.

P

SILKS OF LONG-FANGED SIX-EYED SPIDERS (ARANEAE : DYSDERIDAE)

Hajer J.[1], J. Malý[1] and M. Horejsková[2]

[1]Department of Biology, Faculty of Science, J.E. Purkinje University in Ústí nad Labem, České mládeže 8, 400 96 Ústí nad Labem, Czech Republic. [2]Institute of Molecular Genetics AS CR, Vídeňská 1083, 142 20 Prague, Czech Republic. Jaromir.Hajer@ujep.cz; http://sci.ujep.cz.

Silk production and the ultrastructure of silks produced by the spider family Dysderidae was studied by means of an XL 30 ESEM Environmental Scanning Electron Microscope, TESCAN SEM Microscope and an INTEGRA VITA NT-MDT Atomic Force Microscope (AFM). To study the spinning behaviour, the stereo-microscope equipped with Digital Camera INFINITY LITE was used. Dysderidae represents probably the most primitive Araneomorphae. The spinning apparatus of Dysderidae has been described by Glatz (1972). However the silk produced by Dysderidae is described for the first time in the presented poster. The material used in this study belongs to the following species: *Harpactea hombergi* (Scopoli, 1763), *Harpactea algarvensis* (Ferrándéz, 1990), *Tedia abdominalis* (Simon, 1882), *Rhode scutiventris* (Simon, 1882) and *Rhode aspinifera* (Nikolič, 1963). Three types of spinning glands/spigots can be found in Dysderidae by both, female and male stages. No cylindrical (tubuliform) glands are developed by adult females (i.e. glands which are by a majority of spider families of the suborder Araneomorphae, involved in cocoon silk production). The ultrastructure of the silken threads of Dysderidae webs (i.e. their daylight retreats) is the same as the ultrastructure of retreats inside which the females lay their eggs. Silk secretions, emitted from spigots in the course of web construction, are not processed by legs in the subsequent process of hardening (analogous to Mygalomorphae); silken lines of retreats are not attached to the substratum by using attachment discs (= piriform glands secretions). Threads organized as paired nanofibres (single nanofibre is approx. 100 nm in diameter), represent a basic micro-architecture of web threads, revealed by AFM. These "doublets" are frequently crossed forming a dense network. Occasionally, an exchange of individual 100 nm fibers between two doublets can be observed in the form of "slingshot" structure. This structure increases the variability of fibre crossing and may further strenghten the web. Furthermore, another type of silk fibre is present as a part of micro-sized bundle, which has a distinct spiral architecture and diameter approx. 150-200 nm. A high-resolution AFM scan of individual nanofibres shows a distinct segmented nanostructure. Each globular segment is approx. 30-40 nm long along the fibre longitudinal axis, and resembles the nanosegment of artificial fibroin described by Peres-Rigueiro et.al. (2007). The AFM images document how complicated could be the crossing of fibre bundles. Individual bundles are crossed not only due to their overlapping, but in some cases by interweaving of their nanofibers. Apart of it, the

crossing is sometimes stiffened with amorphous substance, which origin is yet unknown to us.

Ethological observations have shown an unusual method of egg handling by means of silken threads attached to the surface of eggs in the course of taking care of developing eggs. Presented results will expand our knowledge concerning the use of different kinds of silk in the protection of developing spider eggs.

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O

SPIDERS IN A HOSTILE WORLD.

Helsdingen van P. J.

Spiders with their venom and sticky threads are dangerous for the animals around them. However, this does not mean that they are safe. Spiders, too, have their enemies and the world around them is full of threats. An overview of different types of interactions and their impact will be presented.

P

SCRAMBLE COMPETITION AS A POTENTIAL EVOLUTIONARY CAUSE OF EXTREME SEXUAL SIZE DIMORPHISM IN GIANT WOOD SPIDERS

Hou C.

Department of Life Science, Tunghai University, Taiwan

Sperm competition or scramble competition are considered two potential evolutionary causes of sexual size dimorphism in spiders. Each hypothesis is supported by results of various studies, but relevant empirical evidence from the field is still insufficient. The giant wood spider *Nephila pilipes* widely distribute in E and SE Asia has extreme sexual size dimorphism, making it a suitable organism to study the nature and intensity of sexual selection pressures. In this study I monitored population dynamics and estimated strength of male-male competition in *N. pilipes* in a study site in southern Taiwan for one month to realize the relationships between sexual selection pressure and sexual size dimorphism. Preliminary results reveal low intensity of male-male competition in *N. pilipes*. Throughout the study there were on average 0.5 males per female web. Marked females could only be observed for a mean of 4.4 days and females changed their web locations about every two days. These results imply that female *N. pilipes* change their web locations frequently and move for long distance; therefore, it is hard for males to find them. Besides, the probability of finding marked males was much lower than that of finding females, which might be caused by males' high mortality rate. All these results suggest that scramble competition seems to exert a selection pressure to shorten ontogeny and increase number of mature males to enhance the probability of locating frequently-moving females.

O

ARBOREAL SPIDER ASSEMBLAGE: HOW DOES THE DIVERSITY AND COMMUNITY COMPOSITION CHANGE WITH GROWTH OF EUROPEAN BEECH?

Hsieh S. Y.-L. and K. E. Linsenmair

Department of Animal Ecology and Tropical Biology, Bayerische Julius-Maximilians-Universität Würzburg, Bavaria D-97074, Germany

The majority of studies focuses on excitement about the tremendously rich biodiversity and complex structure of arboreal arthropod communities in the strata of lowland tropical rainforest canopies, whereas, those of the temperate forest canopies were forgotten for a long time, even though some previous investigations showed that a rich canopy fauna lives also with many rare, endangered and also new species to science, and there are even higher arthropod densities in the temperate countries. Here we evaluate the diversity indices of arboreal spiders in a European beech forest, illustrate a prominent relationship between beech aged categories and the spider diversity in beech canopies, and reveal that middle-aged beeches may involve a highest diversity and an even six times more abundant fauna than an old-aged beech canopie. Higher beta diversity and more shared species between middle-aged and young-aged canopies, and the temporal dynamic of diversity indices also show that under the Bavaria forestry policy there is a stable and sustainable pattern following two years after the initial observations. With these data, we present that biodiversity of the temperate forest canopies- nearly as a white patch on the biological map as the canopies of tropical forests- should be undoubtedly more estimated and need to be revised by considering the age categories of canopy as well as their climatic zones.

P

SEEING THE COLORFUL WORLD: A NOVEL APPROACH OF STUDYING SALTICID COLOR VISION

Huang J.-N.[1], W.-S. Chung[2], I-M. Tso[1], and H.-Y. Yan[2]

[1]Department of Life Science, Tunghai University, Taichung, Taiwan. [2]Marine Research Station, Institute of Cellular and Organismic Biology, Academia Sinica, Ilan, Taiwan.

The good visual acuity of salticids has long been of interest to scientists. Although many visual ethological studies in the conceptual framework of sexual selection were performed on these spiders, their color vision remains poorly understood. It has long been believed that salticids possess color vision. Results from previous studies suggested that various species of jumping spiders might have dichromatic, trichromatic or tetrachromatic color vision. However, salticids are rather small and therefore it is difficult to perform electrophysiological studies on their eyes. In this study we used the non-invasive electroretinogram (non-invasive ERG) method to investigate salticids' color vision, and used LED lamps of various wavelengths calibrated to the same intensity as light stimuli. By using this method the spectral range and sensitivity of jumping spiders' anterior medium eye (AME) can be easily measured. Based upon this approach we investigated the following two issues: 1) Do the properties of salticids' color vision correlate with their evolutionary history, body size or body coloration? 2) How did color vision evolve in salticids and other closely related spider families? Preliminary results showed that the salticids examined in this study all possessed tetrachromatic color vision, and were capable of detecting a wide spectral range (from UV to red). There was no evidence that the color vision properties of various salticids examined in our study (no matter ancient or advanced species) differed significantly. In addition, we found no remarkable visual differences among conspecifics of different sex or ontogenetic stages. The preliminary physiological data suggest that salticids of different body size, coloration and evolutionary history seem to exhibit no significant difference in color vision properties.

P

SHORT TERM EFFECTS OF THİNNİNG ON SPİDER DİVERSİTY OF A MİD-ELEVATİON PLANTATİON FOREST İN CENTRAL TAİWAN

Huang P.-S.

Department of Life Science, Tunghai University

Spiders are the most diverse and abundant arthropod predators in terrestrial ecosystems and are very sensitive to changes of their habitats. They are considered as a good indicator for comparing the biodiversity of various environments and for assessing the effect of disturbances. In this study, we investigated the short term effects of silvicultural practices on biodiversity by comparing spider community structure and guild composition in a plantation forest receiving various degrees of thinning managements. The study site was located in a mid-elevation *Cryptomeria Japonica* plantation forest in central Taiwan. We quantified the diversities of spiders as well as microhabitat structures and microclimates. Spiders in canopy, understory vegetation and ground were systematically collected four times per year before and after the thinning operation. To realize potential environmental factors generating the observed spider diversity patterns, microhabitat and microclimate parameters of each sampling plot were also measured. Composition of spider assemblages in stands receiving heavy and moderate levels of thinning was similar, but was significantly different from that of unthinned stand. The major contributors of the observed spider diversity variation were space weavers of the family Linyphiidae. We found that the short term impacts of forest managements on mid-elevation *C. japonica* plantation in central Taiwan were reflected by significant changes in spider species, family and guild compositions. The environmental factors influencing spider diversities differed among various microhabitat locations. How environmental factors shaped such diversity variation was complicated and the observed pattern was unlikely to be generated by simple uniform process.

P

HOW SPIDERS LOOK FOR SHELTER IN LAND-SNAIL SHELLS

Hula V. and J. Niedobova

Department of Zoology, Faculty of Agronomy, Mendel University of Agriculture and Forestry in Brno, Zemedelska 1, CZ - 613 00, Czech Republic

Spiders overwintering in land-snail shells is an issue not well studied. However, there are several studies focused on spider faunas, addressing this issue. Most of the authors of these works recognised that the land-snails shells serve as overwintering shelters of relativelly rare species. In middle Europe these spiders are mostly representatives of the families Salticidae and Theridiidae. There are six spider species included in the Red List of Spiders of the Czech Republic (3,3% of all – 2 CR, 3 EN and 2 VU) with documented afinity to the land-snail shells.

We have studied the spider fauna of 32 localities located on different geological substrate. We collected all the empty land-snail shells on all sampled localities (1 hour sampling in each locality). Alltogether we have collected 2448 snail-shells: *Cepaea vindobonensis* – 845 ex., *Helix pomatia* – 421 ex. and *Helicella* sp. – 1182 ex. Under laboratory conditions we have collected all the spiders that were using the snail shells as shelters: 189 individuals of spiders belonging to 19 species, the remaining ones were identified to the family or genus level only. For all localities we have collected environmental data about geographical orientation, geological substrate, conservation site management, cover and origin of the locality. Whole dataset was assessed with the use of the software CANOCO.

From faunistic point of view we have found several interesting species. The most important finding was that of the gnaphosid *Phaeocedus braccatus,* which is only known from two localities in the Czech Republic (sensu Buchar & Růžička, 2002). The remaining records of retrieved species increased our current knowledge regarding the distribution of several species (*Euryopis quinqueguttata*, *Pellenes nigrociliatus*, *Sitticus pennicillatus* and *Micaria formicaria*). Similarly to other authors we have found juvenile *Cheiracanthium* specimens (not *Ch. eraticum*).

CCA analyses didn't show significant affinity of any spider species to management, species of land-snail or other environmental characteristics (Test of significance of first canonical axis: Eigenvalue = 0.999, F = 1.399, P = 0.1020; test of significance of all canonical axes: T = 7.166, F = 12.388, P = 0.0010). The geological substrate was however found to be significant (Test of significance of first canonical axis: Eigenvalue = 0.551, F = 2.166, P = 0.0560; test of significance of all canonical axes: T = 0.894, F = 1.848, P = 0.0240). All models were computed using 999 permutations under the Monte-Carlo permutation test.

On loes we have found affinity of *Myrmarachne formicaria* to the shells of *Cepaea vindobonensis* and this species was often present in higher numbers (12 specimens from locality). Another interesting finding is that the number of snail-shells is not a

limiting factor – on same habitats (limestone stepps), even if the number of land-snail shells is small, these are inhabited by a dense number of individuals of *Pellenes tripunctatus*. This species is able to colonize *Helix* and *Cepaea* only and to the other hand *Helicella* sp. is exclusivelly occupied by *Sitticus pennicillatus* (on loes) and *Pellenes nigrociliatus* (on limestone). The rare Theridiid spider *E. quinqueguttata* occupies only *Cepaea vindobonensis* shells on loes.

According to our results we can claim that land-snail shells are very important for overwintering of rare and interesting species of spiders. This project will benefit from further research, especially by the inclusion of several studies with specific design, which are currently formulated.

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O

BELOW AND ABOVE THE TIMBERLINE: EVIDENCE OF THE IMPACT OF SKI-PISTES ON SPIDER ASSEMBLAGES

Isaia M., M. Negro and A. Rolando

Università degli Studi di Torino. Dipartimento di Biologia Animale e dell'Uomo. Via Accademia Albertina, 13 10123 Torino. marco.isaia@unito.it

It is now largely accepted that the establishment of ski pistes may negatively affect almost every ecosystem component. To assess the extent of this threat to spider diversity, we studied by pitfall trapping, the assemblages both below and above timberline at several ski resorts in north-western Italian Alps. We analyzed the effect of the construction of ski pistes on the abundance and species richness of spiders trapped in natural habitats (forest or grasslands) adjacent to the ski run, on ski pistes and at the edge between the two habitats. On one hand, below the timberline, diversity parameters (mean abundance, species richness and Shannon index) increased from forest interior to open habitat (i.e. ski-piste or pasture). A noticeable exception to this pattern regarded the forest/ski-piste edge at one site where the desolation? of ski-pistes (in terms of scarce grass cover) was great. In this case species richness and diversity were significantly lower on ski-pistes than at the edge. On the other hand, above the timberline, diversity parameters of spiders decreased significantly from natural grasslands to ski-pistes. Both below and above timberline, generalized linear models suggested that the local extent of grass and rock cover can significantly affect assemblages: the low grass cover of ski-pistes, in particular, is a serious hindrance to colonization of spiders. The analysis of indicator species (IndVal) showed in both cases that most of the species (some of them precinctive to restricted areas in the western Italian Alps) had clear preferences for natural habitats. Comparisons with other groups of arthropods (carabids, grasshoppers, opilionids) are also briefly illustrated. This study confirms that spiders may be used as bioindicators of man-induced environmental disturbances, and suggests that the construction of ski-pistes may have consequences on the conservation of endemic species and on the functioning of alpine ecosystems. To retain spider fauna of open habitats environmentally friendly ways of constructing pistes should be developed and existing ski-pistes should be restored through management to promote the recovery of local vegetation.

O

MILLIONS OF YEARS OF EVOLUTION VS. 250 YEARS OF RESEARCH: WHAT DO WE KNOW ABOUT SPARASSIDAE?

Jäger P.

Senckenberg Research Institute, Frankfurt, Germany. Peter.Jaeger@senckenberg.de

Sparassidae (Arachnida: Araneae), known as huntsman spiders represent the eighth largest spider family in the world. Currently 1056 species are described in 83 genera. More than 50% of the species are described in 3 genera: *Olios* (260), *Heteropoda* (206) and *Pseudopoda* (93). Among the huntsman spiders is the largest labidognath spider: *Heteropoda maxima*. Sparassidae occur roughly between the 40° North and 40° South, *Micrommata virescens* has a palaearctic distribution. Representatives are mostly nocturnal ambushing spiders, and show a large size range: 5–50 mm body length and up to 30 cm in leg span. Not all genera can be assigned to one of the subfamilies, although Simon and Järvi presented comprehensive revisions. In a review, the taxonomic history, scientific news and current projects on Sparassidae are presented.

P

HISTORY AND CURRENT CHECKLIST OF IRAN'S SCORPIOFAUNA

Kakhki O. M. [1,2] and A. Sari[1]

[1]Department of Zoology, Faculty of Biology, University of Tehran, Tehran, Iran. [2]Zoological Museum, Faculty of Sciences, Ferdowsi University of Mashhad, Mashhad, Iran

An updated checklist of the scorpiofauna as well as a brief history of taxonomic researches on scorpions of Iran is presented. The checklist is based on records of scorpion species whose presence has been confirmed in Iran as a result of extensive field expeditions, examination of scorpion collections, literature review, and personal communications from researchers. The scorpiofauna of Iran consists of 51 species belonging to 19 genera and four families. Nomenclatural controversies also have been indicated including supporting papers in the bibliography.

