7th European Hemiptera Congress

and

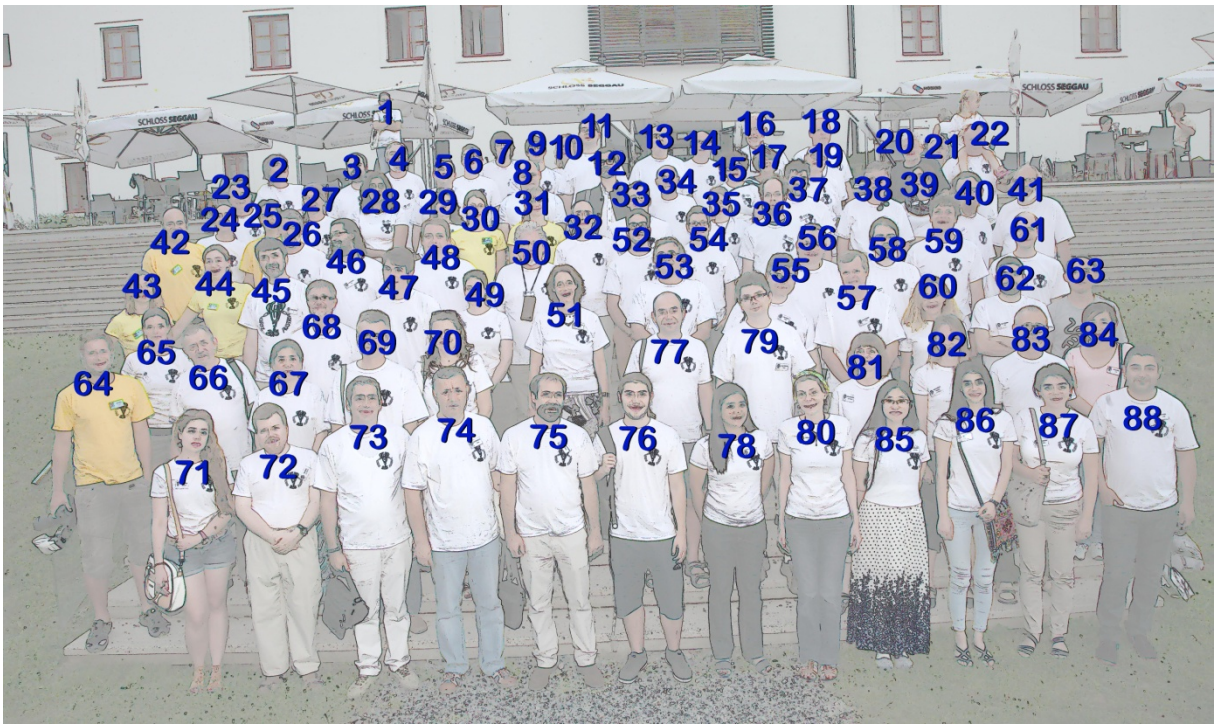
9th International Workshop on Leafhoppers and Planthoppers of Economic Importance

Programme

Abstracts of Talks and Posters

Seggau Castle / Graz (Austria), July 19th - 24th, 2015


SCHLOSS SEGGAU



Congress photo (photo Christian Komposch; unfortunately few participants are missing): 1-Umut AKYÜREK, 2-Andreas SAFER, 3-Vladimir HEMALA, 4-Peter BRÄUNIG, 5-Mariusz KANTURSKI, 6-David SADÍLEK, 7-Igor MALENOVSKY, 8-Balázs KISS, 9-Leonidas Romanos DAVRANOGLOU, 10-Bertl PFUNDNER, 11-Dávid RÉDEI, 12-Philipp ZIMMERMANN, 13-Ahmet DURSUN, 14-Wolfgang MOITZI, 15-Sabrina BERTIN, 16-Ernst HEISS, 17-Ingrid HEISS, 18-Rimantas RAKAUSKAS, 19-Nico NIESER, 20-Pavel STYS, 21-Karina WIECZOREK, 22-Dominik CHŁOND, 23-Cezary SEMPRUCH, 24-Wolfgang RABITSCH, 25-Thomas FRIEß, 26-Eckart FRÜND, 27-Reinhard ZIEGERHOFER, 28-Shruti PARIPATYADAR, 29-Jolanta BROŻEK, 30-Eliska MALANIKOVA, 31-Lydia SCHLOSSER, 32-Frédéric CHÉROT, 33-Carsten MORKEL, 34-Michael R. WILSON, 35-Hiltrud MOSHAMMER, 36-Claas DAMKEN, 37-Alex RAMSAY, 38-Kees DEN BIEMAN, 39-Alice EXNEROVA, 40-Alex DITTRICH, 41-Berend AUKEMA, 42-Werner HOLZINGER, 43-Rachel KORN, 44-Elisabeth HUBER, 45-Dmitry DMITRIEV, 46-Felipe MOREIRA, 47-Tim KLAFFKE, 48-Petr BAŇAŘ, 49-Malkie SPODEK, 50-Attilio CARAPEZZA, 51-Marta GOULA, 52-Marcos ROCA-CUSACHS LÓPEZ-BALCELLS, 53-Romain GARROUSTE, 54-Stefan KÜCHLER, 55-Jacek SZWEDO, 56-Herbert ZETTEL, 57-Thierry BOURGOIN, 58-Viktor HARTUNG, 59-Herbert NICKEL, 60-María del Carmen COSCARÓN, 61-Alvin HELDEN, 62-Fabio CIANFERONI, 63-Qiang XIE, 64-Gernot KUNZ, 65-Hanna GUNCZY, 66-Gabrijel SELJAK, 67-Ping-ping CHEN, 68-Rolf NIEDRINGHAUS, 69-Goran PRODANOVIĆ, 70-Dušanka JERINIĆ-PRODANOVIĆ, 71-Liliya SERBINA, 72-Petr KMENT, 73-Murat KARAVIN, 74-Ünal ZEYBEKOĞLU, 75-Selçuk YURTSEVER, 76-Mete YURTSEVER, 77-Dariusz SWIERCZEWSKI, 78-Sheryl YAP, 79-Adam STROIŃSKI, 80-Adeline SOULIER, 81-Milena BREZIKOVA, 82-Kateřina HOTOVÁ SVÁDOVÁ, 83-Franco FARACI, 84-Yanhui WANG, 85-Huining ZHANG, 86-Elif ÇALIŞKAN, 87-Başak AKYÜREK, 88-Onur DEDE.

Organisation

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ÖKOTEAM – Institute for Animal Ecology and Landscape Planning

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Herzlich willkommen !

Dear colleagues and friends,

It is a real pleasure for us to welcome you here in Seggau Castle 40 km south of Graz. The historic Castle, built in the 11th Century, is one of the most beautiful places and congress venues in Styria and Austria. It is situated in a lovely hilly landscape with thermophilic forests, meadows, wine yards etc., protected as Natura 2000 site and as „Südsteiermark“ Nature park.

We hope you will enjoy your stay here, you will like our field trips to montane / alpine habitats of Upper Styria and to southernmost parts of our country along Mur river, and have a nice, inspiring and memorable meeting!

On behalf of the local organising committee

Werner Holzinger

I want to acknowledge the team who managed the organisation of the congress, especially the local and “almost local” committee - Astrid Leitner, Philipp Zimmermann, Eliska Malanikova, Ingrid Holzinger, Gernot Kunz, Herbert Nickel and Wolfgang Rabitsch - , the scientific committee and the team of the congress venue.

Cordial thanks to all the other people helping us in so many ways, and of course we are very grateful to our financial sponsors - namely the Government of Styria (Land Steiermark, Referat Wissenschaft und Forschung) and the Austrian Entomofaunistic Society (ÖGEF) for their generous support.

W.H.