O

SPIDERS OF WESTERN GHATS IN KERALA, INDIA

Kannimparambil Sunil Jose [1]

[1] *Department of Zoology, St.Albert's HSS, Cochin, Kerala, India-682018*

After the pioneering studies done by European arachnolgists in the earlier part of twentieth century very little has been recorded about spiders of Kerala. However, recent collecting has revealed a rich native fauna, with new taxa at species and genus levels. During the study 417 species of spiders are recorded, which represents 29 % of the total spider species in the country. These include 38 families, 161 genera, and several new species and new records from the country. 43 species recorded from Kerala State are new records to the country. Study raises the number of spiders in the country by 214 species bringing it to 1656. Zoogeographic analysis shows 15 endemic species in Kerala state and 74 endemic to India, and 40 to Indo-Srilankan region. Rare families like Cryptothelidae, Oonopidae, Prodidomidae, Hahnidae, Stenochilidae, Mimetidae, Atypidae and Sicariidae are recorded from Kerala during the study. Spider fauna of Kerala bear affinities with oriental and Palearctic regions.

p

A SCORPION COLLECTION FROM IRAQ

Karataş A.[1] and M. Çolak[2]

[1]Niğde University, Faculty of Science and Arts, Bilogy Department 51200 Niğde Turkey. leiurus9@hotmail.com. [2]Ankara University, Faculty of Science, Biology Department, Ankara Turkey.

336 scorpion specimens were examined and 7 species belonging to three families were determined from Iraq. *Mesobuthus eupeus* (C.L. Koch, 1839), *Compsobuthus matthiesseni* (Birula, 1905), *C. werneri*, *Hottentotta saulcyi* (Simon, 1880), *H . scaber, Orthochirus scrobiculosus,* from the Family: Buthidae; and *Hemiscorpius persicus,* Birula, 1903, from the family Hemiscorpiidae. Photographs and distributional records are given in maps for each species.

P

THE ORB-WEAVER SPIDERS (ARANEAE, ARANEIDAE) OF THE ULUDAĞ MOUNTAIN REGION WITH AN UPDATED CHECKLIST OF THE ARANEIDAE IN TURKEY

Kaya R. S. and İ. H. Uğurtaş

Department of Biology, Faculty of Science and Art, Uludağ University, TR-16059 Nilüfer, Bursa, Turkey. rkaya@uludag.edu.tr

The orb-weaver spiders (Araneidae) were collected from 57 different localities in the period between 2002 and 2007 from the Uludağ Mountain, North-West Turkey. A total of 580 adult specimens belonging to the Araneidae family were examined and identified at species level. The Araneidae family was represented with 18 species belonging to 15 genera in the study area. *Cyclosa sierrae* Simon, 1870 is rocorded for the first time from Turkey. Finally, the updated checklist of Araneidae of Turkey is presented in this study.

O

EASTERN ALPINE ENDEMIC ARACHNIDS

Komposch, C.

ÖKOTEAM–Institute for Animal Ecology and Landscape Planning, Bergmanngasse 22, 8010 Graz, Austria

Recently a comprehensive overview of plant, fungus and animal species, whose range lies entirely (endemics) or predominantly (subendemics) within the political borders of Austria, has been finished. Altogether 748 (sub)endemic animal and plant species have been identified. Within the 548 animal species in Austria 10 pseudoscorpion-, 11 harvestman- and 46 spider-species can be found. The orders scorpions and palpigrades include no real (sub)endemic species of Austria, whereas 10 oribatid mites are classified as endemic and subendemic, many more oribatids as pseudoendemics.

The geographical localisation and digitalisation of all available data facilitates the drawing of distribution maps and – for the first time – the clear identification of centres and hot-spots of faunal and floral endemism of the Eastern Alps. Included in this effort are taxa that are truly endemic to the Austrian Republic as well as those whose distribution area lies primarily within national borders (i.e. subendemic).

The number of (sub)endemic arachnid species differs widely in the nine Austrian federal provinces. Rich in endemic spiders and harvestmen are the mountainous countries Styria, Carinthia, Tyrol and Salzburg. The recent climate history with large-scale expansion of the last ice-shields is of importance to understand today´s distribution ranges.

Highest arachnid species numbers are reached in the central Alps (e.g. Hohe Tauern NP), the north-eastern Calcareous Alps (Ennstaler Alps) and in particular in the southern Alps (Karawanken) with their massifs de refuge, marking the margin of the Würm-ice-shields. Regions outside the Alps are poor in endemics. For animals, a maximum of 46 endemic taxa was found in a grid cell in the Gesäuse NP, and the Hochobir in the Karawanken came second with 41 endemic taxa.

As expected, most of the endemic arachnid species occur from the nival down to the montane zone. The most important habitats are rocky areas, caves and woodlands. High absolute numbers and percentages of endemics can be found within the soil-inhabiting harvestman-families Cladonychiidae, Ischyropsalididae and Nemastomatidae and the spider-family Linyphiidae (*Lepthyphantes* spp. s. l. and *Troglohyphantes* spp.).

The threat status of endemic spider- and harvestman-species in Austria is in general high. Despite to the big threats caused by forestry, hydraulic engineering, agriculture, tourism and climate change up to now no endemic arachnids and insects are protected by law. The coverage of the distribution of endemics by nature reserves is rather poor. Conservation efforts must focus on these unique tesserae of our Alpine fauna.

O

GROUND-LIVING SPIDERS (ARANEAE) AT HEAVILY AND SLIGHTLY POLLUTED SITES IN SUBARCTIC

Koponen S.

Zoological Museum, University of Turku. FI-20014 Turku, Finland. sepkopo@utu.fi

In the late 1980's, news on heavy pollution loads from the Russian smelters in the Kola Peninsula and their possible effect on needle losses of pine in northern Finland, were the starting point for active studies on effects of pollution in northern Finland, Russia and Norway. Spiders, as some other predatory arthropod groups, have been found at heavily polluted sites near the smelters. Therefore spiders have often been used as indicators in monitoring the effects of pollution. In the present work, information will be given on spider assemblages near the Pechenganikel smelter complex, in northern subarctic Kola peninsula, Russia. The present study area, Pechenganikel smelter combine (Nikel and Zapolyarny), ca 69°30'N, 30°20'E, is situated in subarctic pine forest area, where there are also birch woods, bogs and treeless fells. The smelter is close to Norway and Finland, and the distance to the Arctic Ocean is only about 45 km. Annual average temperature is ca +1°C. Yearly emission in 1980/90, just before the spider sampling, was about 250 000 tn SO_2, ca 200 tn Cu and 300 tn Ni. It means that sulphur load was the same as in Monchegorsk smelter, central Kola Peninsula, but Cu and Ni loads were only 10 % of that in Monchegorsk. Area of complete damage to forests was 45 km^2 and severe damage 300 km^2 around the Pechenganikel complex; in these areas SO_2 concentration was over 80 g/m^3, and annual dry sulphur deposition ca 4 g/m^2. The average cover of vegetation indicates the degree of pollution: 30 % coverage at heavily and 80 % at slightly polluted sites. Ground-living spiders were collected, 1991–92, from 25 x 25 cm squares by hand-sorting. The field work was done by Dr. Galina G. Koneva (Moscow) and species identification was carried out by the author. The material consists of ca 630 identifiable spider specimens and is deposited in the Zoological Museum, University of Turku, Finland.

Great differences were found in density of spiders (range 3–32 and 72–266 ind./m^2 in heavily and slightly polluted areas); the average spider density was 6-fold greater at slightly polluted sites, and the density of Linyphiidae specimens 11.5-fold. Also species number/site was higher at slightly polluted sites: 1.8-fold. Altogether, 18 and 58 species of spiders were caught in heavily (5 sites) and slightly (9 sites) polluted areas. Interestingly, as many as 10 families but only 18 species were found at heavily polluted sites, and at slightly polluted sites the material was much more species-rich representing 13 families. The theridiid *Robertus scoticus* clearly dominated at the heavily polluted sites (23.3 % of identifiable specimens) and was the second in abundance at the slightly polluted sites (13.5 %). Other abundant species at heavily polluted sites were *Neon reticulatus, Thanatus formicinus, Xysticus audax*, *Agyneta*

gulosa and *Alopecosa aculeata*. Of these, especially *A. aculeata* (4th in abundance) and also *A. gulosa* were found in good numbers at slightly polluted sites. Altogether, four linyphiid species (i.e., *A. gulosa, Scandichrestus tenuis, Tapinocyba pallens* and *Walckenaeria antica*) were found among the total 18 species (22 %) at heavily polluted sites. The most abundant species at slightly polluted sites were *Tapinocyba pallens* (18.2 %), *Robertus scoticus* (13.5 %), *Maso sundevalli* (9.4 %), *Alopecosa aculeata* (8.1 %), *Micrargus herbigradus* (5.2 %), *Hahnia ononidum* (4.7 %) and *Macrargus rufus* (3.2 %). About 60 % of all species (and also of the 33 most abundant species) at slightly polluted areas belonged to the family Linyphiidae. This family is known to dominate in northern areas. In a previous study, spiders along a pollution gradient were studied near the Monchegorsk smelter complex, central Kola Peninsula, which is also a heavily degraded area. *Robertus scoticus* and *Agyneta gulosa* were found also there in the most polluted areas (black, dead barren sites 2.5–5 km from the smelter). In addition to these two species, only *Steatoda phalerata* occurred at the most polluted sites. *S. phalerata* was not found in Pechenganikel area; which may have too harsh conditions for this thermophilous species. Of the present species found at heavily polluted sites, *Micaria alpina, Alopecosa aculeata*, *Evarcha falcata* and *Tapinocyba pallens* were caught in good numbers at rather heavily polluted sites in Monchegorsk (10 km from the smelter).

P

SPIDERS (ARANEAE) AND ANTS (FORMICIDAE) ON OAK IN SW FINLAND

Koponen S.

Zoological Museum, University of Turku. FI-20014 Turku, Finland. sepkopo@utu.fi

Arthropods were collected from large horizontal branches of oak (*Quercus robur*), at 3-5 m height, using special traps in Turku, Finland. Oak reaches its northern limit here in southwestern Finland. Trees with high and low density of red wood ants (*Formica polyctena* Foerster) were compared. At the study site, Ruissalo island in the City of Turku (60°26.3'N, 22°12.0'E), there were both oaks with high abundance of *Formica polyctena* and others with markedly low abundance. The traps used consist of a collar around the branch, a plastic funnel, and a container. The collar (water pipe, diameter 15 mm) was fitted tightly around the branch with lute and cable tie. The collar was brushed with FLUON to give a Teflon-like slippery surface. The funnel (upper diameter 22 cm) was situated beneath the collar, at the distance of about 5 cm. The container (0.5 l) had an overflow hole covered by gauze. Saturated NaCl solution was used. Large old oaks were studied with trunk diameter on average 70 cm. Of the spider species caught, the linyphiid *Moebelia penicillata* (Westring) was most abundant. Slightly more spiders were found on "ant-free" oaks. *Moebelia penicillata* and *Anyphaena accentuata* (Walckenaer) were more abundant on "ant" trees while *Hypomma cornuta* (Blackwall) and *Salticus cingulatus* (Panzer) were more numerous on "ant-free" oaks. In the present small material, only a few species of spiders were abundant enough to be compared with the above-mentioned study made in Germany. The trends of *Hypomma cornuta, Moebelia penicillata* and Theridiidae spp. are similar as in the study by Floren and Otto. *Anyphaena accentuata* was in the present material more abundant in ant trees, contrasting the situation in Germany. *Hahnia pusilla* C.L. Koch (more abundant in ant trees) and *Salticus cingulatus* (in ant-free trees) were missing in the German study. The total number of spider specimens was higher in ant-free trees, also contrasting the German results. The differences found in comparison of the Finnish and German data can be explained, at least partly, by the small Finnish material and by different collecting methods.

O

KARYOTYPE EVOLUTION OF THE SPIDER SUPERFAMILY DYSDEROIDEA

Král J.[1], M. Řezáč[2], M. Forman[1], J. Musilová[1], R. L. Edwards[3], Y. Lubin[4] and I. Hoffman[4]

[1]Laboratory of Arachnid Cytogenetics, Department of Genetics and Microbiology, Faculty of Science, Charles University in Prague, Viničná 5, CZ – 128 44, Prague 2, Czech Republic. [2]Department of Entomology, Research Institute of Crop Production, Drnovská 507, CZ - 161 06, Prague 6, Czech Republic. [3]Box 505, Woods Hole, MA, 02543, USA [4]Mitrani Department of Desert Ecology, Blaustein Institute for Desert Research, Ben-Gurion University of the Negev, Sede Boqer Campus, 84990 Midreshet Ben-Gurion, Israel

Karyotypes and meiosis of 64 species of the superfamily Dysderoidea has been studied using spreading preparations stained by Giemsa. Analysed species belong to families Dysderidae (genera *Dasumia*, *Dysdera*, *Dysderocrates*, *Harpactea*, *Harpactocrates*, *Kaemis*, *Rhode*, *Tedia*), Oonopidae (genera *Ischnothyreus*, *Oonops*, *Opopaea*, *Silhouettella*, *Stenoonops*, *Tapinesthis*, *Triaeris)*, Orsolobidae (genus *Afrilobus*), and Segestriidae (genera *Ariadna*, *Segestria*). Diploid chromosome numbers of males varied from 5 (*Afrilobus* sp.nov., Orsolobidae) up to 51 (*Tedia abdominalis*, Dysderidae). In contrast to other spiders, chromosomes of Dysderoidea are holocentric. Most representatives of the superfamily possess X0 sex chromosome system; the X chromosome often contains the nucleolus organizer region. The XY system of *Silhouettella* has probably originated by a fusion of an X chromosome and an autosome. The homologue of the autosome has then converted into Y chromosome. Multiple sex chromosome systems have been found in the genera *Segestria* (X_1X_20, all species studied), *Dysdera* (*D.* aff. *erythrina* X_1X_20, *D.* aff. *andreinii* $X_1X_2X_3X_4X_50$, *D. longirostris* and *D. simoni* $X_1X_2X_3X_4X_5X_6X_7X_80$) and *Tedia* (*T. abdominalis* $X_1X_2X_3X_4X_5X_6X_7X_8X_90$). Considering the recent placement of the family Segestriidae into the base of the superfamily, the sex chromosome system of the genus *Segestria* could be homologous to ancestral X_1X_20 system of spiders. On the other hand, comparison of the DNA content of the X chromosomes of *Dysdera westringi* (X0) and *T. abdominalis* ($X_1X_2X_3X_4X_5X_6X_7X_8X_90$) indicates that multiple X chromosome systems of the genera *Dysdera* and *Tedia* originated by multiple fissions of a single X chromosome. Meiosis of Dysderoidea is chiasmatic in both sexes including an unusual period of considerable decondensation of bivalents during prophase of the first meiotic division (so-called diffuse stage). Sex chromosomes of *Dysdera crocata* and closely related *D. gammarae*, members of the subfamily Harpacteinae, orsolobid representative, and oonopid *Silhouettella* show an inverted meiosis. This meiotic modification has probably originated repeatedly during evolution of the superfamily. Indeed, this does not exclude the possibility that inverted meiosis can be a synapomorphy of some Dysderoidea clades. Considerable

diversity of Dysderoidea karyotypes considerably complicates the determination of ancestral karyotype of the superfamily. Autosome evolution has included often fissions and fusions. Interestingly, the autosome number is doubled in some *Dysdera* species in comparison with closely related forms. Similar content of DNA in two closely related species, *Dysdera spinicrus* (2n♂ = 22 + X0) and *D. westringi* (2n♂ = 44 + X0) suggests that the autosome number was doubled by fission of all autosomes into two units. In four *Dysdera* species, fusion heterozygotes has been found. During meiosis, two original and fused chromosome form a trivalent showing inverted meiosis. Interestingly, these species do not exhibit inverted meiosis of the sex chromosome, except *D. crocata*. Surprisingly, the trivalent shows a regular segregation. The balanced segregation of the trivalent is enabled probably by a combination of inverted meiosis and specific kinetic behaviour of chromosomes during metaphase of the second meiotic division (metaphase II). Due to inverted meiosis, chromosomes of the trivalent segregate only during anaphase of the second meiotic division. Similarly to other chromosomes, both ends of chromosomes composing the trivalent are captured temporarily by spindle microtubules at metaphase II. In this way, both chromosome ends are upturned to the same pole and segregation of the trivalent is balanced during anaphase II. Due to regular segregation of chromosomes in fusion heterozygotes, chromosome fusions probably do not form in so far potent reproductive barrier in spiders with holocentric chromosomes as found in organisms with standard chromosomes.

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O

INSIGHTS INTO KARYOTYPE EVOLUTION OF SCORPIONS

Král J. [1], T. Kořínková[1], F. Šťáhlavský[2], J. Musilová[1] and F. Kovařík[3]

[1]Laboratory of Arachnid Cytogenetics, Department of Genetics and Microbiology, Faculty of Science, Charles University in Prague, Viničná 5, CZ – 128 44, Prague 2, Czech Republic. [2]Department of Zoology, Faculty of Science, Charles University in Prague, Viničná 5, CZ – 128 44, Prague 2, Czech Republic. [3]P.O.Box 27, CZ-145 01, Prague 45, Czech Republic

Information on scorpion cytogenetics is still fragmentary. Karyotypes of only ~60 species from 9 families (Bothriuridae, Buthidae, Chactidae, Euscorpiidae, Iuridae, Liochelidae, Scorpionidae, Urodacidae, and Vaejovidae) have been studied so far. In spite of this, available data suggest a considerable karyotype diversity of the order. Diploid chromosome numbers (2n) range considerably from 5 (*Tityus bahiensis*, Buthidae) up to 175 (*Urodacus novaehollandiae*, Urodacidae). Families Bothriuridae, Scorpionidae, and Urodacidae possess standard chromosomes. In contast to this, chromosomes of the family Buthidae are holocentric, lacking a primary constriction and a centromere; 2n of most studied buthids is lower than in scorpions with standard chromosomes. The male meiosis of the families Bothriuridae, Buthidae, Scorpionidae, and Urodacidae is achiasmatic. The apomorphic state of holocentric chromosomes and achiasmatic meiosis represent potential characters for phylogenetic analysis. Unfortunately, data on chromosome structure and meiosis in the other families of scorpions are dubious or lacking. Therefore the present study aims to elucidate fundamental trends of karyotype evolution in scorpions, especially to determine the distribution of holocentric chromosomes and achiasmatic meiosis. The examined species belong to 7 families, representing a sample of all superfamilies of scorpions. Diploid chromosome numbers were found as follows: *Bothriurus coriaceus* 50 (Bothriuridae), *Orthochirus negevensis* 22, *Tityus magnimanus* 20 (Buthidae), *Chaerilus celebensis* 154-158, *C. rectimanus* 114, *C. sejnai* 120-122 (Chaerilidae), *Cazierius gundlachii* 24 (Diplocentridae), *Euscorpius cf. sicanus* 66 (Euscorpiidae), *Iomachus politus* 38, *Opisthacanthus asper* 62 (Liochelidae), *Iurus asiaticus* 106 (Iuridae), *Heterometrus laoticus* 38, *H. spinifer* 56 (Scorpionidae). Representatives of the families Bothriuridae, Diplocentridae, Euscorpiidae, Liochelidae, Iuridae, and Scorpionidae display standard chromosomes; biarmed chromosomes predominate in majority of species. In contrast to these families, chaerilid chromosomes are tiny without visible primary constriction which can reflect a holocentric structure. Holocentric chromosomes would locate chaerilids into the clade formed by scorpions with holocentric chromosomes that contains the family Buthidae and possibly also the family Pseudochactidae (karyotypes of this family are unknown). However, detailed analysis including ultrastructural data is necessary to verify or refuse the holocentric structure of chaerilid chromosomes. Unlike other scorpions studied so far, males of chaerilids retain chiasmatic meiosis. Interestingly, all bivalents contain

invariably a single terminal chiasma. Persistence of standard meiosis in chaerilid scorpions reflects a rather basal position of the family within the order.

O

DISTRIBUTION AND NATURAL HISTORY OF THE GENUS *Chaetopelma* (ARANEAE: THERAPHOSIDAE) IN TURKEY

Kunt K. B., A. Bayram and E. A. Yağmur

Eserköy Sitesi 9/A Blok No:7 TR-06530 Ümitköy Ankara Turkey. chaetopelma@gmail.com (Vice President of the Turkish Arachnological Society).

Chaetopelma is one of 116 genera of the Mygalomorphae family Theraphosidae. It contains 4 species, predominantly distributed around the Mediterranean region. The following species have been recorded from Turkey to date: *Chaetopelma concolor* (Simon, 1873) and *Chaetopelma olivaceum* (C. L. Koch, 1841). During a recent survey in Turkey, on the Taurus mountains, some *Chaetopelma* samples were collected and were observed in natural condition. In this presentation, a detailed distribution of the genus *Chaetopelma* in Turkey with a note on its natural history is reported.

O

PHYLOGEOGRAPHIC PATTERNS IN INDIAN OCEAN NEPHILID SPIDERS

Kuntner M.[1,2] and I. Agnarsson [1,2,3]

[1]Institute of Biology, Scientific Research Centre, Slovenian Academy of Sciences and Arts, Novi trg 2, P. O. Box 306, SI-1001 Ljubljana, Slovenia. [2]Department of Entomology, National Museum of Natural History, Smithsonian Institution, NHB-105, PO Box 37012, Washington, D.C. 20013-7012, USA. [3]Department of Biology, University of Puerto Rico - Rio Piedras (UPR-RP), San Juan, PR, 00931, Puerto Rico. kuntner@gmail.com

The nephilid genera *Nephila* and *Nephilengys* are distributed throughout the tropics and both exhibit similar levels of sexual size dimorphism. Recent revisionary work based on morphology suggests that these genera both contain mostly widespread species with substantial variation in size and somatic morphology, but not life history. These spiders are thought to be highly mobile, be it naturally (*Nephila*) or via synathropic dispersal (*Nephilengys*), which enables them to reach and occupy remote oceanic islands. Here, we report on the study of the phylogeography of *Nephila inaurata* s.l. and *Nephilengys borbonica* in the Indian Ocean. We sampled these spiders in Africa and the island arc between the Comoros and Rodrigues more than 2000 km apart, and including Madagascar, Reunion and Mauritius. Morphologically, *Nephila* populations may belong to two distinct species in this region, one widespread and one narrow endemic, while recent work suggests that populations of *Nephilengys* represent a single morphological species with geographically restricted color morphs. We use mitochondrial markers to examine population level phylogenetic structure within those species, and thus test the morphology-based taxonomy. Our analyses revealed highly structured and divergent lineages in *Nephilengys*, consistent with color morphs, but more shallow and less divergent structure among *Nephila* populations, inconsistent with its color morphs. This suggests that *Nephila* maintains a more steady gene flow throughout the archipelago, while island populations of *Nephilengys* are genetically isolated. We discuss the implications of our results for nephilid taxonomy, and for Indian Ocean biogeography in general.

P

A SURVEY OF SPIDERS (ARANEAE) INHABITING THE SUPERFICIAL UNDERGROUND COMPARTMENT IN BULGARIA

Lazarov S. [1*], C. Deltshev[1], M. Naumova[1] and P. Stoev[2]

[1]Institute of Zoology, Tsar Osvoboditel Blvd. 1, 1000 Sofia, Bulgaria. slazarov@zoology.bas.bg.
[2]National Museum of Natural History, Tsar Osvoboditel Blvd. 1, 1000 Sofia, Bulgaria

The spiders living in superficial, hemiedaphic and cave environments in Bulgaria have been studied quite well for almost 120 years. At the same time very little is known about endogeic spiders and in particular those inhabiting the gravel stratum below the soil layer and the network of crevices in the basal rocks. This particular environment was defined (in French) by Christian Jubertie in 1980 as *Milieu Souterrain Superficiel*, while in publications in English it is known also as *Superficial Underground Compartment* (SUC) or *Mesocavernous Shallow Stratum*. In addition to its specific geomorphologic structure SUC has specific microclimatic and hydrological characteristics. Several highly adapted to subterranean manner of life invertebrates (anophthalmic, depigmented, apterous) inhabit SUC and are unknown from epigeic habitats.

In 2005 a project aiming at the exploration of the SUC fauna in Bulgaria was initiated by a team of Bulgarian and Romanian zoologists. In the course of three years sampling, a total of 29 species of spiders belonging to the following families: Segestriidae (1), Dysderidae (4), Nesticidae (1), Anapidae (1), Linyphiidae (12), Agelenidae (2), Cybaeidae (1), Dictynidae (2), Amaurobidae (1), Gnaphosidae (3), Salticidae (1), were captured from 11 sampling sites. *Zangherella apuliae* (Di Caporiacco, 1949) was recorded from two sites, Gospodintsi and Kalimantsi (situated approx. 30 km apart), which represents the first formal record of the family, genus and species from Bulgaria. The species was hitherto known only from Italy, Greece and Turkey. In spite of the active investigations of the epigean and cave spiders in these regions over the years *Z. apuliae* was not found and it seems that there (and possibly elsewhere in Bulgaria) it occurs only in SUC and nowhere else. The Bulgarian individuals are re-described and illustrated to show some slight differences in the palpal shape. A faunistic overview of all spiders found in SUC is made, along with remarks on the distribution of some rare and interesting species. The higher presence of cave-dwelling spiders in some of the sampled sites indicates the role of SUC as an intermediate stratum where litter- (tanathostromic), soil- (edaphic) and cave-(troglobitic) species may occur together.

P

DIVERSITY OF SPERMATOZOA OF MITE HARVESTMEN (OPILIONES, CYPHOPHTHALMI)

Lipke E. [1], G. Giribet[2] and G. Alberti[1]

[1]Ernst-Moritz Arndt University, Zoological Institut & Museum, Johann-Sebastian-Bach-Str.11/12, 17489 Greifswald, Germany. [2]Department of Organismic and Evolutionary Biology & Museum of Comparative Zoology, Harvard University, 26 Oxford Street, Cambridge, MA 02138, USA

Cyphophthalmi or mite harvestmen are considered to represent the sister group of all other Opiliones. The phylogenetic relationships within this group have not been solved yet. Since sperm fine structure may provide useful characters for revealing such relationships, we started to investigate these cryptic animals with regard to spermatogenesis. Until now, results on only two species of the family Sironidae are available from the literature. From these studies it is known that an obvious sperm dimorphism – exceptional within arachnids and not known from other Opiliones - occurs and that the aflagellate fertile eusperm and infertile parasperm together with secretions form peculiar sperm balls. It is still an open question whether these peculiarities are present in all Cyphophthalmi. We now have results from twelve species representing five of the six families of Cyphophthalmi (Stylocellidae, Pettalidae, Neogoveidae, Troglosironidae, and Sironidae). In all species investigated, sperm dimorphism and sperm ball formation occurs. In contrast to parasperm, which are rather uniform, the eusperm show striking differences. Besides the acrosomal complex, which can be present or absent, the shape of the nucleus, structure of the crypt, localization of the mitochondria, and the arrangement of microtubules might be different. The results are discussed under functional and systematical aspects.

P

MALE DWARFISM IN THE BURROWING WOLF SPIDERS (ARANEAE, LYCOSIDAE)

Logunov D. V.

The Manchester Museum, The University of Manchester, Oxford Road, Manchester M13 9PL.
dmitri.v.logunov@manchester.ac.uk.

The extreme sexual dimorphism, with males being 50% or less of the female size, has been described for a number of the spider families: such as, Araneidae, Nephilidae, Theridiidae, Thomisidae, and even for some mygalomorphs. The majority of Lycosidae display the poorly marked sexual dimorphism, usually seen as the leg elongation and slightly smaller body size (up to 20%) in males. To date, true dwarf males have never been observed in the lycosids.

The present study provides first evidence of the occurring of dwarf males in two newly described species of Central Asian borrowing wolf spiders. Both species are closely related to *Lycosa fulviventris* (Kroneberg, 1875) described from Uzbekistan and so far known from the ♀ holotype only. *Lycosa* sp.n.-1 (3♂3♀) was collected from the mountane steppe of the Karatau Mt. Range (South Kazakhstan), and *Lycosa* sp.n.-2 (5♂3♀) was collected from the desertificated steppe of the SW slope of Zeravshan Mt. Range (Uzbekistan). All the three related *Lycosa* species are (re)described and illustrated. Males of new species are about twice as small as the corresponding females (*Lycosa* sp.n.-1: ♂ carapace length is 46-52% of the ♀ one; *Lycosa* sp.n.-2: it is 43-54%). Both new species occur in desert-kind habitats, apparently at low densities, with females living in burrows. Yet, the biology of these species remains unstudied. It is likely that one of the hypotheses dealing with low population densities and/or early male maturation is suitable to explain the origin of the observed size dimorphism in *Lycosa* spp.

O

DOES DISTURBANCE INCREASE SPIDER DIVERSITY? ANSWERS FROM A MEDITERRANEAN ECOSYSTEM

Lubin Y., N. Assaf and N. Angel

Institute for Desert Research, Ben-Gurion University of the Negev, Sede Boqer Campus, Israel

Grazing and tree cutting were widespread in the past in Mediterranean ecosystems. Following restrictions on these activities in nature reserves in Israel, there has been extensive re-growth of woody vegetation, leading to formation of dense, closed canopy woodlands. The increase in woody cover is considered to have reduced the diversity of many groups of organisms owing to the loss of open patches of herbaceous vegetation. We used grazing and removal of woody cover in 0.1 hectare plots to investigate the consequences of re-creating a mosaic of open habitats and woody cover, and compared the spider fauna in manipulated and un-manipulated plots. The experiment was replicated in three Mediterranean woodland sites with average annual rainfall ranging from 600 to 900 mm. We compared taxon richness between herbaceous and woody patches and between manipulated and un-manipulated plots, and we compared the changes in the spider communities following the manipulations at the three sites.

O

ARANEOGEOGRAPHIC DIVISION OF THE NORTHERN HOLARCTIC AND STATUS OF BERINGIA

Marusik Y. M.

Institute of Biological Problems of the North, RAS, Portovaya Str. 18, Magadan 685000, Russia.
yurmar@mail.ru

There are several schemes of subdivision of the Holarctic. Among them there are two schemes that differ very significantly. The classical one recognizes two main subdivisions of the Holarctic Realm, Palaearctic and Nearctic; another scheme recognizes four main subdivisions, where the northern Holarctic belongs to one of these subdivisions called Boreal. So far, only one scheme of division of the northern Holarctic based on spiders has been suggested. Eskov's scheme has been focused only on northern Holarctic (north of 45-50ºN). Eskov divided this territory into five parts: Angarian (Siberia east of Yenisei River), Canadian (Northern Nearctic without northwesternmost part), European, Beringian (NE Asia & NW Nearctic) and Lapland-West Siberian. Two of them, Lapland-West Siberia and Beringia, were treated as transitional. Transitional status was given to Beringia (territory lying east and west of the Bering Strait) because of its low number of endemic species and a relatively high number of Nearctic species penetrating Asia (only to the Asian part of Beringia) and Siberian species penetrating Nearctic Beringia. 18 species where traced with west and east borders within Berginia.

Further studies revealed that the number of transitional species is much higher – about 80; and the number of endemic species in both parts of Beringia (NE Asia and NW North America) is extraordinarily high for latitudes north of 55ºN and comprises about 60 species or 9% of the fauna in northeastern Siberia (=Western Beringia). About the same number of endemic species occurs in the much less studied northwestern Nearctic (=Eastern Beringia). Other Eskov's subdivisions have much lower level of endemism, less than 2%. The borders of Beringia were traced on the basis of the ranges of transitional and endemic species and widespread species that do not penetrate Beringia.

Although Beringia has many unique characteristics, to my mind, this region cannot be treated as a separate part of the Holarctic. There are much more similarities between the Asian part of Beringia and Siberia, or between the American Beringia and the rest of the Nearctic, than between the Asian and American parts. It is worth mentioning that Beringia has no well defined boundaries. Its western boundary can be drawn along Verkhoyanski Mt. Range (or Lena-Yana Rivers watershed), and its eastern boundary can be drawn along Mackenzie River channel.

Extensive studies of spiders in the east Palaearctic and northwestern Nearctic allow to revise the old scheme and to suggest a new division of the whole Holarctic. I suggest dividing the northern Holarctic into three parts: European, Siberian and Canadian.

Within the northern Holarctic there are two well recognized zoogeographical boundaries. One boundary, called Stegman or Yenisei, divides the northern Eurasia to European and Siberian subregions. This boundary is defined by about 200 species of spiders. These species do not cross this border. Another well defined boundary is Kolyman - Sea of Okhotsk watershed. It is defined by ranges of about 180 species. About 100 species occurring in Kolyma River basin and in more western regions do not penetrate the Sea of Okhotsk, and about 80 species that are common in coastal parts were not found in Kolyma River basin. Although this boundary is very well defined it has only provincial status.

The Yenisei boundary has interesting characteristics. Its northern and southern parts resembling a semipermeable membrane: many Siberian species with northern distribution easily cross the northern part of this boundary and penetrate northern Europe, and vice versa.

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P

SPIDERS ON ARCTIC ISLANDS: DIVERSITY AND DISTRIBUTION PATTERNS

Marusik Y. M.