Graz, July 2015

Location data for collection labels

Congress venue

Austria, Styria, Seggau Castle 40 km south of Graz: 46°46‘54‘‘N 15°31‘27‘‘E, 356 m

Field trip

Option 1: Austria, Styria, Ennstal: From Wörschach via Wörschachklamm to lake Spechtensee; 47°33’16’’N/14°08’58’’E, 655 m, to 47°33’36’’N/14°05’54’’E, 1050m

Option 2: Austria, Styria, Ennstal: From Stainach via Leistenalm and Leistensattel to lake Spechtensee; 47°32’04’’N/14°06’30’’E, 668m, to 47°33’36’’N/14°05’54’’E, 1050m; highest point 1260 m

Option 3: Lake Spechtensee 47°33’36’’N/14°05’54’’E, 1050m

Post congress trip

Stop 1: Austria, Styria, Murtal: Gosdorf E Mureck; 46°43’12’’N/15°49’06’’E, 225 m

Stop 2: Austria, Styria, Poßruck: Glanz 74,; 46°39’19’’N/15°31’18’’E, 380m

Congress Programme

Sunday, July 19, 2015

15:00 – 19:00	Registration and Welcome buffet
18:00 – ?	Welcome Dinner

Monday, July 20, 2015

Morning sessions

08:30-08:45	Werner E. HOLZINGER, Wolfgang RABITSCH: Welcome address and acknowledgements
Chair	**Ernst Heiss**
08:45-09:15	Werner E. HOLZINGER, Michael R. WILSON: Sakis Drosopoulos - a life for biosystematic research
	Michael R. WILSON: Remembering Hani Abdoul-Nour
	Pavel STYS: Remembering Carl Schaefer
09:15-09:40	Adam STROIŃSKI, Jacek SZWEDO: Dictyopharidae planthoppers from Madagascar (Fulgoromorpha) – paucity of knowledge or paucity of fauna?
09:40-10:05	Liliya SERBINA, Daniel BURCKHARDT, Klaus BIRKHOFER, Mindy SYFERT, Susan E. HALBERT: Taxonomy and host-plant patterns of the potato pest *Russelliana solanicola* Tuthill (Hemiptera: Psylloidea)
10:05-10:30	Coffee break
Chair	**Mike Wilson**
10:30-11:10	**Pavel ŠTYS: Gynotraumatic insemination in Heteroptera: Review, origins, and function**
11:10-11:35	Jowita DROHOJOWSKA, Ewa SIMON, Jacek SZWEDO, Piotr WĘGIEREK: So small insects, so important record: Fossil Sternorrhyncha in Eocene Baltic amber
11:35-12:00	Alvin J HELDEN, Alex D K DITTRICH: Hemiptera community and species responses to grassland sward islets
12:00-13:30	Lunch break

Afternoon sessions

Chair	**Pavel Stys**
13:30-13:55	Thierry BOURGOIN, Florian LAFOSSE-MARIN, Angel ANTA: FLOW, Fulgoromorpha lists on the web,a knowledge and taxonomy database dedicated to planthoppers: the "F's-pages"
13:55-14:20	Rachel KORN: Heteroptera communities of dry meadows in Southern Styria (Austria)
14:20-14:45	Malkie SPODEK, Yair BEN-DOV, Murad GHANIM, Zvi MENDEL: Taxonomy and life history of Kermesidae species in Israel (Hemiptera: Coccoidea)
14:45-15:10	Sheryl A. YAP, Thierry BOURGOIN, Jacek SZWEDO, Adeline SOULIER-PERKINS, Edwino S. FERNANDO, William Sm. GRUEZO, Nelson M. PAMPOLINA: Planthopper-Palm relationships: The case of the Sikaianini (Hemiptera: Fulgoroidea: Derbidae)
15:10-15:40	Coffee break
Chair	**Rimantas Rakauskas**
15:40-16:05	Eliška MALANÍKOVÁ, Igor MALENOVSKÝ, Petr KMENT: Responses of Auchenorrhyncha and Heteroptera communities to restoration of species-rich grasslands in the White Carpathians (Czech Republic)
16:05-16:30	Viktor HARTUNG, Roland MÜHLETHALER: Acoustic diversity in Peloridiidae (Hemiptera: Coleorrhyncha) and its bearing on systematics
18:00 – 19:00	Dinner
19:15 – 19:30	Congress Photo – *please wear your congress T-Shirt, if possible!*
19:30 – 20:30	Concert: “Aniada a Noar” and Reinhard Ziegerhofer
20:30 - ?	Wine tasting

Tuesday, July 21, 2015

Morning sessions

Chair	Berend Aukema
08:30-09:10	**Peter BRÄUNIG: Froghoppers and planthoppers – a neurobiological perspective (Auchenorrhyncha)**
09:10-09:35	Igor MALENOVSKÝ, Robert TROPEK: Auchenorrhyncha communities in Czech mining and post-industrial sites – man-made deserts or oases for threatened biodiversity?
10:00-10:20	Coffee break

Chair	Ünal Zeybekoglu
10:20-10:45	Balázs KISS, Réka LUPTÁK: Species richness of Auchenorrhyncha in highway rest areas in Hungary
10:45-11:10	D. SADÍLEK, J. VILÍMOVÁ, T. URFUS: Does more really always necessarily mean more? The secret of the bed bug karyotype revealed
11:10-11:35	Sumin OH, Young nam YOUN, Sunghoon JUNG: Taxonomic review of the genus *Arboridia* Zachvatkin (Auchenorrhyncha: Cicadellidae: Typhlocybinae) in Korea
11:35-12:00	Leonidas-Romanos DAVRANOGLOU: Taxonomy, phylogeny and biogeography of the genus *Holotrichius* Burmeister, 1835 (Heteroptera: Reduviidae)
12:00-13:30	Lunch break

Afternoon sessions

Chair	David Redei
13:30-13:55	Matija GOGALA, Tomi TRILAR: Genus *Cicadivetta* of Greece: acoustics, morphology and distribution
13:55-14:20	Yan-Hui WANG et al.: Phylogenetic divergences of the True Bugs (Heteroptera), with emphasis on the aquatic lineages

14:20-14:45 Gernot KUNZ: A pictorial synopsis of the Hemiptera fauna of Austria

14:45-15:00 Werner E HOLZINGER: Introduction to tomorrows field trip to "Spechtensee"