Institute for Biological Problems of the North, RAS, Portovaya Str. 18, Magadan, 685000 Russia

Spider fauna of 12 well investigated islands situated north of the Polar Circle: Greenland, Jan Mayen, Spitsbergen, Novaya Zemlya, Dolgiy, Franz Jozef, Wrangel, Gerald, Herschel, Banks, Devon, Ellesmere have been analyzed. Altogether these islands encompass about 150 species belonging to 12 families. The most species-rich families are Linyphiidae (105) and Lycosidae (17), and most species-rich genera are as follows: *Agyneta* (12), *Erigone* (9), and *Pardosa* (10). Species richness on each island varies from two (Franz Jozef) to 75 (Greenland). Only two islands, besides Greenland, Wrangel and Dolgiy have more than 40 species (45 and 52 species respectively). Fauna of Greenland is so rich due to the presence of numerous boreal species in south part of the island (from 60° to 67°N). There are no places in Arctic with less than two species. These two species are *Erigone psychrophila* and *Collinsia spetsbergensis*. Only four species were found in 6 and more islands: *Silometopoides pampia* (6), *Collinsia holmgreni*, *C. spetsbergensis* (8) and *Erigone psychrophila* (10). Only one species is restricted exclusively to Arctic Islands: *Collinsia thulensis*. Level of endemism among arctic island spiders is rather low. Only few species or subspecies are endemics of one or two islands (*Erigone arctica soerenseni, Praestigia makarovae, Oreoneta mineevi, Sciastes extremus*, *Theridion ohlerti lundbecki* and some undescribed species). Such species occur only in species-rich islands (Greenland, Dolgiy and Wrangel).

O

ARE DIVERSITY AND DISTRIBUTION OF OPILIONES IN SIBERIA LIMITED BY TEMPERATURE?

Meshcheryakova E. N., G.V. Kuzminykh and Y. M. Marusik

Institute of Biological Problems of the North, RAS, Portovaya Str. 18, Magadan 685000, Russia.
yurmar@mail.ru

Harvestmen are the third largest order of arachnids with about 6400 species, distributed worldwide. Although harvestmen are widely distributed they are not found in tundra, and have low species diversity in Siberia. There are only 10 species of opiliones belonging to two families in the whole region, or 0.2 % of the global diversity, whereas spiders are represented in Siberia by a much higher number, 3.75%.

Diversity of the harvestmen in Siberia is 2.5 times lower than in the United Kingdom, which has much smaller territory (25 species); at the same time diversity of spiders in Siberia is at least twice higher than in UK.

What can be a reason or reasons for such low diversity? Cold or short summer, very cold winter, lack of available food, or other reasons? We undertook special research trying to understand this.

In northeastern Siberia there are only two species of harvestmen, an East Siberian -*Homolophus arcticus*- and a Holarctic species -*Mitopus morio*. The first possible reason about low species diversity is the severe climate conditions, e.g. harsh winter with very low temperatures.

We tried to use for this study harvestmen from more southern regions, and faced serious difficulties with transporting and keeping fragile females in laboratory. Finally, we managed to study only one species from outside the Magadan Region, *Oligolophus tienmushanensis* from environs of Khabarovsk.

Eggs of studied harvestmen persist at cold temperatures without freezing. Freezing leads to death of eggs. To study cold hardiness, we gradually decreased temperature from +5ºC to -10ºC, exposed eggs to such temperatures for three weeks, and then we exposed different sets of eggs in lower temperatures from -15ºC to -31ºC by gradually decreasing temperature by 1ºC each day. The number of survived eggs was studied after incubation of eggs on moist filter paper at room temperatures.

It was found that eggs of *H. arcticus* and *M. morio* after 3 week exposure to -10ºC were able to tolerate temperatures -30ºC and -28ºC, respectively. Eggs taken from room temperature were able to tolerate -25.5ºC in *M. morio*, -29.6ºC in *H. arcticus*, and -21ºC in *O. tienmushanensis.*

Are the temperatures -30ºC or -28ºC critical for the distribution of the two harvestmen? In the upper Kolyma where the microclimate has been studied during many years in about 100 habitats, 90 habitats have minimal winter temperatures higher than -28ºC. Thus, both native species can easily overwinter in a wide variety

of habitats. Minimal winter temperatures higher than -22ºC, suitable for *O. tienmushanensis,* have been observed in about 70 habitats. Nevertheless, this species is unknown north of 50ºC.

Therefore, winter temperatures are not a limiting factor for distribution, at least for Siberian species.

A second possible limiting factor is shortage of summer heat or length of warm period necessary for the development of the eggs.

We studied whether there is enough time in reserve for oviposition during the fall. The beginning of oviposition can be easily recognised thanks to the appearing of sexual dimorphism.

During three years of study (2004-2006), dimorphism appeared at different time, during the first week of August in 2004 and 2006, and in the first week of July in 2005. The sum of positive mean temperatures over +10ºC in the environs of Magadan in shaded places is 500-750º, while in open places it can be 1000º. In cold years such as 2004 and 2006, under shortage of positive temperature, it seems that not all specimens can complete their developmental cycle. However, in warm summers like in 2005 they have over a month in reserve.

We can conclude that neither winter nor summer temperatures are the factors that limit harvestmen distribution in eastern Siberia. Harvestmen hibernate at the egg stage; they are resistant to rather low temperatures (even southern species); there are enough habitats with temperatures suitable for overwintering; summer temperatures are high enough for completing one life cycle for at least part of the population.

Therefore, the explanations for low species diversity of Siberian harvestmen must be sought in other aspects - possibly their trophic or habitat preference, predator pressure, or most probably - combined historical biogeographic reasons connected to Pleistocene habitat changes.

P

THE PEDIPALPAL SENSITIVE HAIRS IN A*nyphaena accentuata, meta merianae* AND *Scytodes thoracica* (ARANEAE: ANYPHAENIDAE, METIDAE, SCYTODIDAE)

Melekoglu A., Z. Sancak, N. Yigit, T. Danisman, I. Corak Ogal and A. Bayram

University of Kirikkale, Faculty of Sciences and Arts, Department of Biology, Turkey.
amelekoglu@gmail.com

Cuticular extensions are important diagnostic characters in taxonomy. Among the cuticular extensions sensitive hairs that located on the pedipalpus have become a subject of research in arachnology. These hairs have a part as mechano- and chemoreceptors. In this study, morphology and variation of the sensitive hairs on the pedipalpus in a buzzing spider (*Anyphaena accentuate*, Anyphaenidae), a cave spider (*Meta merianae*, Metidae) and a spitting spider (*Scytodes thoracica*, Scytodidae) have been investigated by using the light and scanning electron microscopes comparatively.

O

LIVE FOR THE MOMENT – ADAPTATIONS IN THE MALE GENITAL SYSTEM OF A SEXUALLY CANNIBALISTIC SPIDER (THERIDIIDAE, ARANEAE)

Michalik P. [1], B. Knoflach[2], K. Thaler[(†)2] and G. Alberti[1]

[1]Zoologisches Institut und Museum, Ernst-Moritz-Arndt-Universität, J.-S.-Bach-Str. 11/12, D-17489 Greifswald, Germany. [2]Institut für Ökologie, Universität Innsbruck, Technikerstr. 25, A-6020 Innsbruck, Austria

Monogyny in spiders culminates in extreme traits, like dramatic male self-sacrifice and emasculation of the male by the female during copulation. Here we show that monogynous males can be highly adapted for this fatal sexual behaviour using different methodology (light and electron microscopy). Dwarf males of the one-palped theridiid spider *Tidarren argo,* which are cannibalised immediately after the insertion of their single copulatory organ, stop spermiogenesis when reaching adulthood. Their testes atrophy, which economise the energy expenditures of these males. We also found that the amount of seminal fluid produced is stored in an enlarged seminal vesicle until the single sperm induction takes place. The volume of the seminal vesicle is similar to the sperm droplet taken up into the copulatory organ (palpal organ). Sperm uptake takes much longer than in related species most likely due to the large amount of seminal fluid (consists of very dense secretion and sperm). As shown by histological observations males are able to fill one of the paired female sperm storage organs during copulation thereby presumably impeding subsequent charging by rival males.

P

ON THE GENUS *Graecophalangium* Roewer, 1923 (OPILIONES, PHALANGIIDAE)

Mitov P. G.

Department of Zoology and Anthropology, Faculty of Biology, University of Sofia, 8 Dragan Zankov Blvd., 1164 Sofia, Bulgaria. pl_mitov@yahoo.com

The genus *Graecophalangium* was established by Roewer in 1923, and it includes currently 5 species (*Graecophalangium militare* (C.L. Koch, 1839), *G. atticum* Roewer 1923, *G. cretaeum* Martens, 1966, *G. punicum* Staręga, 1973, and *G. drenskii* Mitov, 1995), distributed on the territory of the Balkan Peninsula and the Middle East. During a revision of the available opilionid material from the Balkan Peninsula, Anatolian Peninsula, and from different East Mediterranean regions, deposited in various arachnological collections (Natural History Museum of Crete, Muséum d'Histoire Naturelle, Genèva (MHNG), National Museum of Natural History, Sofia, Natural History Museum Vienna, Museum and Institute of Zoology in Warszawa (MIZW), I considered especially material from this genus. As a result, many new and interesting chorological data about the representatives of the genus *Graecophalangium* were collected, and several new species were found. In the presentation a new *Graecophalangium*, collected in the Mediterranean Region of Turkey (Southern Turkey, Mersin Province, Sertavul Pass, 1500-1600 m altitude, Collection of MHNG) is described and illustrated based on a single male specimen. This new species differs from the remaining by the structure of penis, and on this base it belongs to the group of species related to *Graecophalangium atticum* and *G. drenskii* from the Balkans. This task required actualizing and redescription of the type materials of genus *Graecophalangium* that were insufficiently described. Therefore the redescription of the *Graecophalangium punicum* holotype (from Lebanon, Collection of MIZW) is included in the current work as well.

The results from this work will complete our knowledge on the Balkan and Middle-East opilionid faunas and will contribute to the clarification of many taxonomical and zoogeographical problems from these regions.

O

AN INTRODUCTION TO THE STUDY OF GENUS *Eusparassus* Simon, 1903; WITH NOTES ON HUNTSMAN SPIDERS (ARANEAE: SPARASSIDAE) OF IRAN

Moradmand M. and P. Jäger

Research Institute Senckenberg, Senckenberganlage 25, D- 60325 Frankfurt am Main, Germany

The aim of our study is to revise the genus *Eusparassus* Simon 1903 (Araneae: Sparassidae) and investigate the phylogeographical relationships of the species on the basis of a combined molecular and morphological analysis. Representatives of *Eusparassus* are large predators in arid and semiarid regions in Asia, Africa and Southern Europe, and frequently found. The taxonomic position of the genus is not clear and no generic revision has been carried out so far. *Eusparassus* species are distributed from Southern Africa and the Mediterranean region to India and China.

Iran builds a main part of a transition between Africa and Asia. It covers the largest part of the Iranian Plateau which is located in the connection of three main zoogeographic regions: Palaearctic, Ethiopian and Oriental realms. Iran covers mountainous areas, highlands, desert plains and depressions, lakes as well as coast line of the Caspian Sea in the North and Persian Gulf and Oman Sea in the South. Varied topography and climate as well as palaeogeographical location and geological history exhibit a rich faunal and floral diversity. Iranian spiders are very poorly investigated so far. In a recent checklist of Iranian spiders 224 species from 33 families are reported with three species of Sparassidae.

Specimens for the revision are available from museum and private collections, as well as from personal investigations in Iran. Morphological studies will be mainly based on male and female copulatory organs. Molecular studies using mitochondrial and nuclear genes will complete the morphological results. A phylogenetic analysis from combined data will be conducted.

P

SPİDERS FROM ALİBOTUSH MOUNTAİN, SW BULGARİA (ARACHNİDA, ARANEAE)

Naumova M., S. Lazarov and C. Deltshev

Institute of Zoology, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd; 1000 Sofia, Bulgaria. munny@abv.bg, slazarov@zoology.bas.bg, cdeltshev@zoology.bas.bg.

A total of 343 species from 37 families were found in Alibotush (Slavyanka) Mountain, SW Bulgaria. Four species are new for the Bulgarian spider fauna and 127 species are new also for the Alibotush Mountain. The species composition of the study area was not well known and this is the first attempt to describe it. The spiders are classified into 21 zoogeographical categories combined in 5 chorological complexes. The chorological composition of the Alibotush Mountain mountain spider fauna shows a Palearctic and European character. The presence of endemic and Mediterranean species emphasizes the local character of this fauna, but their low percentage suggests an important process of colonization.

O

SPIDERS FROM THE MARITIME RISLE MARSHES IN THE DEPARTMENT OF EURE (FRANCE)

Olivier V.*, C. Rollard ** and C. Courtial*

** AsFrA (French Association of Arachnology) – National Museum of natural History - 57 rue Cuvier, CP 53 – 75005 PARIS (FRANCE). vilp@free.fr, cyril.courtial@laposte.net. ** National Museum of natural History, Department of Systematic & Evolution, Arthopods section – 57 rue Cuvier, CP 53 – 75005 PARIS (FRANCE). chroll@mnhn.fr*

As part of a study on Insects and Spiders from the Natural Sensitive Space of the maritime Risle Marshes, different types of surroundings were prospected in 2008. 329 species of spiders have been reported in the bibliography for this department and only 25 in the Marshes.

Actually the spider fauna present at different levels in the vegetation comprises 98 species, included in 16 families, a list certainly still underevaluated. 54% of the species are inclined to damp habitats and a fourth is bound to this biotope. Some are qualified as "remarkable" for their ecology or their part as bioindicator for instance: *Zelotes lutetianus, Enoplognatha tecta, Antistea elegans, Hysosinga heri* and other species of Lycosidae, Thomisidae and Linyphiidae. These data are also important to complete the knowledge on the distribution of some species in the country and their departmental presence.

P

NOTES ON SOME FOSSIL SPIDERS FROM THE CRETACEOUS OF BRAZIL

Ono H.

Department of Zoology, National Museum of Nature and Science, Tokyo

A fossil material of spiders from the Cretaceous of Brazil registered in the Fossil Collection of the Geological Department of the National Museum of Nature and Science, Tokyo was morphologically observed. The material consists of three fossils of three different species of Araneomorphae, probably Araneoidea. Although only their ventral side was available for examination, some interesting structures were recognized. One female spider possesses a massive epigynum with some swelling and furrows, while the other specimen has fine hairs on the legs. On the basis of the determination of possible characteristics, these fossils are described and illustrated, and their taxonomical position is discussed in comparison with recent spiders.

P

GENETIC AND CHROMOSOMAL DIVERSITY OF EUROPEAN CHERNETID PSEUDOSCORPIONS (PSEUDOSCORPIONES, CHERNETIDAE)

Opatová V., F.Šťáhlavský and I.Čepička

Department of Zoology, Charles University, Viničná 7, CZ - 128 44 Prague 2, Czech Republic. Vera.Opatova@seznam.cz

The order Pseudoscorpiones is the fourth largest member of the class Arachnida. In spite of this fact, we have still only scarce information about this group especially due to the cryptic manner of life and the small body length of its representatives. They are found in almost all terrestrial habitats, commonly in the leaf litter, under the stones or under the bark of trees. The family Chernetidae is the richest group of the whole order and represents 20% of its species diversity. The occurrence of approximately 50 species is known in Europe at this time. Despite the possibility of long distance dispersion by phoresy in many representatives of this family, only a minority of species has wider distribution. That is why we start to study genetic and karyological variability of this family that may help us to disclose phylogenetic relationships and uncover the real diversity of the morphologically uniform pseudoscorpions. Simultaneously we can also try to detect the factors that affect the speciation in this group.

Here we present the fist study focused on the family Chernetidae using both molecular and cytogenetic methods. The chromosomal preparates were obtained from males and females gonads using the standard cytogenetics methods. All sampled individuals were sequenced for both mitochondrial and nuclear genes. The analyses were performed on more than 50 individuals comparing their chromosomal diversity with molecular data, where all most common European species of the family Chernetidae were represented.

Our preliminary results support the subdivision of the family Chernetidae in two subfamilies: Chernetinae and Lamprochernetinae, in agreement with traditional systematics based on morphological characters. As in previous studies in other families we also confirmed the great variability of chromosome numbers at interspecific level in pseudoscorpions. This fact may help us to specify more precise possible cryptic species also in the family Chernertidae. On the other hand such variability of basic karyological characters seems to be inapplicable for reconstruction of phylogeny in the studied representatives.

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O

DIVERSITY OF DOMINICAN SPIDERS: OONOPIDAE ON CACAO PLANTATIONS

Ovtcharenko V.

Department of Natural Sciences, Hostos Community College of the City University of New York, 500 Grand Concourse, New York, N.Y. 10451, USA. vio@hostos.cuny.edu

Extant spiders were studied in the Dominican Republic (DR). Spiders were collected from different island habitats including natural habitats and agricultural fields. Special attention was focused on spiders that occur in leaf litter. Extensive collecting was made in the northern part of the island, particularly in the region of Miches, El Seibo Province. The largest diversity and density of spiders in leaf litter here occurred in cacao plantations. The thickness of leaf litter in cacao plantations can reach 30 centimeters. The more abundant species in cacao plantation leaf litter are representatives of the families Theridiidae, Caponiida (*Nops*) and Oonopidae (*Stenoonops, Heteroonops*). In the southern part of the island, at Eastern National Park, the climate is arid, and leaf litter samples produced representatives of Gnaphosidae family. Our research shows that extant spiders of DR are not fully studied, and we found several new species of spiders as well as a new species for Hispaniola island.

O

DIVERSITY AND SEASONAL DYNAMICS OF SPIDERS IN OAK FORESTS OF BLACK ROOK FOREST NEAR NEW YORK CITY

Ovtcharenko V.*, A. Tanasevitch** and B. Zakharov***

**Department of Natural Sciences, Hostos Community College of the City University of New York, 500 Grand Concourse, New York, N.Y. 10451, USA. vio@hostos.cuny.edu. **Centre for Forest Ecology and Production of the Russian Academy of Sciences, Profsoyuznaya Str., 84/32, Moscow 117997, Russia. atan@orc.ru. ***Department of Sciences, John Jay College of Criminal Justice of the City University of New York, 445 West 59th Street, New York, N.Y. 10019, USA. zakharov@amnh.org*

Spiders were monitored for 10 years in Black Rock Forest (BRF). BRF is a 1530-hectare scientific and educational research station located in the Hudson Highlands around 60 miles north of New York City. This project is part of a large scale project entitled "Ecosystem Consequences of Dominant Taxon Loss: the Future of Oak Forests" and, in 2008, we carried out a pilot project on an experimental area of four 75 m square plots. In the first plot, all oak trees were completely removed; in the second plot, all oak trees were girdled; in the third plot, 15% of the canopy oak remained; and the fourth plot was left as an untreated control. We recorded 80 species of spiders belonging to 12 families from the four plots. The seasonal dynamics of spider biomass was similar in all four of the experimental plots, which was characterized by one distinctive pick of spider biomass between mid-June and mid-July. This type of seasonal dynamics tends to be more common for spider species that have one generation per year. Differences in spider biomass in the four experimental plots are discussed.

O

THE GENUS *Berinda* (ARANEAE, GNAPHOSIDAE) IN THE EAST MEDITERRANEAN: HOW MANY SPECIES WILL THERE BE?

Panayiotou E. [1], D. Kaltsas [1], O. Seyyar [2] and M. Chatzaki[3]

[1] Natural History Museum of the University of Crete, Knossou Av., 71409 Irakleio, Crete, Greece, Po BOX 2208. [2]Erciyes University, Faculty of Science and Arts, Department of Biology, TR-38039 Kayseri, Turkey. [3]Department of Molecular Biology and Genetics, Democritus University of Thrace, Dragana, 68100 Alexandroupolis, Greece

Berinda is a small genus of the family Gnaphosidae (Araneae) with restricted distribution in the area of the East Mediterranean. Up to now three species were known, namely *B. amabilis* Roewer, 1928, *B. ensigera* (O.P.-Cambridge, 1874), and *B. aegilia* Chatzaki, 2002, all recorded from the Greek islands, Uzbekistan and Turkey (the last two localities refer to *B. amabilis*). The study of newly collected material from the Greek islands, Cyprus and Turkey added new records of the previously recorded species and further revealed two new species, one found on the island of Cyprus, *B. cypriota* Chatzaki & Panayiotou n.sp. and one found in Kayseri, Central Anatolia, Turkey, *B. hakani* Chatzaki & Seyyar n.sp. Thus the present list comprises five species included in the genus. New evidence from more localities will certainly increase the diversity of this little known genus in the region of the East Mediterranean.

O

IMPACT OF OVERGRAZING ON SPIDER ASSEMBLAGES IN THE REGIONAL PARK OF ALPI MARITTIME (NW- ITALY, CN)

Paschetta M. and M. Isaia

Università degli Studi di Torino. Dipartimento di Biologia Animale e dell'Uomo. Via Accademia Albertina, 13 10123 Torino. mauro.paschetta@gmail.com

Alpine pastures represent one of the most important element in the Alpine landscape. Land-use changes and the recent abandonment or the irrational use of pastures, leads generally to the gradual involution of a number of vegetational assemblages, with the related reduction of local biodiversity. The effects of overgrazing are seen on a number of ecosystem components, from soil, to vegetation to fauna. Considering the crucial influence of vegetation architecture, spiders could represent a good model for the study of the effect of grazing on arthropods biodiversity. The impact of overgrazing was evaluated by means of pitfall traps in two sites within the Regional Park of Alpi Marittime (NW-Italy, province of Cuneo). One of the two sites chosen for the analysis was designated as "*focal site*" by the *European Distribute Institute of Taxonomy* (EDIT), in the framework of the ATBI+M project (*All Taxa Biodiversity Inventory + Monitoring*). Following a gradient of pasture exploitation, several tipologies of pastures were chosen for the analysis, ranging from the natural-like *Festuca ovina* and *Festuca scabriculmis* types to the intermediate *Festuca rubra* type to the extremely exploited and transformed *Alchemillo/Poa supina* and *Rumicetum alpini* types. Sampling was performed from June to September 2009 (497 samples). Altogether 1972 spiders were collected, belonging to 58 species and 13 families. Lycosidae and Gnaphosidae dominated the sample, followed by Amaurobiidae and Linyphiidae. Several endemic species, precinctive to the Western Alps, were collected, including *Araeoncus vaporariorum* (Linyphiidae), *Coelotes poweri* (Amaurobiidae) and *Harpactocrates drassoides* (Dysderidae). Data were analyzed by means of several statistic procedures (*Principal Component Analysis, Canonical Correspondence Analysis, Indicator Species Analysis, General linear models*), with the main aim to analyze the response of spider coenosis to grazing and in order to compare different spider assemblages found in the different pasture types. In general terms spider assemblages react significantly to the disturbance determined by grazing, both quantitatively and qualitatively. By means of comparisons, we highlighted how spider assemblages are different across different pasture types and resulted particularly influenced by the same factors determining the pasture type (i.e. trampling, soil cover and presence of rocks). In particular, Lycosidae seem to prefer the open habitat created by overgrazing (i.e. bare ground and poor developed herbaceous layer). On the other hand Gnaphosidae were preferably found in natural-like pastures, characterized by a continuous herbaceous layer and by the presence of rocks. It is interesting to notice that the most particular coenosis, characterized by

endemic species of higher conservation value, were found preferably in extensively managed pastures, characterized by low grazing pressure, attesting the importance of this kind of management on the conservation of such coenosis.

O

MALE *Zodarion* SPIDERS ARE OBLIGATORY KLEPTOPARASITES OF THE FEMALE'S AND JUVENILE'S PREY

Pekár S. [1], M. Martišová[1] and T. Bilde[2]

[1]Department of Botany and Zoology, Faculty of Science, Masaryk University, Kotlářská 2, 611 37 Brno, Czech Republic. [2]Department of Ecology and Genetics, Aarhus University, Aarhus, Denmark

Kleptoparasitism is widespread among diverse animal taxa. Most described kleptoparasitic interactions are facultative and influenced by life-history stage and reproductive status. Here we investigated the effect of sex and life history stage on the frequency of kleptoparasitism in ant-eating spiders of the genus *Zodarion*. The spiders use a special capture technique involving a quick attack of an ant that is left unguarded for several minutes, providing ample opportunities for kleptoparasitism. In the field we found that adult females exclusively relied on active prey capture, while adult males engaged in kleptoparasitism. Juveniles predominantly engaged in active prey capture independent of sex. The field data was supported by experiments showing that females preferred live over dead ant in contrast to males that showed preference for dead prey. Similarly, females and juveniles showed high capture efficiency, while adult males experienced significantly lower capture efficiency. We conclude that male *Zodarion* spiders undergo an ontogenetic shift in foraging behaviour from active hunting to kleptoparasitism. Such opportunistic foraging behaviour during the mating period has been reported also for web-building spider species, and suggests that males may be maximizing their mating opportunities by allocating energy to mate searching at the expense of active hunting.

O

AT THE FRONTLINE OF PUBLISHING IN SYSTEMATIC ZOOLOGY: A PRESENTATION OF ZOOKEYS

Penev L.[1], T. Erwin[2] and J. Miller[3]

[1]Pensoft Publishers, Sofia, Bulgaria, info@pensoft.net, [2]Smithsonian Institution, Washington D.C., USA, ewrint@si.edu, [3]Naturalis, Leiden, The Netherlands, Miller@naturalis.nnm.nl

There are major challenges in publishing and dissemination of scientific information at the beginning of 21st Century. In systematic zoology, a universal electronic register of animal names, ZooBank, was proposed. In academic publishing, the new model of open access seems to have become widely welcomed. To respond to these challenges Pensoft Publishers has launched *ZooKeys* – a new open-access, peer-reviewed, rapidly disseminated, online and print journal – to accelerate research and free information exchange in taxonomy, phylogeny, and biogeography (www.pensoftonline.net/zookeys). The journal publishes taxonomic revisions of extant (or "recent") and fossil animal groups; checklists and catalogues; phylogenetic and evolutionary analyses; papers in descriptive and/or historical biogeography; methodology papers; data mining and literature surveys; monographs, conspecti, atlases; collections of papers, Festschrift volumes, and conference proceedings. In June 2009, ZooKeys published a special issue where for first time in systematic zoology a format for publishing, identification, citation and dissemination of datasets was provided. ZooKeys provides as well several cutting-edge semantic Web enhancement to taxonomic papers (i.e. Miller et al. 2009 and others), such as: (1) All primary biodiversity data underlying a taxonomic monograph are published as a dataset under a separate DOI within the paper; (2) The occurrence dataset is uploaded to GBIF simultaneously with the publication; (3) The occurrence dataset is published as a KML file under a distinct DOI to provide an interactive experience in Google Earth; (4) All new taxa are registered at ZooBank during the publication process (mandatory for ZooKeys); (5) All new taxa are provided to the Encyclopedia of Life through XML markup on the day of publication (mandatory for ZooKeys); (6) All new taxa and are provided with images to Wikispecies on the day of publication (mandatory for ZooKeys); (7) Publication of interactive keys based on LUCID and DELTA/IntKey platforms.

O

FACTORS DETERMING NOCTURNAL VISUAL LURE PROPERTIES OF A BRIGHTLY-COLORED SPIDER

Peng P., S.-W. Chen, I-I Kuo and I-M. Tso

Department of life science, Tunghai university, Taichung, Taiwan

Signal exploiters can deceive signal receivers by sending signals similar to that of legitimate signal emitters. Relevant studies about factors determining the properties of such signals are rare, especially those involved in visual deception in the nocturnal condition. In this study, we investigated what elements of the bright body coloration of giant wood spider *Nephila pilipes* were essential in visually attracting nocturnal prey. We used colored cardboards to make dummies resembling the outline of *N. pilipes* and manipulated size, chromatic property and arrangement patterns of the bright signals. Video cameras with night shot function were used to record the prey attractiveness of various dummies under nocturnal condition. A 24-hour censoring was also conducted to evaluate the relative importance of daytime and nighttime foraging to this brightly-colored predator. The results showed that *N. pilipes* caught more and larger prey during nightime, indicating that nocturnal prey constituted a major portion of nutrient intake. Results of field experiments showed that dummies with size of bright signal enlarged lured significantly more prey than those with standard signal pattern. When signal chromatic property was changed by replacing yellow spots with blue ones, the attraction rate of dummies decreased significantly. Altering the arrangement pattern of yellow spots, however, had no significant effect in prey attraction rate. These results indicate that chromatic property is an essential element of nocturnal visual lure of *N. pilipes* while arrangement pattern plays a relatively minor role.

O

SPATIAL AND TEMPORAL STRUCTURE OF SPIDER COMMUNITIES IN CLAY SEMIDESERT OF WESTERN KAZAKHSTAN

Piterkina T. V.

Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, 33, Leninskii Prospect, Moscow, 119071, Russia. piterkina@yandex.ru

The spatial and temporal structure of spider communities was studied in clay semidesert of the northwestern Caspian Sea Lowland, Western Kazakhstan (49°23′ N, 46°48′ E). The vegetation is characterized by the complexity and composed of mosaic desert and steppe plant communities. In addition to native associations, there are areas occupied by 50-year-old plantations. The traditional collecting techniques such as pitfall trapping, manual sorting of serial soil-litter samples, and net sweeping were used.

Both ground-dwelling and herbage-dwelling spider populations are characterized by substitution of multispecific polydominant spring-summer communities for poor oligodominant autumn ones. In this case, the season affects the structure of population even higher than the differences in habitats.

For all associations studied, their own complexes of typical species are revealed.

O

COMPARATIVE ANALYSES OF ARANEOFAUNA OF DIFFERENT STEPPE TYPES OF EASTERN EUROPE (CENTRAL RUSSIA AND UKRAINE)

Polchainova N. Y.

Kharkov National University, 4, Maydan Svobody, Kharkov 61077, Ukraine.
polchaninova@mail.ru

Within the East European Plain in the area in question (Central Russia and Left-Bank Ukraine), 4 zonal and 5 main azonal steppe types are distinguished. Meadow steppes, called according to the Russian geobotanical terminology 'northern steppes', are typical of the forest-steppe zone. True steppes, i.e. forbgrass (forbgrass-*Festuca-Stipa*) and fescue-feathergrass (*Festuca-Stipa*) steppes, cover the upper interfluves in the respective subzones of the steppe zone. Desert steppes (*Artemisia-Festuca-Stipa*) are extended by narrow short strip along the Black Sea coast forming the third steppe subzone. Azonal steppes, like chalk grasslands, are situated in the forest-steppe and in the Northeast part of the steppe zone. Stony (mainly granite) and limestone steppes grow on Donetsky Ridge (East Ukraine); sandy steppes occupy an area in the river Dnieper valley; seaside steppes grow nearby the coasts of the Azov and Black Sea. All steppe plots are more or less separated, and can be regarded as 'false island' communities surrounded by agrolandscape. Zonal steppe communities remained only in nature reserves, main azonal steppes are also represented in protected territories, and only chalky and granite steppes are partly under grazing pressure.

In total, in 20 local steppe sites, 359 spider species from 27 families were registered. Three of them are the most numerous: Linyphiidae (59 species, 16% of the fauna), Gnaphosidae (54 species, 15%) and Salticidae (46 species, 14%). The families Araneidae, Lycosidae, Thomisidae and Theridiidae account from 7,5% to 9,5%, each. This ratio depends on the steppe type and changes dramatically. Northern steppes stand separately. They are characterized by the leading role of Linyphiidae (22%), the highest percentage of Lycosidae (11%) and the bulk of 5 families (Araneidae, Gnaphosidae, Theridiidae, Thomisidae, Salticidae) with equal value (9,15-9,8%). Xerophilous and southern families like Eresidae, Uloboridae, Titanoecidae, Oxyopidae, Zodariidae are absent in this steppe. In the steppe zone, the role of Linyphiidae decreases from 11-12% in fobgrass and stony steppe to 4% in the chalky one. Tendencies in Gnaphosidae and Salticidae distribution develop in the opposite direction. The number of Gnaphosidae is a maximum in stony, chalky, and sandy steppes (some 18%), while Salticidae shows the highest figures in southern sandy (18%) and chalky (15%) steppes. The role of Thomisidae reaches the maximum in the *Festuca-Stipa* steppe (12%), Araneidae are the most divers in sandy (11%) and seaside (10,5%) steppes.

Species richness and composition in different steppe types depends on various factors: numbers of steppe plots studied, their area, adjacent habitats, level of investigation, anthropogenic pressure.

O

INSIGHTS INTO THE MOLECULAR PHYLOGENY OF *Euscorpius* (SCORPIONES, EUSCORPIIDAE) IN GREECE.

Poulikarakou S.[1], I. Mplazakis [2,3], A. Parmakelis [1,2], I. Stathi [3], V. Fet [4] and M. Mylonas [2,3].

[1] Dept of Ecology and Taxonomy, Faculty of Biology, Univ. of Athens. [2] Dept. of Biology, University of Crete. [3] Natural History Museum of Crete, Univ. of Crete. [4] Department of Biological Sciences, Marshall Univ.

The scorpion genus *Euscorpius* Thorell, 1876 (Scorpiones: Euscorpiidae) includes a number of very common European and Mediterranean species. Up to today several taxonomic revisions have been conducted and numerous species and subspecies have been described. However, their validity remains inconclusive, and changes constantly.

Regarding Greece at least seven species of *Euscorpius* (Fet et al 2003; Kaltsas et al 2008) are considered to be present in mainland and insular habitats and in some cases species appear sympatrically. A collaborative international work is currently under way to obtain a detailed molecular and morphological phylogeny of these species and their populations.

In this perspective we are presenting the first molecular phylogeny of the Greek *Euscorpius* species using sequence data from two mtDNA genes (16S rRNA and COI). The material used originated from 43 mainland (Greece and adjacent regions) and 38 insular populations (Greece) including almost all nominal *Euscorpius* species distributed in Greece as well as several congeneric species.

The molecular phylogeny of the *Euscorpius* lineages is compared to the current taxonomy of the genus.