15:00-15:20 Coffee break

15:20 – 17:00 Poster presentations

1	Dominik CHŁOND, Agnieszka BUGAJ-NAWROCKA: Pattern of distribution of *Sirthenea flavipes* Stål, 1855 (Heteroptera: Reduviidae)
2	Fabio CIANFERONI: Advancements in the knowledge of African Nepomorpha
3	Fabio CIANFERONI: The forgotten Hebrid (Gerromorpha, Hebridae)
4	Eugenia F. CONTRERAS, Lilia E. NEDER DE ROMÁN, María C. COSCARON: Biodiversity of Aradidae – taxonomic revision and cladistic analysis of genus *Iralunelus* Ŝtys
5	Marah A. DERDAR, Hamzeh M. BELAL: First report of *Cicadatra platyptera* (Hemiptera: Cicadidae) distributed in Erneh, Syria
6	Fernando DIEZ, Marcela CORNELIS, José Luis Pall, María del Carmen COSCARÓN: Redescription of *Athaumastus haematicus* (Stål, 1860) (Heteroptera: Coreidae) adults and immature stages
7	Fernando DIEZ, Marcela F. CORNELIS, María del Carmen COSCARÓN: Redescription of *Nabis ashworthi* Faundez & Carvajal, 2014 (Heteroptera: Nabidae)
8	S. A. EL-SONBATI, M. R. WILSON, H. M. AL DHAFER: A new species of the leafhopper genus *Naevus* Knight, 1970 (Cicadellidae: Deltocephalinae: Opsiini), from Saudi Arabia
9	Romain GARROUSTE: *Cixidia pilatoi* (Fulgoromorpha, Achilidae) in France: first occurence and preliminary ecological observations in Massif des Maures (Var)
10	Stefan M. KÜCHLER, Siegfried KEHL, Konrad DETTNER: Diversity of symbiotic organs and bacterial endosymbionts of lygaeoid bugs (Hemiptera:Heteroptera: Lygaeoidea) *****Winner of the "Best Poster Award" of this Congress*****
11	Carsten MORKEL: Monitoring flat bugs (Heteroptera: Aradidae) as indicators of natural forest development in a European beech forest reserve
12	İnanç ÖZGEN , Tarkan AYAZ , Murat KARAVIN: Additional Notes on Cicadellidae fauna in Iraq and Syria border (Silopi, Cizre/Şırnak province) in Turkey
13	José Luis PALL, Maria del Carmen COSCARÓN: Redescription of *Merocoris (Merocoris) bergi* Mayr (Heteroptera: Meropachyinae) from Argentina
14	Jacek SZWEDO, Elżbieta SONTAG: Hemiptera in the collection of Museum of Amber Inclusions, University of Gdańsk, Poland
15	Marcos ROCA-CUSACHS, Frédéric CHÉROT, Marta GOULA: Cryptic alien species in the genus *Fulvius*: The case of *F. borgesi* vs. *F. imbecilis* (Miridae: Cylapinae), and clarification of the species of *Fulvius* present in Europe
16	Başak AKYÜREK, Ünal ZEYBEKOĞLU, Gazi GÖRÜR, Murat KARAVİN: A new host record for *Tuberolachnus salignus* (Hemiptera: Aphididae) from Turkey

17	Berend AUKEMA: Distribution Atlas of the Miridae (Hemiptera: Heteroptera) of the Netherlands
18	Ahmet DURSUN, Meral FENT: Contributions to the Auchenorrhyncha fauna of the Turkish part of Thrace (Hemiptera: Fulgoromorpha and Cicadomorpha)
19	Orsolya VICZIÁN, Emese MERGENTHALER, Emese KISS, Balázs KISS: Monitoring populations of *Cacopsylla pruni* (Hemiptera: Psyllidae), a vector of European stone fruit yellows in Hungary
20	Mariusz KANTURSKI, Thierry BOURGOIN, Karina WIECZOREK: Morphology of the representatives of the genus *Cinara* Curtis, 1835 (Aphididae: Lachninae) – a comparative study
21	Karina WIECZOREK, Mariusz KANTURSKI, Ge-Xia QIAO, Masakazu SANO, Hiroyuki YOSHITOMI: The identity of little-known aphid species *Periphyllus acerihabitans* Zhang and *P. viridis* Matsumura (Aphididae, Chaitophorinae)
22	Karina WIECZOREK, Mariusz KANTURSKI, Łukasz JUNKIERT: Review of the sexual generation in *Drepanosiphum* Koch, 1855 (Aphididae: Drepanosiphinae)
23	Higor D. D. RODRIGUES, Felipe F. F. MOREIRA: Four new species of *Paravelia* Breddin, 1898 from Brazil (Heteroptera: Veliidae)
24	Petr BAŇAŘ, Pavel ŠTYS: Fauna of Madagascan Enicocephalomorpha - present state of knowledge and future perspectives
25	Barbara FRANIELCZYK, Jolanta BROŻEK, Piotr WĘGIEREK: A light, electron and confocal microscopic study of the forewing articulation among Sternorrhyncha
26	Małgorzata Kalandyk-KOŁODZIEJCZYK, Jolanta BROŻEK: Preliminary morphological studies of mealybug nymphs (Hemiptera: Coccoidea: Pseudococcidae)
27	Dušanka JERINIĆ-PRODANOVIĆ: The psyllids from the genus *Psyllopsis* Löw, 1879 (Hemiptera: Psylloidea) and their natural enemies in Serbia
28	Dušanka JERINIĆ-PRODANOVIĆ: Parasitoids of jumping plant-lice (Hemiptera: Psylloidea) in Serbia
29	Dušanka JERINIĆ-PRODANOVIĆ: Contribution to the knowledge of biology and host plants of *Bactericera trigonica* Hodkinson (Psylloidea, Triozidae)
30	Igor MALENOVSKÝ, Daniel BURCKHARDT: Biodiversity of jumping plant-lice (Psylloidea) on the island of Socotra

18:30 – 22:30 Congress Dinner (Restaurant “Schlossberg”, Graz)

Wednesday, July 22, 2015

08:30 – 19:00 Field trip to lake “Spechtensee” (fen lake, wet meadows…), either via the gorge “Wörschachklamm” or via montane forests and pastures crossing “Leistensattel” (or simply by bus directly to the lake…)

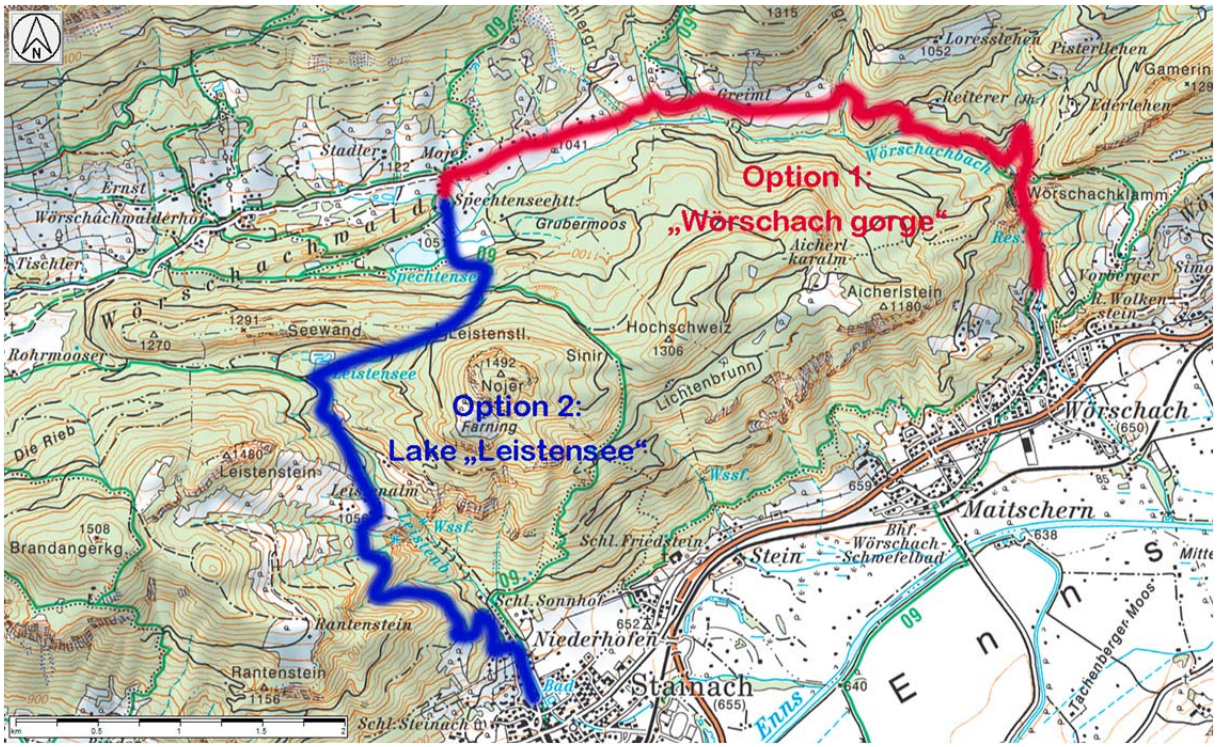

Fig: Walking options for the field trip. Source: AMAP 3d, © BEV.