O

DIVERSITY OF SPIDERS IN HIGH ALTITUDE ECOSYSTEM, NANDA DEVI BIOSPHERE RESERVE - THE WORLD HERITAGE SITE, INDIA.

Quasin S. and V.P. Uniyal*

Wildlife Institute of India, Post Box # 18, Chandrabani Dehradun, Uttarakhand India -248 001
uniyalvp@wii.gov.in

Nanda Devi Biosphere Reserve (NDBR) is located in the northern part of the western Himalayas in India, one of the important sites of wilderness and hot spot of biodiversity in the Himalayan region. The knowledge of Himalayan spider diversity and distribution is sparse as compared to other regions, because of its difficult terrain and climatic conditions. The attempt was initiated for the first time in September 2008 to investigate the effect of altitude, vegetation and spatial factors on the spider assemblages in NDBR Altitudinally, the vegetation dominated by trees was sampled for spiders by dividing the area into different zones of closed and open forest cover, scrub and alpine pastures. Sampling was done by pitfall traps and other collection methods. Preliminary results show that 12 families representing 20 genera and about 30 species were documented so far. The expected diversity of spiders seems to be very high due to the diverse vegetation structure and physical features of the region. It is proposed to conduct the extensive survey of the study area for three years to evaluate the diversity of spiders in this fragile ecosystem of NDBR. Importance of spiders in the ecosystem and relevance of the present study for Himalayan protected area management will be discussed in the paper.

O

A NEW SPECIES OF THE "SUBMARINE" SPIDER, *Desis* FROM NORTHERN AUSTRALIA (ARANEAE: DESIDAE)

Raven R. J. and B. C. Baehr

Queensland Museum, PO Box 3300, South Brisbane, Q. 4101 Australia

Hundreds of metres off the north Queensland coast, a small area of fringing coral reef is exposed only 3-4 times each year when the low tide is maximally 20 cm. On the algal-covered brain coral, *Favites*, a new species of *Desis, D. hebronae*, "sees" the sky. The occurrence of *Desis* in intertidal habitats is well known but reports of spiders living in such inundated habitats to date have only been anecdotal. Mostly likely, the colonisation occurred when the sea-level was much lower and the coral more frequently exposed.

O

CHALLENGING STATISTICS FROM THE DATABASE OF PLATNICK'S SPIDER CATALOG

Raven R. J.[1] and N. I. Platnick[2]

[1]Queensland Museum, PO Box 3300, South Brisbane, Q. 4101 Australia. [2]Entomology Department, American Museum of Natural History, New York, NY 10024, USA

With the update of the database of the World Catalog of Spiders to version 9.5, diverse statistics emerge as challenges for the future. The database allows quick collation of species lists by region and in some cases, country, and this provides useful feedback to regional arachnologists and to the cataloguer. Clearly, collecting efforts and taxonomy need to be ramped up in many countries but not so much from Europe which "suffers" from a glut of attention. Despite there being at least 40,700 spider species, barely half have been mentioned more than once in the literature. Changes in the numbers of species described over the past 50 years are shown. Many species are known only from one sex or simply juveniles. Countries where collecting and taxonomic attention should be directed are signalled as is the longevity of monotypic genera. Revisionary studies present least problems for the future, from many aspects, and are strongly encouraged in contrast to the discouraging policies of journals and institutions to support them.

P

THE ROLE OF THE WEB AND THE PREY INTERCEPTION OF THE SPIDER *Meta menardi* (Latreille 1804) (ARANEAE, TETRAGNATHIDAE)

Řeháková K.

Department of Biology, J. E. Purkinje University České mládeže 8, 400 96 Ústí nad Labem, Czech Republic.

The role of the web and the prey capture strategy of the spider *Meta menardi* (Latreille 1804) were main fields of study. The population of *Meta* was narrowly observed in its habitat, brick cellar hollowed in a clay stone (Moravany u Dubic, CZ), without any human intervention and was visited daily from July 2008 to December 2008. Notes on the behavior, temperature fluctuation and ingesta spectrum were written down; some video records of ethologic items were made and worked up in this term of the study.

Two prey capture strategies were noted. A "bite-wrap" attack to retrain a flying prey (Dipterans and moths) stuck in viscous threads of a spiral was observed. The spider catching behavior was initiated when the flying prey became entangled in the sticky spiral thread. The bite attack on the prey took a few seconds until the prey´s struggle subsided. The victim was immobilized after this manner. Wrapping began in conjunction with still keeping the prey by spider´s chelicerae at the capture site. To hitch the wrapped prey below the web suspended on a silk line ("a suspension thread") the spider attached it to a dragline. To seize a prey walking over a surface of the wall (Isopods or Diplopods) *Meta* used a "snatch-wrap" attack strategy. The spider rushed out of the web centre to the potential prey, which brushed against the end of a radial thread anchored in the surface. *Meta* ran along the same radius that was brushed to snatch the prey off the wall by legs I, II and III. One of legs IV attached the dragline and stuck it on the moving prey. After legs replacement the spider started wrapping movements hanging below the radial thread by legs I. The left leg IV pushed some threads toward the prey and the right leg IV touched spinnerets alternately. Abdomen movements and movements of the legs IV were in coordination closely. The spider swarmed up the radius step by step to the hub of the web, where it unhooked the tarsus of the front legs to disengage itself from the thread and to drop from the radius hanging by the dragline (attached to the wrapped prey) by spider´s front legs. A rhythmic wrapping motion supervened. After having the prey wrapped, the spider pulled a new dragline from the spinnerets by one of its hind legs, stuck it on the prey and climbed up to the hub along the old primal dragline (pulling new silk). It attached the new dragline on the old one several times over in the process. The wrapped prey was hung on the rope of draglines – to "the suspension thread" this way. Repeated wrapping came after and it was interrupted by spider´s biting.

Both capture strategies differ in a role of the silky threads. The sticky spiral thread has a decisive role in a flying prey interception act by contraries with a walking prey

capture. The flying prey is netted in adhesive threads whereas radial threads are however essential to snatch the walking prey and for victim manipulation too. One of the radial threads performs a function of signal thread if the potential walking prey brushes against the end of this thread. *Meta* runs along the same radius to snatch the prey. The spider is hung on to this thread during start-up phase of wrapping. The radial threads are used during the wrapping act furthermore – *Meta* is locked into the radius by legs I. The dragline has a key function at the walking prey capture (the suspension thread is a rope of the draglines).

The „walking prey" was a basic component of spider´s diet (94,3%) in contrast to the „flying prey", which formed inconsiderable percentage of the total prey (1,9%). The populations of *M. menardi* living in a closing vessel (like cellars contrary of caves) developed a different well effective strategy of the walking prey catch and uses two methods of an immobilization different for the flying and the walking prey. The "snatch-wrap" strategy wasn´t observed for any Tetragnathidae yet. The results of this research could be applied to a phylogenic reconstruction of family Tetragnathidae and Araneoidea.

O

REGIONAL VARIATIONS IN AGROBIONT COMPOSITION AND AGROBIONT LIFE HISTORY TRAITS WITHIN HUNGARY

Samu F.[1] and C. Szinetár[2]

[1]Plant Protection Institute, Hungarian Academy of Sciences, P.O. Box 102 Budapest, H-1525 Hungary. samu@julia-nki.hu. [2]University of West Hungary, P.O.Box 170, Szombathely, H-9701 Hungary. szcsaba@ttmk.nyme.hu

Agrobiont spider species are well adapted to arable systems, which have fairly uniform vegetational structure and pest assemblages over continent-wide areas. We wanted to study, whether agrobiont spider assemblages and the life history of the most prominent agrobiont *Pardosa agrestis* show any regional variations within Hungary, where only modest climatic differences exist between the NW and SE parts of the country. We studied agrobiont assemblages in 27 alfalfa and 21 cereal fields with suction sampling and pitfalls. The similarity structure of these assemblages (Sørensen distance measure) was congruent with the geographic distance matrices (Eucledian distance), as tested by Mantel test. However, if we considered the non-agrobiont species of the assemblages, this similarity was always higher. Thus agrobionts respond moderately to geographical variation as compared to non-agrobiont species. We studied generation number and the occurrence of first adult individuals in *P. agr*estis, the commonest agrobiont spider in Hungary. This comparison involved comparing fields along a NW – SE gradient during 6 sampling years in pairwise comparison, where in each year a Norhtern and a Southern population was compared, with a minimum distance of 126 km in between. In generation number there was no difference, we found two generations across Hungary. However, the first occurrence of adult individuals was on average 15 days earlier in both generations in the more Southern populations. Thus, agrobionts seem to show a fairly stable and relatively low magnitude response over country sized geographical ranges.

P

WEIGHING THE POSSIBLE POSITIVE AND NEGATIVE EFFECTS OF GRASSLAND RESERVES IN AN AGRICULTURAL LANDSCAPE

Samu F.[1], B. Kiss[1], É. Szita[1], K. Fetykó[1], D. Neidert[1] and A. Horváth[2]

[1]Plant Protection Institute, Hungarian Academy of Sciences, Budapest. [2]Institute of Ecology and Botany, Hungarian Academy of Sciences, Vácrátót

Natural habitat fragments in an agricultural landscape can provide important ecosystem services, such as pest control by natural enemies and pollination. They can be also sources of various risks by potentially being reservoirs for weeds, insect pests and plant diseases. We conducted a 3 years' study in the Mezőföld area of Hungary, an area predominated by traditional arable cultures, but where in incised loess valleys various amounts of loess steppe grassland patches still remain. By making investigations in six 5x5 km 'landscape windows' where grassland ratio varied, and by surveying cereal fields at various distances from grasslands, we tried to establish whether grassland proximity a) affects the abundance of spiders – a model natural enemy group– in the cereal fields; b) causes an increase of risk of getting infected by wheat dwarf virus (WDV) for the cereal plants. The studies showed highly significantly increased spider abundance in cereal fields close to the grassland patches. The virus study combined field and laboratory experiments. It could show the potential for the virus infection (virus vector occurrence in grasslands, grass species can be inoculated with virus in the laboratory), but they failed to show any field evidence that infection from grassland to arable culture would take place. Summarising other case studies that were made within the framework of the present project, we also establish a broader picture on the significance of natural grassland remnants in the agricultural landscape.

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O

JURASSIC SPIDERS FROM CHINA

Selden P. A. [1] and D. Huang[2]

[1]*Paleontological Institute, University of Kansas, Lawrence, Kansas, USA. selden@ku.edu.*
[2]*Nanjing Institute of Geology and Palaeontology, Nanjing, China. huangdiying@163.com*

Spiders are extremely rare in non-amber preservation, and especially so in Jurassic strata. Until the discovery of spider fossils in the Jurassic of China only two specimens had been described: Juraraneus from the middle Jurassic of Transbaikalia and Jurarchaea from the Callovian-Kimmeridgian of Kazakhstan. Here, we report on a diverse fauna of spiders from the Middle Jurassic Jiulongshan Formation of Daohugou, Inner Mongolia, China. The fauna includes mygalomorphs, Palpimanoidea (including Archaeidae), Uloboridae, Plectreuridae, and other families. Living Archaeidae occur in Australia, South Africa and Madagascar: a classic Gondwanan distribution, but fossils have previously been described from the Jurassic of Kazakhstan, Cretaceous of Myanmar, Eocene Baltic amber and Holocene Madagascan copal. The Chinese record extends the geographic range of archaeids in the Mesozoic and suggests a wider distribution of the family in the past than today. Plectreurids today have a limited range in arid south-western USA, Mexico and Cuba. Fossils have been described from Baltic amber, and the Jurassic record from China, supported by adult and subadult males and females, provides additional evidence for not only a wider distribution in the past but also a habitat shift towards drier environments.

P

ANT MIMICRY IN LINYPHIID SPIDERS (ARANEAE: LINYPHIIDAE)

Seyfulina R. R.

Department of Invertebrate Zoology, Faculty of Biology, Lomonosov Moscow State University, Leninskie Gory, Moscow 119991 Russia. r-seyfulina@yandex.ru

Ant mimicry is a widely occurring phenomenon in the invertebrate world. Ants are ubiquitous and well protected against predators. Spiders with the ant-like appearance occur in many families. Morphological and behavioral adaptations to mimic ants evolved independently in different spider groups. Ant mimics are mostly hunter spiders, especially from the Salticidae and Corinnidae families (over 50 and 30 species, respectively). Among web-building spiders, only males often imitate ants, whereas the weaving females have typical appearance. However, in other weavers, mostly from Theridiidae (4 or 5 spp.) and Linyphiidae, both sexes perfectly imitate ants. This paper focuses on linyphiid ant mimics.

Two linyphiid species are usually reported as myrmecomorphic – *Meioneta affinis* (Kulczyński 1898) and *Neriene furtiva* (O. P.-Cambridge 1871). These spiders, however, bear only slight resemblance to the ants. True ant-mimicking linyphiids belong to the genera *Mecynidis* Simon 1894, *Cresmatoneta* Simon 1929, *Solenysa* Simon 1894, and *Tennesseellum* Petrunkevitch 1925 (subfam. Linyphiinae and Micronetinae). All of them have the same morphological adaptations for mimicry. (i) The carapace cuticle is sculptured with the pimples or pits to imitate an ant cuticular texture; this feature is quite rare in linyphiids, which mostly have a smooth cuticle. (ii) Cephalic area is elevated; this character is common in Erigoniinae among males, but rare in Linyphiinae and Micronetinae, especially among females. (iii) Carapace is posteriorly elongated into a tube or cone occupying approximately one fifth of the total carapace length to provide an impression of a petiole; uniquely for linyphiids, carapace length in this case is about twice its width. Spiders evolved several adaptations to imitate the ant's waist – elongation of the rear end of cephalothorax, extension of the pedicel, and specific cephalic or abdominal constrictions. Linyphiidae have the first one in the list. (iv) Abdomen is rather cylindrical, often very short (shorter than cepahalotorax) even in females. Some of the species have abdominal scuta and/or other sclerotized patches.

Ant-looking linyphiid genera are not closely related to each other (according to the comparison of male genital structures and phylogenetic analyses). All adaptations arose independently within their groups. As a result, some of them are more similar in habitus to each other than to their closest relatives. As we found, the Afrotropical genus *Mecynidis* includes at least 30 species (although only 8 of them have descriptions so far). These canopy dwelling spiders live in closest neighborhood with the ants, which represent about 70% of the African forest canopy mesofauna (D. De Bakker, pers. commun.). This might serve an explanation of ant mimicry in one of the

two *Mecynidis* species-groups. Representatives of the second species-group look typically. The Palaearctic myrmecomorphic genus *Cresmatoneta* (4 sp. and 1 subsp.) relates closely to *Kaestneria* Wiehle 1956, the spiders with a typical linyphiid habitus. For example, the ant-looking *Mecynidis* and *Cresmatoneta mutinensis* (Canestrini 1868) specimens could be misidentified by an inexperienced student due to very similar patterns of body shape, coloration and carapace granulation. The Eastern Palaearctic genus *Solenysa* (China, Korea, Japan) contains exclusively ant-mimicking species with similar appearance (8 species). The Nearctic genus *Tennesseellum* is monotypic with a single ant-mimicking representative, *T. formica* (Emerton 1882).
Generally, ant mimicry is enhanced by copying the special ant-like erratic movement and reproducing fake antennae by the twitching front legs. We observed this behavior in *Cresmatoneta mutinensis* (the most common representative of the genus) and, with additional data, it might appear as a common trend in other myrmecomorphic linyphiids.

O

POPULATION DYNAMICS OF THE MEXICAN REDRUMPED TARANTULA (*Brachypelma vagans*) IN BELIZE.

Shaw E.M. and S. Bennett

Department of Environmental and Geographical Sciences, Manchester Metropolitan University, Manchester, UK, M15 5GD. e.shaw@mmu.ac.uk

Brachypelma vagans is a tarantula that is part of a bright and colourful family that has, up until recently, been heavily collected for the pet trade. Now the species is CITES protected and the populations are in a significant state of recovery. However, despite the protected status of this group to date there is a paucity of knowledge regarding their ecology and behaviour. Over the last couple of years the distribution of *B. vagans* at Las Cuevas Research Station, Belize was mapped to determine the distribution of individuals on an annual basis. Population dynamics are compared annually as are the location of individuals. Despite the assumption that individuals do not move burrows regularly the level of overlap between years is minimal, suggesting high levels of intra habitat dispersal. However, without the ability to distinguish individuals individually the dispersal distance and level of population movement is impossible to determine. Therefore, a number of individuals were fitted with RFID tags to allow the identification of those individuals over the coming years. This will provide a greater level of information on not only the dispersal of individuals but their growth and development over subsequent years.

P

COMPARISON OF THE KARYOTYPE EVOLUTION IN *Neobisium* AND *Roncus* PSEUDOSCORPIONS (PSEUDOSCORPIONES: NEOBISIIDAE).

Šťáhlavský F.[1], K. Janko[2] & T. Vařil[3]

[1]Department of Zoology, Faculty of Sciences, Charles University, Viničná 7, CZ-128 44 Prague, Czech Republic. stahlf@natur.cuni.cz. [2]Laboratory of fish genetics, Institute of Animal Physiology and Genetics ASCR, Rumburská 89, CZ-277 21 Liběchov, Czech Republic. [3]Department of Biology, Jan Evangelista Purkyně University, České mládeže 8, CZ-400 96 Ústí nad Labem, Czech Republic

The Pseudoscorpiones is arachnid order with considerable species diversity. Despite the great richness (3300 described species) we have still only limited information about its karyology. It is a pity because the karyology may be utilized in taxonomy of morphologically uniform pseudoscorpions very well. That is why we focused for cytogenetic research in European species from the family Neobisiidae during several last years. This family includes two large genera: *Neobisium* (more than 200 species) and *Roncus* (more than 120 species). Both groups have similar distribution, inhabit similar biotopes (usually soil or caves) and both have complicated taxonomy. We used standard cytogenetic techniques for karyotype characterization of species mainly from Central Europe, Alps, Carpathians, and Balkan Peninsula. We found that karyotypes of studied species are differentiated very well and that the karyotypes may help us to identify cryptic species better than only morphological characters. Analyses of DNA support this conclusion very well. It is also interesting that despite many similar features of both studied genera the karyotype evolution is distinct in these two groups. In both genera the chromosome numbers decrease independently in several evolutionary lines. In *Roncus* the reductions of the diploid numbers are induced mainly by centric fusions while in *Neobisium* also the tandem fusions are present very often. The tandem fusions induce prominent differentiation of size of chromosomes. In both genera we find presence of two different sex chromosome systems X0 and XY. The XY sex chromosome systems are probably derivatives of rearrangements between ancestral X0 system and autosomes. This type of differentiation may play considerable role in fast isolation of the populations and that is why it may be very important in speciation in the studied genera.

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O

SPIDER WEB DENSITY IN INDONESIAN CACAO AGROFORESTRY IN RELATION TO HABITAT VARIABLES AT THREE DIFFERENT SPATIAL SCALES: (I) TREE (II) PLOT AND (III) LANDSCAPE

Stenchly K. *, Y. Clough, T. Tscharntke

*University of Göttingen – Agroecology, Waldweg 26, 37073 Göttingen, Germany.
kstench@gwdg.de

Web-building spiders are recognised as obligate insectivorous predators which reach high abundances in all terrestrial habitats. However studies on the functional role of spider communities and the impact of vegetation structure and landscape context on spider web-density especially in complex tropical agroecoystems such as agroforests are still rare. The relationship of five web-building spider guilds to habitat variables at three different spatial scales: tree, plot and landscape was determined. In Sulawesi, Indonesia, we surveyed the distribution of several spider–web types within 420 cacao trees of 42 different managed cacao plantations. We fitted linear mixed model, selected the best model subset using information-theoretic criteria and calculated the model-averaged estimates. In addition we correlated the density of different web types to the incidence of the local main pests, cacao pod borer and cacao pod sucker. The analysis showed a significant impact of habitat heterogeneity on spider web abundance on different spatial scales whereas the requirements on plant structural complexity and environmental conditions diversified among web-building spider guilds. The orb- and line-weavers, that dominated the web guild structure on cacao trees showed a high dependence on tree structural complexity, while the abundance of tangle-, lattice- and sheet-weavers was additionally influenced by environmental conditions. On the tree scale web density was positive related to canopy openness and at plot scale a higher number of shade trees was correlated with a higher web–density. At the landscape scale the elevation determined the distribution patterns of web building spiders. High densities of lattice- and tangle-webs were weakly associated with reduced herbivore damage to cacao pods.

O

DIVERSITY OF SPIDERS IN KURUVA ISLAND, SOUTHERN WESTERN GHATS, KERALA, INDIA.

Sunish E., A.V. Sudhikumar, M. J. Mathew and P. A. Sebastian

Division of Arachnology, Dept. of Zoology, Sacred Heart College, Thevara, Cochin-682 013, Kerala, India. esunish@yahoo.com

Spiders represent a diverse and functionally important group of arthropods. They are probably the most important predators of insect pests. Spiders can provide much information useful in monitoring the integrity of biotic communities. They are the important components of our biological diversity due to their abundance, small size and specialized nature of requirements and are also excellent indicators of the health of our environment. Although considerable effort has been invested in recording spider diversity in different habitats, very meager knowledge exists about the spiders associated with isolated forest ecosystems in Kerala, especially in northern Kerala. Against this backdrop, a preliminary study was conducted to document and determine the diversity and seasonal fluctuation of araneofauna in Kuruva Island, Kerala, which eventhough a part of the Nilgiri Biosphere Reserve but isolated from rest of the places. Attempts were made to study the diversity and characteristics of spider families occurring in a range of habitat types, to assess the influence of habitat type and seasonality on their diversity and to determine the levels of similarity between habitat types based on species composition. Spiders were collected from different habitats by employing standard collection methods. A total of 921 individuals representing 84 species belonging to 65 genera of 20 families were collected during the study. The different families showed varying degrees of habitat fidelity with some being widespread and abundant while others restricted to a single site. The most dominant family was Salticidae with 29 species whereas the least encountered one was Zodariidae with only 1 species. Araneidae, Thomisidae, Oxyopidae and Lycosidae were the other dominant families. The collection also includes 10 species of primitive mygalomorph spiders. The analysis of collected spiders on the basis of foraging mode revealed 5 types of feeding guilds viz., orb weavers, ground hunters, foliage hunters, stalkers and ambushers. As Kuruva Island is lying in the Western Ghats, a preliminary insight into the diversity of spiders, their seasonality and threats to their habitats may provide further insight into the modalities for conservation of this otherwise neglected animal group.

P

WHAT IS THE RELATION BETWEEN IMPERIAL EAGLE AND GRASSLANDS SPIDERS?

Szinetár C.[1] & F. Samu [2]

[1]University of West Hungary, Savaria University Center, Zoological Department 9700 Szombathely, Károlyi G. tér 4. HUNGARY. szcsaba.bdtf@gmail.com. [2]Plant Protection Institute, Hungarian Academy of Sciences, P.O.Box 102, Budapest, H-1525 HUNGARY. samu@julia-nki.hu

The Hungarian grasslands have outstanding nature conservation importance in European scale. Most of them are "secondary" grasslands, which means they were formed in the past few thousand years due to the considerate land use methods. Their maintenance and the preservation of their rich biodiversity depend on the human use in the future too. One of the main reasons for their vanishing is the spontaneous spread of shrubs and trees due to the lack of use. The study site is situated at the bottom of the Vértes Mountains on a moderately steep slope of southern exposition with loess soils on calcareous rocky substrate. Although the natural vegetation of the area is forest-steppe, considerable amount of the forest has been cut. Recently the site is covered by Sub-Pannonic steppic grassland of secondary origin dominated by narrow-leafed tussock forming grasses and sedges. The area is a suitable habitat for a population of *Spermophilus citellus*, which provides food for birds of prey like *Falco cherrug* and *Aquila heliaca*. Grazing was given up around the year 2000, and the area became totally occupied by scrubs. The scrubs were cut with front mounted stem grinder leaving groups of scrubs in patches. There are 200 traditional breed sheep grazing the site since 2006. In 2007and 2008 the field works were done twice in summer and once in autumn (one-month periods). The collections have been carried out in three habitat patches by Barber-trapping. Management actions in the habitat patches:

- Massively overgrazed
- Sparsely grazed
- Closed out of grazing

In the spring season the highest spider density and species number was observed (spider specimens or species /trap/10day) in the case of not grazed habitat (closed out of grazing). In the massively overgrazed area there was a spectacular increase in the frequency of the agrobiont spider species. Although in the autumn season the diversity, evenness and density were the highest in the massively overgrazed patches, this is not a positive result. The increase of characteristics (pseudo-diversity, density etc.) is due to the appearance of species that well tolerate disturbance (for ex.: *Araeonchus humilis, Oedothorax apicatus, Osterarius melanopygius, Robertus arundineti*). The monitoring examination is basically trying to find out how intense grazing can maintain the status that can maintain the highest natural value of the

secondary grassland. We assume that what the most suitable is for the imperial eagle (*Aquila heliaca*) that is good for spiders as well.

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P

IF THE MOUNTAIN WILL NOT COME TO MOHAMED... THE FIRST LOWLAND REPRESENTATIVE OF AN ALPINE GENUS – SIDE-EFFECT OF GLACIATION?

Szinetár C. [1] and Szűts T.[2]

[1]University of West Hungary, Savaria University Center, Zoological Department 9700 Szombathely, Károlyi G. tér 4. szcsaba.bdtf@gmail.com.[2]Carlsberg postdoc fellow, Entomology Department, Danish Natural History Museum. tszuts@gmail.com

The first lowland species of the alpine genus *Parasyrisca*, *Parasyrisca arrabonica* Szinetár & Eichardt, 2009, is described from the sandy grasslands of Hungary in an upcoming paper. The ground spider genus hitherto was known from Western European (Pyrenees and Western Alps) and Eastern European (Crimea) Asian (Caucasus, Pamir, Tian Shan, Altai) and Nearctic (southern British Columbia and western Washington) mountains only, and although some lower records are found in the literature, it was considered as alpine fauna element. The discovered species is not only the first representative of the genus *Parasyrisca* in the Hungarian fauna, in the Pannonian region but it is the first verified record of the genus in Central Europe as well. Detailed descriptions of the species' ecological characteristics (habitat preference, co-occurring species) are given to *P. arrabonica* due its habitat preference which is unusual and unique within the genus. This species is quite rare, only eight specimens have been found among the 20,700 captured spiders. Adult specimens have been collected exclusively at late autumn and early spring so practically outside the major collecting period, which might explain why this relatively big spider was not discovered earlier. *Parasyrisca arrabonica* Szinetár & Eichardt, 2009 seems to have a very peculiar life cycle (seems to be found in other psammophilous species) which might shed some light how the habitat switch could have maintained. Identification, drawing maps satellite photos are presented to illustrate an interesting theory how the habitat switch could have happened.

This study is in press in special issue of Zookeys in 2009. The studies have been supported by the Scientific Board of the University of West Hungary Savaria University Center.

O

3D SPIDER WEBS: BARRIER AGAINST PREDATORS OR EFFECTIVE PREY TRAP?

Tso I-M., C. Hou and L.-F. Chen

Department of Life Science, Tunghai University, Taichung 407, Taiwan

3D spider webs are generally believed to be apomorphic structures evolved from 2D orb webs. Most researchers regard them as a defensive adaptation to aerial predators. It has long been hypothesized that 3D webs' complicated scaffolding can enhance survivorship by protecting the spiders from aerial predators, but their high visibility to prey may potentially decrease foraging success. In this study, we conducted a field manipulative study to investigate how 3D webs built by *Cyrtohpora moluccensis* are involved in predator defense and prey catching. We manipulated presence of barrier scaffolding and used video cameras to monitor such treatment's effects on spiders' interactions with prey and predators in both diurnal and nocturnal conditions. The results showed that spiders in webs with barrier scaffolding removed experienced significantly more wasp attacks than those in normal webs, indicating a predator defense function of 3D webs. During daytime webs with barrier scaffolding removed had higher prey approaching and consumption rate, and such results seemed to be congruent with the proposed foraging disadvantage of 3D webs. However, during nighttime webs with or without barrier scaffolding did not differ in prey approaching rate. Moreover, spiders in webs with intact barrier scaffolding were more capable of catching intercepted prey and therefore they consumed significantly more nocturnal prey than those in webs without. Since nocturnal prey constituted a substantial part of *C. moluccensis*'s overall nutrient intake, the barrier scaffolding was in fact able to enhance foraging success. Our results show that the 3D spider webs can effectively protect the spiders during daytime and enhance prey catching during nighttime. Our findings that 3D spider webs are both barrier against predators and effective prey trap may explain why the diversity and abundance of spiders building 3D webs are much higher than those of other spider guilds.

P

ON THE DISTRIBUTION OF SPIDERS (ARANEAE) ALONG ALBANIAN COASTAL AREAS WITH NOTES ON THEIR ECOLOGY

Vrenozi B.

Universiteti i Tiranës, Fakulteti i Shkencave Natyrore, Muzeu i Shkencave Natyrore. Albania.
blerinavrenozi@yahoo.com

This presentation is the first study realized by Albanian researchers to our Araneae fauna, only some publications are conducted by foreign specialists like Capporiacco, Giltay, Deltshev and Blagoev. This report presents extensive studies over three years from 2006 - 2009, from which the spectrum of spiders species and their distribution within a typical Mediterranean Ecosystem in Albania has been revealed. The reasons for their occurrence in restricted areas are preferences for special habitats and the diversity of landscape. The arachnofauna occurring in 17 different types of habitats in the Coastal areas of Albania was analyzed. Seven areas were selected according to expected differences and similarities in vegetation composition (Saranda, Apollonia, Shkumbini, Durresi, Vora, Tirana and Shengjini). The 345 specimens collected were identified as belonging to 81 species, 59 genera and 22 families. The family Araneidae and Salticidae were the richest in number of genera and species. Within Araneidae, which dominated almost in all areas in terms of numbers of individuals and species numbers, *Araneus diadematus* and *Argiope bruennichi* were found in much higher numbers. Comparing three areas (Area I – Saranda with altitude 0 m – 50 m; Area II – Apollonia, Shkumbini and Durresi with altitude 0 m – 20 m; Area III – Vora, Tirana and Shengjini with altitude 50 m – 1200 m), has resulted that areas II and III of West Lowland with similar habitat types showed a similarity in spider species composition (K = 18.48 %), assessed according to the Jackart formula.

O

TELLING AN OLD STORY? – WEB ADVERTISEMENT HYPOTHESIS OF WEB DECORATIONS IN *Argiope keyserlingi* (ARANEAE; ARANEIDAE)

Walter A.

Institut für Biologie, Bereich Zoologie, Martin-Luther-Universität Halle-Wittenberg. Hoher Weg 4, 06099 Halle (Saale), Germany.

The adaptive significance of the conspicuous web decorating behaviour of species of the araneid genus *Argiope* has been subject of a spirited debate for decades. Over this period of time many functional explanations for these silken extra structures have accumulated. One of the most often discussed hypotheses is the web advertisement function. This hypothesis states web decorations to act as warning signals for non prey animals that would otherwise inadvertently damage the web. However, this idea was only studied in field observations and indirect field experiments so far. I investigated this hypothesis in a laboratory experiment in which the webs of *A. keyserlingi* were artificially damaged to different degrees. In a first treatment I cut a quarter of all present radii to simulate damages that usually occur when prey encounters the web. A second group of spiders was faced with a higher degree of damage. Here I additionally cut two opposite anchor threads causing a collapse of the web but not a complete destruction. At the end I found neither the web building nor the web decorating behaviour differing significantly between the mild damage group and an untreated control. Yet spiders that experienced the heavy damage treatment built larger decorations in subsequent webs. This result suggests that *A. keyserlingi* spiders are able to discriminate between inevitable damages caused by prey and unusual destructive incidents. At the end this conclusion supports the web advertisement hypothesis. Although this possible function of *Argiope*'s web decorations is an 'old' story, for the first time I found also evidence for this idea in a manipulative experiment in the lab.

O

EXTERNAL MORPHOLOGY OF A HARVESTMEN (*Paranemastoma silli* (HERMAN, 1871) NEWLY RECORDED FROM TURKEY

Yigit N.[1], I. C. Ocal[2], T. Danisman[1], A. Melekoglu[1], S. N. Korkmaz[2] and A. Bayram[1]

[1]University of Kirikkale, Faculty of Sciences and Arts, Department of Biology, Turkey. naz_yigit2@hotmail.com. [2]University of Kirikkale, Graduate School of Natural and Applied Sciences, Department of Biology, Turkey.

Opilionids are classified by morphologic, anatomic and genetic characters. Scanning Electron Microscope (SEM) studies are needed to clarify and identify some taxonomical characteristics. Therefore SEM studies are also becoming intense in arachnology. In this study, morphology of the chelicerae, pedipalpus, dorsal integument and penis of a harvestmen are studied by using scanning electron microscopy. This harvestmen is *Paranemastoma silli* (Herman, 1871), member of Nemastomatidae family (Palpatores, Opiliones), newly recorded from the West Black Sea Region of Turkey. No species was recorded for *Paranemastoma* genus in Turkey so far.

P

THE COMPARATIVE MORPHOLOGY OF THE SUCTORIAL ORGAN OF THE MALE *Biton zederbaueri* AND *Gluviopsilla discolor* (SOLIFUGAE: DAESIIDAE)

Yigit N. [1], M. Erdek[2], H. Koc[3], A. Melekoglu[1] and A. Bayram[1]

[1]University of Kirikkale, Faculty of Sciences and Arts, Department of Biology, Turkey. naz_yigit2@hotmail.com. [2]University of Kirikkale, Graduate School of Natural and Applied Sciences, Department of Biology, Turkey. [3]University of Sinop, Faculty of Sciences and Arts, Department of Biology, Turkey.