Option 1: Austria, Styria, Ennstal: From Wörschach via Wörschachklamm to lake Spechtensee; 47°33’16’’N/14°08’58’’E, 655 m, to 47°33’36’’N/14°05’54’’E, 1050m

Option 2: Austria, Styria, Ennstal: From Stainach via Leistenalm and Leistensattel to lake Spechtensee; 47°32’04’’N/14°06’30’’E, 668m, to 47°33’36’’N/14°05’54’’E, 1050m; highest point 1260 m

19:30 – 20:30 Dinner

Thursday, July 23, 2015

Morning sessions

Chair	Marta Goula
08:30-09:10	**Herbert ZETTEL: An Introduction to the Helotrephidae**
09:10-09:35	Maxime LE CESNE, Adeline SOULIER-PERKINS: Phylogenetic structuration along an altitudinal gradient in Papua New Guinea (Hemiptera; Fulgoromorpha)
09:35-10:00	Huining ZHANG, Herbert NICKEL, Stefan SCHEU, Ina SCHAEFER, Wu DAI: Molecular phylogeny of the tribe Paralimnini (Hemiptera, Cicadellidae, Deltocephalinae)
10:00-10:20	Coffee break
Chair	**Herbert Nickel**
10:20-10:45	Murat KARAVİN, Ünal ZEYBEKOĞLU, Başak AKYÜREK: Evaluation of the Turkish Delphacidae Fauna
10:45-11:10	Junggon KIM, Yong Man YU, Sunghoon JUNG: Taxonomic review of the genus *Capsus* Fabricius (Heteroptera: Miridae) from the Korean Peninsula
11:10-11:35	İnanç ÖZGEN, Ilia GJONOV, Murat KARAVIN: New data on early spring Auchenorrhyncha species in Bozdağ Montain (Turkey)
11:35-12:00	Karina WIECZOREK: Sexuales of aphids (Aphididae, Drepanosiphinae, Chaitophorinae) – the crucial generation
12:00-13:30	Lunch break

Afternoon sessions

Chair	Peter Bräunig
13:30-13:55	Michael R WILSON: A remarkable sampling machine for cereal Pentatomidae in Turkey: 70 years on
13:55-14:20	Petr KMENT, Attilio CARAPEZZA, Pierre MOULET: Heteroptera of the Socotra Archipelago
14:20-14:45	Cezary SEMPRUCH, Bogumił LESZCZYNSKI, Hubert SYTYKIEWICZ, Paweł CZERNIEWICZ, A. KOZAK, Marta CHWEDCZUK: The participation of lysine decarboxylation in biochemical plant responses to infestation by aphids
15:10-15:30	Coffee break

Chair	**Thierry Bourgoin**
15:30-15:55	Dmitry A. DMITRIEV: TaxonWorks, a new cybertaxonomic workbench for taxonomic research
15:55-16:20	Rimantas RAKAUSKAS: *Brachycaudus divaricatae* in central Europe: invasive or naturally spreading (Aphididae)?
16:20-16:45	Shruti V. PARIPATYADAR, Anand D. PADHYE, Hemant V. GHATE: Ultrastructure of stridulatory structures in some aquatic Heteroptera of the Western Ghats, India (Heteroptera: Nepomorpha)
17:00-18:00	IAS executive committee meeting

18:00 – 19:00 Dinner

Friday, July 24, 2015

Morning sessions

Chair	**Wolfgang Rabitsch**
08:30-09:10	**Alice EXNEROVA, Katerina MACHALKOVA, Pavel STYS: Detectability and palatability of flat bugs (Heteroptera: Aradidae) for avian predators**
09:10-09:35	Selcuk YURTSEVER, Sofia G. SEABRA: Introduction to the Meadow Spittlebug Philaenus spumarius (Hemiptera, Aphrophoridae)
09:35-10:00	Dariusz ŚWIERCZEWSKI, Adam STROIŃSKI: Antennal ultrastructures in Flatidae (Hemiptera: Fulgoromorpha) – a preliminary report

10:00-10:20 Coffee break

Chair	**Jacek Szwedo**
10:20-10:45	Jolanta BROŻEK, Thierry BOURGOIN: Morphology and modification of the labial segments in the Fulgoromorpha (Insecta: Hemiptera) with notes on the phylogenetic characteristics
10:45-11:10	Mariusz KANTURSKI, Łukasz KAJTOCH, Karina WIECZOREK: Taxonomy and biology of the genus *Eulachnus* Del Guercio, 1909 (Aphididae: Lachninae)
11:10-11:35	Kateřina HOTOVÁ SVÁDOVÁ, Alice EXNEROVÁ, Eliška FLÉGLOVÁ, Pavel PIPEK, Pavel ŠTYS: Role of contrasting pattern in detectability of a cryptic

seed bug *Rhyparochromus pini* (Heteroptera: Rhyparochromidae)

12:00-13:30 Lunch break

Afternoon sessions

Chair	**Balázs Kiss**
13:30-13:55	Jacek SZWEDO, Jowita DROHOJOWSKA: Diversity out of the blue – fossil Aleyrodomorpha (Hemiptera: Sternorrhyncha)
13:55-14:20	Sabrina BERTIN, Stefano DEMICHELIS, Christopher H. DIETRICH, Domenico BOSCO: DNA markers provide insights into the taxonomy of the Empoascini tribe (Hemiptera: Cicadellidae)
14:20-14:45	Barbara L. CAOILI, Ireneo L. LIT, Jr., Sheryl A. YAP, Michelle A. GUERRERO, Edsel C. RUBICO, Gelyn D. SAPIN, Normandy M. BARBECHO, Regina Faye C. SANDOVAL: Geographic profile of *Aspidiotus destructor* Signoret and *A. rigidus* Reyne (Coccoidea: Diaspididae) infesting coconut in the Philippines
14:45-15:10	Vladimír HEMALA, Petr KMENT, Igor MALENOVSKÝ: Morphology and phylogeny of the true bug superfamily Pyrrhocoroidea (Heteroptera: Pentatomomorpha) – a preliminary report
15:10-15:30	Coffee break
Chair	**Adeline Soulier-Perkins**
15:30-15:55	Viktor HARTUNG: SEM delivering characters for the systematics of Peloridiidae (Hemiptera: Coleorrhyncha)
15:55-16:20	Alex J. RAMSAY: Feeding ecology of European shieldbugs (Pentatomoidea)
16:20-16:45	Alex D K DITTRICH, Alvin J HELDEN: The community ecology of *Ribautodelphax* imitans, a rare UK planthopper in a distinct grassland habitat
16:45-17:00	Closing ceremony
18:00 – …	Farewell Dinner

Saturday, July 25, 2015

09:00 – 18:00 Post Congress trip
"riverine habitats and dry meadows in Southern Styria"

Stop 1: Austria, Styria, Murtal: Gosdorf E Mureck; 46°43'12''N/15°49'06''E, 225 m

Stop 2: Austria, Styria, Ennstal: From Stainach via Leistenalm and Leistensattel to lake Spechtensee; 47°32'04''N/14°06'30''E, 668m, to 47°33'36''N/14°05'54''E, 1050m; highest point 1260 m

Abstracts of talks and posters

A new host record for *Tuberolachnus salignus* (Hemiptera: Aphididae) from Turkey

Başak AKYÜREK[1], Ünal ZEYBEKOĞLU[2], Gazi GÖRÜR[3], Murat KARAVİN[1]

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3 Niğde University, Niğde, Turkey

Key words: Sternorrhyncha, Aphidoidea, aphids, host plants, biology, Samsun Province

The giant willow aphid, *Tuberolachnus salignus* (Gmelin, 1790), is one of the largest known aphids (body length 5.0–5.8 mm). *T. salignus* is distributed worldwide except for Australasia, although it was recorded also from New Zealand in 2013. The most distinct taxonomic feature of this species is a large dark brown tubercule on the centre of the dorsum, in front of the siphunculi that are on large cones. *T. salignus* lives on *Salix* and some poplar (*Populus*) species (Salicaceae). It appears on the hosts from mid-summer until January–February and builds up large colonies in late summer (Blackman and Spence, 1996; http://www.aphidsonworldsplants.info). It has anholocyclic life cycle almost everywhere.

This study was performed in Samsun province on the northern coast of Turkey between 2009 and 2013. Samsun has large growing areas of vegetable, fruit and other, economically important agricultural crops as well as large natural forest areas. We surveyed aphid species and their hostplants in Samsun province and identified the aphids collected using the works by Blackman & Eastop (1994, 2000, 2006, http://www.aphidsonworldsplants.info). Taxonomic characters of specimens collected from quince (*Cydonia oblonga* Miller, 1768; Rosaceae)*, Salix* spp. and *Populus* spp. were examined, compared and identified as belonging to a same species, *T. salignus*. As a result, *C. oblonga* is recorded for the first time as a host plant for *T. salignus.* The specimens were photographed on their host plants in the field just prior to the collection. This new host plant record is important to understand the biology of this species.

Fauna of Madagascan Enicocephalomorpha - present state of knowledge and future perspectives

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Key words: Heteroptera, Madagascar, Aenictopecheidae, Enicocephalidae

The fauna of heteropteran infraorder Enicocephalomorpha from Madagascar and adjacent islands from the Indian Ocean (Mascarene Islands, Seychelles and Comoros) contains 43 described species in 14 genera belonging to two families (Aenictopecheidae – single species from Madagascar, Enicocephalidae – rest of the species). Thanks to recent collecting activities, more than 350 samples containing Enicocephalomorpha are available for our study, most of them from sifting of forest litter. More than 2000 adults and about 3000 larvae were sorted out so far. This material includes several undescribed genera and dozens of undescribed species, more than half of them in the Madagascar endemic genus *Proboscidopirates* Villiers, 1958.

DNA markers provide insights into the taxonomy of the Empoascini tribe (Hemiptera: Cicadellidae)

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Key words: Empoasca, taxonomy, molecular markers

The tribe Empoascini includes polyphagous as well as oligophagous species, which are associated with a wide range of cultivated and wild plants. These leafhoppers feed in both the phloem and mesophyll and some species have been recently shown to be phytoplasma vectors.

The identification of the Empoascini species is currently based on the morphology of male genitalia, but the morphological features are hard to distinguish and require strong expertise in this insect group. In addition, females are often indistinguishable even among genera, except for very small differences in the ovipositor that can be observed with the scanning electron microscope. The analysis of the Empoascini species by means of molecular markers facilitated evaluation of the traditional identification methods and gave new insights into the tribe phylogeny.

Firstly, data from DNA markers were obtained from different Empoascini genera and the analysis of the ribosomal Internal Transcribed Spacer 2 (ITS2) provided a rapid tool for the discrimination among the genera *Empoasca*, *Asymmestrasca* and *Jacobiasca*. Moreover, genetic variability at both mitochondrial and nuclear (ribosomal DNA and gene coding the Histone 1) DNA regions was explored within the genus *Empoasca*. Different populations of both European (*E. vitis*, *E. pteridis*, *E. decipiens*, *E. alsiosa*, *E. affinis*, *E. kontkaneni*) and North-American (*E. fabae*) species were analysed. The species *E. vitis* and *E. fabae* were clearly differentiated at all DNA regions, whereas *E. pteridis*, *E. decipiens*, *E. alsiosa*, *E. affinis* and *E. kontkaneni* showed an unusual pattern of variability. Individuals identified as the same species based on morphological criteria were divergent at most of the analysed loci and, in some cases, shared the same haplotype with individuals of other species. Therefore both intra-specific variability and inter-specific conservation were observed, leading to suppose that these five species may represent a complex of a single widespread and variable species. This pattern of genetic variability was independent of the geographical origin and/or the plant hosts.

FLOW, Fulgoromorpha lists on the web,a knowledge and taxonomy database dedicated to planthoppers: the "F's-pages"

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Key words: taxonomic database, taxon name history, taxonomic indices, DBTNT

As indicated on its home page (http://www.hemiptera-databases.org/flow/), objectives of FLOW are to synthesise and share all nomenclatural, taxonomic and bibliographical data about planthoppers to better preserve and organize the systematics expertise already acquired on this group. With the objective to link also other biological data to this taxonomic backbone, the aim of FLOW is to promote Fulgoromorpha as a research model for future basic and applied studies in the fields of biodiversity and conservation management.

Organised in a database, FLOW should be a useful tool for delivering and accessing structured data to further explore new aspects of planthoppers biodiversity. Accordingly, we present here the next steps of the development of FLOW, allowing to move from basic information to knowledge that will be automatically provided on-line in the website, the "F's-pages" (First Figures From FLOW For Fulgoromorpha):

- Graphical display of the history of name(s) of a taxon and of its classification;
- Graphical display of the generic composition of a supra-generic taxon and its classification;
- Taxonomic indices and various figures for each taxon documenting its distribution according to the Wallacean-Holt realms/regions, its latitudinal profile and its corresponding climatic zone occurrence;
- Automatically generated texts summarising all information about a taxon (classification, history through names, distribution, taxonomic indices, interspecific relationships...) in an easy-to-read format and with the corresponding bibliographic references. These texts, available in several languages, will be also directly downloadable for free re-usage in other publications.

Trying to follow and document planthopper biodiversity is a challenge for such a large group of more than 13,000 species and 26,000 names. Planthopper primary data associated to these are also regularly published, some of which in journals that are difficult to access, and edition in the database is quite time-consuming. While clearly incomplete in several aspects, FLOW has now a quite good number of data, enough to start studying macro-patterns. Efficiency will grow with time and with the help from more contributors.

Froghoppers and planthoppers – a neurobiological perspective (Auchenorrhyncha)

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Key words: planthopper, froghopper, jump, neurobiology, sense organs

Froghoppers and planthoppers are the champion jumpers of the animal kingdom. We investigated the neuromuscular apparatus responsible for such jumps in the froghopper *Philaenus spumarius* and the planthopper *Issus coleoptratus.* In both species the main power for the jump is provided by the massive trochanter depressor muscles of the hind legs. In *Issus* these muscles make up for 10-15% of the whole body weight. In addition to the large muscles, small accessory muscles insert on the trochanter depressor tendon. Their innervation is unusual and they may be involved in triggering the jumps.

In a second line of research the sensory pits of *Issus* nymphs were investigated. In principle these pits consist of a bowl-shaped depression in the cuticle underneath a single, horizontally-oriented sensory hair. In *Issus* and a few other families the pits are covered by a transparent cupola and additional small sensory bristles insert into the base of this cupola. All sensory hairs of the pits are innervated by only one sensory neuron each. Ultrastructural investigations indicate that the large sensory hairs are highly modified mechanoreceptors. Older notions that the pits might be hygroreceptors are not supported by our results.

Finally we have just started to investigate complicated arrangements of scolopidial organs in the first abdominal segments of froghoppers, planthoppers and leafhoppers. Some of these look like vibration detectors and might play a role in intraspecific communication.