Diagnostic characters such as presence or absence of lateroventral or mesoventral spines on pedipalpus have importance in solpugids. Distal tarsus of the pedipalpus fulfill the fuction of suctorial organ. By means of this organ solpugids can climb smooth, vertical surfaces and also facilitate grasping prey. In the present study, the comparative morphology of male *Biton zederbaueri* (Werner, 1905) and *Gluviopsilla discolar* (Kraepelin, 1899) (Daesiidae, Solifugae) is studied by using the light and scanning electron microscope. There is no study on electroscopy of these species. This study may clear up the distance or impendence between the species.

P

THE CRAB SPIDERS (ARANEAE, THOMISIDAE) OF THE ULUDAĞ MOUNTAIN REGION WITH A REVIEW OF THE THOMISIDAE IN TURKEY

Yilmaz Z., R. S. Kaya and İ. H. Uğurtaş

Department of Biology, Faculty of Science and Art, Uludağ University, TR-16059 Nilüfer, Bursa, Turkey. zeybio@hotmail.com

Crab spiders (Thomisidae) were collected between the years of 2006-2008 from the Uludağ Mountain, North-West Turkey. A total of 73 adult specimens belonging to Thomisidae family were examined and identified. The Thomisidae family was represented with 16 species in 8 genera. *Synema globosum* (Fabricius, 1775) and *Thomisus onustus* Walckenaer, 1805 are the most dominant species among thomisids. *Xysticus loeffleri* Roewer, 1955 is recorded for the first time from Turkey in this study. So, the total number of Thomisids is increased to 81 species in Turkey.

List of participants

AMBALAPARAMBIL Sudhikumar
Ghent University
Terrestrial Ecology Unit
Department of Biology
K. L. Ledeganckstraat 35
Ghent B-9000
BELGIUM
avsudhi@rediffmail.com
ambalaparambil.sudhikumar@ugent.be

ARNEDO Miquel
University of Barcelona
Biodiversity Research Institute
Dept. Animal Biology
Av. Diagonal, 645, 2on floor
Barcelona 08028
SPAIN
marnedo@ub.edu

BAEHR Barbara
Queensland Museum
Biodiversity, Arachnology
South Bank, PO Box 3300
South Brisbane OLD 4101
AUSTRALIA
BarbaraB@qm.qld.gov.au

BAYRAM Abdullah
Kirikkale University
Sci.&Arts Faculty, Biology Dep.
Kirikkale 71450
TURKEY
abdbayram@yahoo.com

BERGTHALER Gernot J.
Elisabethstr. 43a
Salzburg 5020
AUSTRIA
gjbergthaler@gmail.com

BIDEGARAY BATISTA Leticia
Universitat de Barcelona
Departament de Biología Animal
Av.Diagonal 645
Barcelona 08028
SPAIN
letigaray@yahoo.com

BLICK Theo
Forschungsinstitut Senckenberg
Projekt Hessische Naturwaldreservate
Entomologie III
Senckenberganlage 25
Frankfurt am Main DE 60325
GERMANY
theo.blick@senckenberg.de, info@theoblick.de

BOSMANS Robert
Terrestrial Ecology Unit
Ledeganckstraat 35
B-9000 Gent
BELGIUM
robert.bosmans@lne.vlaanderen.be

BRUGGISSER Odile
Greyerzstr. 81
Bern 3013
SWITZERLAND
odile.bruggisser@unifr.ch

BUCHHOLZ Sascha
University of Muenster
Institute of Landscape Ecology
Department of Community Ecology
Robert-Koch-Str. 28
Muenster 48149
GERMANY
saschabuchholz@uni-muenster.de

CHIARLE Alberto
Via Rattazzi n.2
Alba (CN)
ITALY
alb.chiarle@gmail.com

CHO Tien-Ying
Tunghai University
Department of Life Science
Taichung 40704
TAIWAN

DANIŞMAN Tarık
Kirikkale University
Sci.&Arts Faculty, Biology Dep.
Kirikkale 71450
TURKEY
tarikdanisman@yahoo.com.tr

DECAE Arthur
M. Smallegangehof 25
Middelburg 4331 WC
THE NETHERLANDS
halldec@planet.nl

DELTSHEV Christo
Bulgarian Academy of Sciences
Institute of Zoology
1 Tsar Osvoboditel blvd
Sofia 1000
BULGARIA
cdeltshev@zoology.bas.bg

DOLANSKY Jan
East Bohemian Museum in Pardubice
Zamek 2
Pardubice 530 02
CZECH REPUBLIC
dolansky@vcm.cz

DOLEJŠ Petr
Charles University
Department of Zoology
Faculty of Science
Viničná 7
Prague 2 CZ – 128 44
CZECH REPUBLIC
dolejs@natur.cuni.cz

DUNLOP Jason
Universität zu Berlin
Museum für Naturkunde der Humboldt
Invalidenstraße 43
Berlin D-10115
GERMANY
jason.dunlop@museum.hu-berlin.de

EL-HENNAWY Hisham K.
41, El-Maneqa El-Rabia St.
Heliopolis
Cairo 11341
EGYPT
el_hennawy@hotmail.com

ENATHAYIL Sunish
Sacred Heart College
Division of Arachnology
Dept. of Zoology
Thevara, Cochin-13
Kerala
INDIA
esunish@yahoo.com

ESPOSITO Lauren A.
American Museum of Natural History
Invertebrate Zoology
79th Street, Central Park West
New York 10024
USA
esposito@amnh.org

FET Victor
Marshall University
Department of Biological Sciences
Huntington WV 25755-2510
USA
fet@marshall.edu

FORMAN Martin
Charles University in Prague
Faculty of Science
Department of Genetics and Microbiology
Viničná 5
Prague 2 CZ -128 44
CZECH REPUBLIC
formivelkejpan@seznam.cz

FRICK Holger
Natural History Myseum Bern
Bernastrasse 15
Bern 3005
SWITZERLAD
holger.frick@students.unibe.ch

GREGORIČ Matjaž
Slovenian Academy of Sciences and Arts
Institute of Biology
Scientific Research Centre
Novi trg 2, P. O. Box 306
Ljubljana SI-1001
SLOVENIA
matjaz.gregoric@gmail.com

HAJER Jaromír
J.E. Purkinje University
Department of Biology
České mládeže 8
Ústí nad Labem 40096
CZECH REPUBLIC
jaromir.hajer@ujep.cz

HELSDINGEN Van P.J.
European Invertebrate Survey
P.O. Box 9517
Leiden NL-2300 RA
NETHERLANDS
helsdingen@nnm.nl

HERVÉ Christophe
Muséum national d'Histoire naturelle
Département systématique et évolution
Unité OSEB (USM 601)
Section arthropodes (CP 53)
57 rue Cuvier
Paris CEDEX 05 F-75231
FRANCE
phil@mnhn.fr

HORAK Peter
Ragnitzstrasse 163 / 23
Graz 8047
AUSTRIA
p.horak@aon.at

HOU Chueh
Tunghai University
Department of Life Science
Taichung 40704
TAIWAN
g97232002@thu.edu.tw

HSIEH Samuel Yu-Lung
University of Wuerzburg
Zoologie III
Am Hubland
Wuerzburg D-97074
GERMANY
hsieh@biozentrum.uni-wuerzburg.de

HUANG Pau-Sheng
Tunghai University
Department of Life Science
Taichung 40704
TAIWAN
person0517@gmail.com

HUANG Jin-Nan
Tunghai University
Department of Life Science
Taichung 40704
TAIWAN
myrspid@gmail.com

HUBER Siegfried
Linzgaustrasse 18
Oberuhldingen D-88690
GERMANY
huber.siegfried@t-online.de

HULA Vladimir
Agronomical faculty of MZLU Brno
Department of zoology
Zemedelska 1
Brno 613 00
CZECH REPUBLIC
Hula@mendelu.cz

ISAIA Marco
Via Accademia Albertina, 13
Torino 10123
ITALY
marco.isaia@unito.it

JÄGER Peter
Research Institute Senckenberg
Arachnology
Senckenberganlage 25
Frankfurt am Main 60325
GERMANY
peter.jaeger@senckenberg.de

KANNIPARAMBIL Sunil Jose
St. Albert's HSS
Department of Zoology
Cochin
Kerala 682018
INDIA
sunil32@gmail.com

KAYA Rahsen S.
Uludag University
Faculty of Arts and Science
Department of Biology
Gorukle
Bursa 16059
TURKEY
rkaya@uludag.edu.tr

KNAPIČ TEA
Biotehniška fakulteta
oddelek za biologijo
Večna pot 111
Ljubljana 1000
CZECH REPUBLIC
tea.knapic@gmail.com

KOMNENOV Marjan
Bull. Kuzman Josifovski Pitu 19/5/3
Skopje 1000
FYROM
mkomnenov@yahoo.com

KOMPOSCH Christian
OEKOTEAM
Institute for Animal Ecology and Landscape Planning OG
Bergmanngasse 22
Graz 8010
AUSTRIA
c.komposch@oekoteam.at

KOPONEN Seppo
Zoological Museum
University of Turku
Turku FI-20014
FINLAND
sepkopo@utu.fi

KRÁL Jiří
Charles University in Prague
Faculty of Science
Department of Genetics and Microbiology
Viničná 5
Prague 2 CZ -128 44
CZECH REPUBLIC
spider@natur.cuni.cz, tegenaria@seznam.cz

KROPF Christian
Natural History Museum
Bernastrasse 15
Bern CH-3005
SWITZERLAND
christian.kropf@iee.unibe.ch

KUNT Kadir Boğaç
Turkish Arachnological Society
Eserköy Sitesi 9/A Blok No:7 Ümitköy
Ankara TR-06530 Umitkoy
TURKEY
chaetopelma@gmail.com

KUNTNER Matjaž
Slovenian Academy of Sciences and Arts, Institute of Biology
Scientific Research Centre
Novi trg 2, P. O. Box 306
Ljubljana SI-1001
SLOVENIA
Kuntner@gmail.com

LIPKE Elisabeth
Zoologisches Institut und Museum
Johann-Sebastian-Bach-Str. 11/12
Greifswald 17489
GERMANY
ELipke@gmx.de

LOGUNOV Dmitri V.
The Manchester Museum
University of Manchester
Oxford Rd
Manchester M13 9PL
UK
dmitri.v.logunov@manchester.ac.uk

LUBIN Yael
Institute for Desert Research
Ben-Gurion University
Sede Boqer Campus 84990
ISRAEL
Lubin@bgu.ac.il

MARUSIK Yuri M.
IBPN RAS
Prortovaya Str. 18
685000
RUSSIA
yurmar@mail.ru

MELEKOĞLU Abdullah
Kirikkale University
Biology Dep.
Sci. & Arts Faculty
Kirikkale 71450
TURKEY
amelekoglu@gmail.com

MICHALIK Peter
Ernst-Moritz-Arndt-Universität
Zoologisches Institut und Museum
Johann-Sebastian-Bach-Str. 11/12
Greifswald 17487
GERMANY
michalik@uni-greifswald.de

MITOV Plamen
University of Sofia
Faculty of Biology
Department of Zoology and Anthropology
8 Dragan Zankov Blvd.
Sofia 1164
BULGARIA
pl_mitov@yahoo.com

NAUMOVA Maria
Bulgarian Academy of Sciences
Institute of zoology
BULGARIA
munny@abv.bg

NIEDOBOVA Jana
Mendel University of Agriculture and Forestry
Dep. Of Zoology, Faculty of Agriculture
Zemedelska 1
BRNO 61300
CZECH REPUBLIC
Naaudia@seznam.cz

ONO Hirotsugu
National Museum of Nature and Science
3-23-1 Hyakunin-cho, Shinjuku-ku
Tokyo 169-0073
JAPAN
ono@kahaku.go.jp

OPATOVA Vera
Charles University
Department of Zoology
Viničná 7
Prague 2 CZ - 128 44
CZECH REPUBLIC
Vera.Opatova@seznam.cz

OVTCHARENKO Vladimir
University of New York
Hostos Community College of The City
Department of Natural Sciences
500 Grand Concourse
New York NY 10451
USA
ovtshare@amnh.org, vio@hostos.cuny.edu

PARMAKELIS Aristeidis
University of Athens
Dept. of Ecology and Taxonomy
Faculty of Biology
Athens
GREECE
aparmakel@biol.uoa.gr

PASCHETTA Mauro
Via Accademia Albertina, 13
Torino 10123
ITALY
falcogiocoliere@yahoo.it

PEKAR Stano
Masaryk University
Department of Botany and Zoology
Kotlarska 2
Brno 611 37
CZECH REPUBLIC
pekar@sci.muni.cz

PENEV Lyubomir
Pensoft Publishers, Sofia
BULGARIA
Info@pensoft.net

PENG Po
Tunghai University
Department of Life Science
Taichung 40704
TAIWAN
s942345@thu.edu.tw

PITERKINA Tatyana
Orlovo-Davydovskii Pereulok 1-124
Moscow
RUSSIA
piterkina@yandex.ru

POLCHANINOVA Nina
Kharkov National University
Dprt of Zoology and Ecology
maid. Svobody, 4
Kharkov 61077
UKRAINE
polchaninova@mail.ru

POULIKARAKOU Stavroula
University of Athens
Dept of Ecology and Taxonomy
Faculty of Biology
Athens
GREECE
villie22@windowslive.com

RAVEN Robert
Queensland Museum
South Bank, P.O. Box 3300
South Brisbane QLD 4101
AUSTRALIA
Robert.Raven@gm.gld.gov.au

ŘEHÁKOVÁ Kateřina
J.E.Purkinje University in Usti nad Labem
Department of Biology
České mládeže 8
Ústí nad Labem 400 96
CZECH REPUBLIC
katerina.rehakova@ujep.cz

ROLLARD Christine
Museum national d' Histoire naturelle
Departement "Systematique & Evolution"
USM 0602 Taxonomie-Collections
61 rue Buffon-CP 53
Paris 75005
FRANCE
chroll&mnhn.fr

SAMU Ferenc
15 Herman Otto Str.
Budapest H-1022
HUNGARY
samu@julia-nki.hu

SELDEN Paul Antony
University of Kansas
Paleontological Institute
Lindley Hall, 1475
Jayhawk Boulevard
Lawrence, Kansas 66045
USA
paulselden@mac.com

SEYFULINA Rimma
Moscow State University
Faculty of Biology
Department of Invertebrate Zoology
Leninskie Gory
Moscow 119991
RUSSIA
r-seyfulina@yandex.ru

SHAW Emma M.
53 Brackley Avenue, Hulme
Manchester M15 4FS
UK
e.shaw@mmu.ac.uk

ŠŤÁHLAVSKÝ František
Charles University
Department of Zoology
Prague 2 CZ-128 44
CZECH REPUBLIC
stahlf@natur.cuni.cz

STENCHLY Kathrin
University of Goettingen
Agroecology
Waldweg 26
Göttingen D – 37073
GERMANY
stenchly@yahoo.de

STOEV Pavel
National Museum of Natural History Sofia
Sofia
BULGARIA
pavel.e.stoev@gmail.com

SZINETÁR Csaba
University of West Hungary
Savaria University Center
Zoological Department
Károlyi G. tér 4.
Szombathely 9700
HUNGARY
szcsaba.bdtf@gmail.com

TAHIR Hafiz Muhammad
University of The Punjab
Department of Zoology
Lahore
PAKISTAN
tahirvector@hotmail.com

THALER-KNOFLACH Barbara
Institute of Ecology, University of Innsbruck
Technikerstrasse 25
Innsbruck A-6020
AUSTRIA
barbara.knoflach@uibk.ac.at

TSO I-Min
Tunghai University
Department of Life Science
Taichung 40704
TAIWAN
Spider@thu.edu.tw

UNIYAL V.P.
Wildlife Institute of India
Post Box # 18
Chandrabani, Dehradun
Uttarakhand 248001
INDIA
uniyalvp@wii.gov.in

VRENOZI Blerina
University of Tirana
Museum of Natural Sciences
Rr. Kavajes, No. 134
Tirana
ALBANIA
blerinavrenozi@yahoo.com

WALTER André
Institute of Biology
Department of Zoology
Martin-Luther-University Halle-Wittenberg
Hoher Weg 4
Halle (Saale) D-06099
GERMANY
andre.walter@zoologie.uni-halle.de

YAĞMUR Ersen Aydın
Ege University (Bornova)
Science Faculty
Biology Department
Zoology Section
Izmir 35100
TURKEY
ersen.yagmur@gmail.com

YIGIT Nazife
University of Kirikkale
Faculty of Sciences and Arts
Department of Biology
TURKEY
naz_yigit2@hotmail.com
yigit@kku.edu.tr

YILMAZ Zeyhan
Uludag University
Faculty of Arts and Science
Department of Biology
Gorukle
Bursa 16059
TURKEY
zeybio@hotmail.com