Geographic profile of *Aspidiotus destructor* Signoret and *A. rigidus* Reyne (Coccoidea: Diaspididae) infesting coconut in the Philippines

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Key words: scale insects, molecular markers, COI, 28S rRNA, pests, Oriental Region

Aspidiotus destructor Signoret, 1869 is a polyphagous insect that was first introduced probably around 300 years ago and which is known to infest coconut palms in the Philippines. Farmers usually associate the presence of another armored scale insect, which cause a devastating loss in some coconut areas in the country with this species. The recent confirmation of *Aspidiotus rigidus* Reyne, 1947 as the main species involved in outbreaks of coconut scale insects in the Southern Tagalog region in Luzon island, Philippines, has helped identify various strategies to manage this insect pest. Quarantine measures have been implemented as one of the tactics to prevent or delay the spread of *A. rigidus* to other coconut-growing areas in the country. In this paper, we report the geographic profile of *A. destructor* and *A. rigidus* based on the molecular markers *cytochrome c oxidase I* (*COI*) and *28S rRNA* nucleotide sequences coupled with morphological analyses. The geographic profile generated will serve as an important baseline reference in monitoring the spread of these species in the country. At the same time, the molecular and morphological evidences that support the sympatric co-existence of these two species present questions on certain aspects of their ecology. These two species with overlapping, if not the same, niche need to be studied further to understand better their interspecific interactions and implications to pest management.

Pattern of distribution of *Sirthenea flavipes* Stål, 1855 (Heteroptera: Reduviidae)

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Key words: Heteroptera, Reduviidae, Peiratinae, *Sirthenea*, speciation, distribution, populations

Representatives of the genus *Sirthenea* are unspecialized predators, widely distributed in the world. Oriental and Palaearctic part of Asia is inhabited by one species - *S. flavipes*, for which we can observe two distinct populations. There is a high probability that this species has been divided into two populations after the last glacial maximum (between 26,500 and 19,000–20,000 years ago), when due to the lowered sea levels the Indonesian islands as far east as Borneo and Bali were connected to the Asian continent by a landmass called Sundaland. Our study on the current potential distribution of the species *S. flavipes* and its ecological niche, as well as distribution during the Last Glacial Maximum, has been carried out using Maxent software. Ecological niche modeling was based on 95 records of occurrence – 50 for eastern population and 45 for those from the west of Asia.

Advancements in the knowledge of African Nepomorpha

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Key words: Nepomorpha, Africa, new species

Knowledge of the Hemipteran fauna of the Afrotropical Region is far from perfect; this extends to aquatic Heteroptera and in particular for most of Nepomorpha, the understanding of which has stagnated since the time of Poisson's contributions.

The old descriptions were based solely on the external morphology; some groups were supposed to have a low number of species in Africa (e.g. Gelastocoridae), and this approach has continued until now. A study of the male genitalia of the type specimens (including the supposed synonyms), has led me to identify several undescribed sibling species.

Poisson had begun to extract and study the genitalia of most of African aquatic Heteroptera. Despite his modern approach, his works were mainly based on characteristics which were later considered to be unreliable and highly variable (e.g. parameres and antennae for Belostomatidae). The extraction of the phallus from the genital capsule in Belostomatidae allowed me to discover undescribed taxa, including a large (over 6 cm in length) new species belonging to the genus *Hydrocyrius* Spinola.

Nonetheless, the taxonomy of several genera of Nepomorpha needs to be accurately revised, particularly in the case of some of the smaller taxa.

The forgotten Hebrid (Gerromorpha, Hebridae)

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Key words: Gerromorpha, Hebridae, valid species

The description for *Hebrus franzi* (Wagner, 1957) (sub *Neogaeus franzi*) was based on material collected by H. Franz in the Apuan Alps - a mountain range in northern Tuscany (Italy). Since then it has never been recorded again, and has until now only continued to be known for the type series, leading subsequent authors - perhaps suspicious of a misidentification or a mislabeling - to consider this taxon to be of "uncertain value" and "questionable validity". It has been quoted, however, as endemic to the Apuan Alps.

After more than 50 years, the collection of further specimens from the type locality, but also from a new site in Northern Italy (with very different characteristics: near a lowland river), allows us to confirm the validity of this taxon, and to expand its range.

No additional data about the ecology of the species was included in the original description, but the methods used to collect the recent specimens (sieving flood or litter debris) would suggest that this species has semi-terrestrial behavioral.

Biodiversity of Aradidae (Hemiptera: Heteroptera) – taxonomic revision and cladistic analysis of genus *Iralunelus* Ŝtys

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Key words: Aradidae, *Iralunelus*, biodiversity, taxonomic revision, cladistic analysis

The Aradidae family (Hemiptera: Pentatomomorpha) consists of 1931 species distributed in 233 genera and is represented in all the biogeographic regions of the world. They are commonly known as "bark bugs" and among their most interesting features their mycetophagous habit stands out. Currently the aradidae are grouped into eight subfamilies: Aneurinae, Aradinae, Calisiinae, Carventinae, Chinamyersiinae, Isoderminae, Mezirinae and Prosympiestinae. The Aneurinae subfamily comprises seven genera, of which three are represented in the Neotropical Region: *Aneurosoma* Champion*, Aneurus* Curtis, and *Iralunelus* Ŝtys. In this study the phylogenetic relationships among species of *Iralunelus* and between them and their next genera were analyzed. The cladistic analysis was performed based on all the species of *Iralunelus* and seven species belonging to the close genera. To do so, a basic data matrix of 28 taxa and 31 characters was built, and TNT program was used to obtain the most parsimonious hypothesis. The resulting tree (fit: fit: 10.21334, CI: 0.34 and RI: 0.617) was constituted by 22 species of which 19 correspond to the original species of the genus: *Iralunelus bergi* (Kormilev)*, I. bispinosus* (Kormilev)*, I. bolivianus* (Kormilev)*, I. carioca* (Kormilev)*, I. costariquensis* (Kormilev)*, I. flavomaculatus* (Distant)*, I. gallicus* Ŝtys, *I. fritzi* (Kormilev)*, I. leptocerus* (Hussey)*, I. longicornis* (Kormilev)*, I. marginalis* (Walker)*, I. monrosi* (Kormilev)*, I. plaumanni* (Kormilev)*, I. politus* (Say)*, I. sahlbergi* (Bergroth)*, I. simulans* (Walter)*, I. subdipterus* (Burmeister)*, I. tenuis* (Champion)*, I. wygodzinskyi* (Picchi); *I. zipaquirensis* sp. nov. and two species that were located in the close genera: *Aneurillus doesburgi* (Kormilev) and *Aneurus bucki* (Kormilev) are incorporated. *I. aibonitensis* (Kormilev) is transferred to the *Aneurus* genus. The studied species were redescribed and illustrated incorporating new morphological and meristic characters; a new species for the science was described and a key to identifying them was produced. Starting from the georeferencing of the sites where the study species were recorded maps were prepared, and general considerations concerning the geographical distribution were made. The existing limited data in the literature on the bionomics of Aradidae were integrated and new records for the Argentine Northwest are provided.

Taxonomy, phylogeny and biogeography of the genus *Holotrichius* Burmeister, 1835 (Heteroptera: Reduviidae)

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Key words: *Holotrichius*, taxonomic revision, biogeography, fossula spongiosa, hairy attachment structures

The problematic taxonomy of the assassin bug genus *Holotrichius* (Insecta: Heteroptera: Reduviidae) is critically revised, based on a thorough morphological examination. The phylogeny of the genus is also reconstructed for the first time, using morphological characters and provides insights into the origins and biogeography of this genus.

First report of *Cicadatra platyptera* (Hemiptera: Cicadidae) distributed in Erneh, Syria

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Key words: cicada, acoustic analysis, morphological characters, thistle plants, Erneh

The cicada *Cicadatra platyptera* Fieber, 1876 (Hemiptera: Cicadidae) was reported for the first time in the fruit orchards of Erneh (33°21'N, 35°52'E), a village located in the Alsheikh mountain in the south west of Syria. However, no research was conducted on Syrian cicadas previously. In this research, adults were observed on the thistle plants that are grown among the fruit orchards. The species was identified as *C. platyptera* based on morphological and acoustical characters.

Contribution to the knowledge of Patagonia, Argentina: Redescription of *Athaumastus haematicus* (Stål, 1860) (Heteroptera: Coreidae) adults and immature stages

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Key words: Nymphs, new host plant, Coreidae, *Athaumastus haematicus*

The worldwide record of the family Coreidae reveals a total of 2559 species assigned to 436 genera. Knowledge of South American coreids is poor, especially regarding their economic importance for humans. Eighty-two species have been mentioned in the literature as potentially or actually damaging crops. The tribe Acanthocerini includes species of minor economic importance such as *Athaumastus haematicus* (Stål), which attacks potatoes, cotton, sunflower, oranges and eggplant. The purpose of this contribution was to redescribe and illustrate adults of *A. haematicus* Stål, including details of the genitalia, and instars I–V, from Argentina. To this end, *A. haematicus* specimens were collected with a sweep-net in different Argentine provinces in December 2014. All stages of *A*. *haematicus*, including nymphs and copulating adults, were found on the same host plant, *Centaurea solstitialis* L. (Asteraceae). Specimens were preserved in 75% ethanol. One male, three females and 22 nymphs were captured in La Pampa province, and four males, five females and one nymph were captured in Neuquén province. Specific identification of nymphs was confirmed by associating the material studied with adults. The images were taken with a digital camera (PANASONIC DMC-S3). The material has been deposited in the collection of the Museo de La Plata (MLP), Argentina. The present contribution provides a new host plant of *A. haematicus, Centaurea solstitialis.*

Contribution to the knowledge of Patagonia, Argentina: Redescription of *Nabis ashworthi* Faundez & Carvajal 2014 (Hemiptera: Heteroptera: Nabidae)

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Key words: Nabidae, *Nabis ashworthi*, immature stages, Patagonia, Argentina

The Nabidae, often called "damsel bugs", is a family of generalist predators, feeding on a wide variety of small arthropods. Their predaceous habit, together with the widespread distribution and occurrence of some species, particularly in agroecosystems, makes them important as controllers of crop pests. Nabids contain about 386 species distributed in 31 genera in the world. In the Neotropical Region, 11 genera and 83 species have been recorded. *Nabis ashworthi* Faúndez & Carvajal, distributed in Chile, belongs to the subfamily Nabinae and has been described within the *Punctipennis* complex. In Argentina, this complex is represented by four species: *Nabis argentinus* Meyer-Dür, *N. faminei* Stål, *N. paranensis* Harris, and *N. punctipennis* Blanchard. The purpose of this contribution was to redescribe adults, describe morphology of male genitals and immature stages II-IV, and new distributional records of this species in Argentina. Specimens were collected with a sweep-net and a garden vacuum from the undergrowth of *Araucaria araucana* (Molina) K. Koch forest (951 m a.s.l.) and *Nothofagus* sp. forest (1246 m a.s.l.) in Lanín National Park, Neuquén, Argentina, in December 2014. Specimens were preserved in 96% ethanol. *N. ashworthi* was recorded for the first time in Argentina, and with this record the *Punctipennis* complex is now formed by five species. Currently, *N. ashworthi* has a localized distribution on both sides of the Andes mountain range between 71˚S to 72˚S in Chile and Argentina. More localities should be sampled to have further knowledge on its distribution.

The community ecology of *Ribautodelphax imitans,* a rare UK planthopper in a distinct grassland habitat

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Key words: Auchenorrhyncha, Delphacidae, tussock, habitat interactions

Ribautodelphax imitans is a rare planthopper (Delphacidae) in the UK; one of just a handful of Auchenorrhyncha recognised as a conservation priority. After the species was discovered on Coe Fen, Cambridge (an extensively managed meadow in the centre of Cambridge) a study was started to understand more about its ecology and how this could be later fed into its conservation. In the first study year (2012), systematic random sampling of the site occurred April to October, in which all adult Auchenorrhyncha were collected and identified. This helped establish the size of the *R. imitans* population, whilst illustrating how other species overlap with *R. imitans*. Subsequently information on Coe Fens plant biodiversity was incorporated into a series of field based modelling and lab based experimental approaches. One of the key structural characteristics that *R. imitans* appeared to respond to were tussocks of its host plant *Schedonorus* (*= Festuca*) *arundinaceus* with only weak responses to non-tussock *S. arundinaceus* observed. This highlights the importance of mature tussock forming *S. arundinaceus* in *R. imitans* conservation. The strength of fidelity towards tussocks was increased by shorter surrounding sward heights, indicative of microhabitat preference and refugia utilisation. Within tussocks a negative response to cutting was recorded, however no patterns were observed for *R. imitans* attributed to small numbers collected. In experimental manipulations, the positive response to tussocks was increased by nitrogen input, whilst sward density was the most important structural characteristic Delphacidae responded to. Data collected in 2011 suggested that there was considerable spatial and temporal overlap between *R. imitans* and other delphacids, illustrating possible interspecies interactions. This discovery fed into various interaction experiments with more abundant species including *Javesella pellucida* the results of which are also discussed.

TaxonWorks, a new cybertaxonomic workbench for taxonomic research

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Key words: database, taxonomy, systematics, web application

The Species File Group is a team of cybertaxonomists and programmers whose focus is producing software for scientists describing biodiversity on local, national and international scale, and located in the Illinois Natural History Survey (USA). Currently supported products are taxonomic databases, such as SpeciesFile (http://speciesfile.org), 3i (http://dmitriev.speciesfile.org), MX (https://hymenoptera.ucr.edu/mx-database), as well as global initiatives: Catalogue of Life (CoL, http://www.catalogueoflife.org/) and Global Name Architecture (GNA, http://www.globalnames.org/). Our collective software currently supports several comprehensive nomenclatural catalogs, museum specimen databases, interactive and dichotomous keys, taxon pages, phylogenetic data matrices, bibliography, image and sound collections, anatomical onthologies and more. As an effort to modernize, expand, and unify existing efforts of the Species File Group, we have started working on a new online workbench platform, TaxonWorks (http://taxonworks.org).

TaxonWorks is being designed as an open-source software. The code and documentation have been open since the beginning and are available on GitHub. TaxonWorks is using Ruby on Rails on Postgres/PostGIS database and NOMEN ontology for nomenclatural validation. The goal is a web-based project, which support virtual collaboration by multiple users; emphasis on interfaces for efficient data capture; batch loading support (e.g. Darwing Core Archive, Excel sheets); sharing data between projects (e.g. references, geography); flexible and highly annotable data model (support for notes, translations, tags, user defined fields).

Supported features are nomenclature governance for animals (ICZN) and plants (BCN); modular taxon pages; build in georeferencing tools; bibliography handling based on BibTeX standard; image libraries; specimen collection support including profiling and loans; character matrices; identification tools (dichotomous and multi-entry keys) and anatomy onthology.

So small insects, so important record: Fossil Sternorrhyncha in Eocene Baltic amber

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Key words: scale insects, aphids, psyllids, whiteflies, palaeontology, Palaeogene

The Sternorrhyncha are hemipteran plant feeders, unique in having their mouthparts (rostrum) located between the bases of fore legs. The species diversity of these insects in Baltic amber is surprising (many unique forms have not survived to recent times) and contradicts the widespread opinion that the Eocene fauna differed only slightly.

The first information about fossil scale insects comes from the mid-19th century with classic works of Berendt, Germar, Koch and Menge. After almost 100 years Ferris (1941) 'redis-covered' fossil scale insects by describing a collection of 20 coccids from Baltic amber. For many years coccid palaeontology has been neglected. Scale insects were unattractive for collectors and coccidologists didn't appreciate the potential of knowledge on scale insect morphology and phylogeny hidden in fossil resins. The real bloom of coccid palaeontology has come with the late Professor Jan Koteja, who revealed a great biodiversity of ancient scale insects. Till now from the Eocene Baltic amber we know 12 families and 29 species of Coccidomorpha.

Concerning aphids, their fossil record in the Eocene Baltic amber comprises 12 families and 101 species so far (Heie & Wegierek 2011). Only one family – Elektraphididae – is extinct, the other groups are still represented in the extant fauna. The first descriptions come from of the mid-19th century, with the milestone in knowledge of the Aphidomorpha from Baltic amber marked with the monograph of Heie (1967). The taxonomy of the Baltic amber aphids seems to be the best elaborated among Sternorrhyncha, but far from complete.

The first species of fossil psyllids was described by Enderlein in 1915. Subsequent descriptions appeared 80 years later, in works of Klimaszewski (1993, 1997) and Drohojowska (2011) and the Palaeogene fauna has been reviewed by Ouvrard et al. (2013). Psylloidea from the Eocene Baltic amber are represented by 8 described species, attributed to extinct genera of the extant family Aphalaridae. Recently about 20 additional specimens of psyllids have been acquired, all of them currently being studied in detail.

There are only two species of whiteflies (Aleyrodomorpha) known from Baltic amber: '*Aleyrodes*' *aculeatus* Menge, 1856 of uncertain systematic position, and *Paernis gregorius* Drohojowska et Szwedo, 2011. Over 80 specimens of Aleyrodidae are under study now and awaiting formal descriptions.

Contributions to the Auchenorrhyncha fauna of the Turkish part of Thrace (Hemiptera: Fulgoromorpha and Cicadomorpha)

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Key words: Turkey fauna, Thrace, Fulgoromorpha, Cicadomorpha

Fulgoromorpha and Cicadomorpha specimens were collected in different localities in Turkish Thrace in the spring and summer period of 2014. The collected material was evaluated and *Metcalfa pruinosa* (Say, 1830) (Flatidae), *Tettigometra laeta* Herrich-Schäffer, 1835 (Tettigometridae), *Scorlupella discolor* (Germar, 1821) (Issidae) and *Euides basilinea* (Germar, 1821) (Delphacidae) from Fulgoromorpha and *Eupelix cuspidata* (Fabricius, 1775) (Cicadellidae) from Cicadomorpha were recorded for the first time for region of Thrace. *E. cuspidata* was so far only known from the Asian part (Anatolia) of Turkey. *S. discolor* was found in several localities, and *T. laeta* and the exotic species *M. pruinosa* were found only in one locality, respectively. *E. basilinea* was already published from Turkey but without any data on the locality. Taxonomical characteristics of the species and their distributions in Turkey and within the Palaearctic Region were given.

A new species of the leafhopper genus *Naevus* Knight, 1970 (Hemiptera: Cicadellidae: Deltocephalinae: Opsiini), from Saudi Arabia

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The genus *Naevus* Knight, 1970 is recorded from the mountains of southwestern Saudi Arabia, the first record from the Arabian Peninsula. A new species is described here, which appears to have an asymmetric aedeagus. An illustrated key to *Naevus* species is presented to facilitate identification.

Detectability and palatability of flat bugs (Heteroptera: Aradidae) for avian predators

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Key words: *Parus major*, camouflage, chemical defence, larvae, adults, *Aradus*, *Dysodius*

The dominant antipredatory strategy of flat bugs (Aradidae) is supposed to be a camouflage as their coloration and surface morphology usually closely matches their background, in Europe mainly tree bark and wood fungi. On the other hand, like other true bugs, the flat bugs produce a repellent secretion from their scent-glands (dorso-abdominal glands in larvae and metathoracic glands in adults), which may be effective against the predators. Surprisingly, neither the factors affecting camouflage nor the effectiveness of chemical defense against avian predators have yet been tested.

In the first experiments we tested an effect of body-margin shape on detectability of the flat bugs for juvenile and adult great tits (*Parus major*). We used photographs of two species of the Neotropical genus *Dysodius* matching in size and coloration, but differing by the shape of body margin, which is either straight or serrate. The photographs of both species were taken on several different backgrounds of a tree bark and the birds were pre-trained to search for the bugs baited with a piece of mealworm hidden beneath. Juvenile birds were generally faster than adults in searching for the bugs, and the detection times were affected by the type of background. The shape of body margin influenced the detectability of the bugs, but its effect was evident only in juvenile birds searching on more difficult backgrounds.

In the second experiment we compared palatability of the fifth-instar larvae and adults of a common Palaearctic flat bug *Aradus betulae* for naive juvenile great tits. The birds were presented either with larvae or adults in a sequence of trials alternating with the familiar palatable prey (mealworms) until they either consumed or avoided three bugs in a row. The birds tested with larvae usually attacked only the first bug offered, and then learned to avoid them. The larvae frequently survived the attacks. Contrastingly, the adults were repeatedly attacked, killed and consumed, and the birds did not show any signs of discomfort after eating them. The antipredatory defense of larvae seems to be more effective against passerine birds than the defense of adults.

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Cixidia pilatoi (Fulgoromorpha, Achilidae) in France: first occurence and preliminary ecological observations in Massif des Maures (Var)

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Key words: Achilidae, ecology, France, trophic ecology, fungus

Cixidia (Epiptera) pilatoi D'Urso & Guglielmino, 1995 has been described from Italy. Since then it has been recorded in several countries in Europe, mainly in Central Europe.

Colonies of adults and nymphs were observed for the first time in France in natural habitats in 2013 during a survey for a scientific popularization program (Guide des Hémiptères editorial project, in French -in press-). It seems to be common in the Massif des Maures (Var Department, South East of France), in oak forests dominated by *Quercus suber* and *Quercus pubescens*, in mixed habitat with *Pinus* spp. and diverse understorey shrub trees. We found *Cixidia pilatoi* nymphs in small to large colonies during spring (March to May) in decaying wood colonized by fungus, under bark or close to litter, when the litter is also colonised by fungus in moist habitat. Relationships with ants also seems to occur and especially with carpenter ants (*Camponotus* sp.) and other species like *Lasius* sp. occuring in logs and branches where *Cixidia* is found. In laboratory conditions, the larvae collected with bark grow until the imaginal metamorphosis under high humidity conditions (75-95%), that allow fungi to maintain and continue their development. In natura and in the laboratory, it is difficult to demonstrate a direct trophic relationship between nymph and fungi. Nymphs are very sensitive to disturbance of the observer and they change their behavior.

This species is widespread in the Massif des Maures and in the south of France in general and could therefore become a model for understanding the trophic ecology of Achilidae. We plan to study the trophic ecology in cooperation with specialists of the fungal flora, to establish relationship between fungal biodiversity, ecological conditions and Achilidae biodiversity. We discuss whether this species, described from Italy is a cryptic species or a species that increases its range northward because of climate change and anthropogenic effects.

Acoustic diversity in Peloridiidae (Hemiptera: Coleorrhyncha) and its bearing on systematics

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Key words: Peloridiidae, vibrational signalling, systematics, Coleorrhyncha, moss bugs, speciation

Peloridiidae, the only extant family of the suborder Coleorrhyncha, use intraspecific vibrational communication. Until recently, these signals were only described for the Australian species *Hackeriella veitchi*. Here, we report the calls of two species from New Zealand and two from South America. Several more peloridiidae species were analysed that did not produce signals; possible reasons (suboptimal experimental setup; sexual differences in behaviour) are discussed. An overview of the recorded signals is given, hypotheses on their role and mechanisms of their production are presented. Temporal patterns and other features of the vibrational signals are valuable as characters for assessing the strength of reproductive barriers between sibling species, here shown for two South American representatives. Acoustic and behavioural characters also deliver possible apomorphies for New Zealand species as a monophyletic group within the family. Vibrational signaling is considered a characteristic trait of Peloridiidae and a plesiomorphic trait of the Hemiptera, since it is also widespread within other suborders (Cicadomorpha, Fulgoromorpha and Heteroptera).

SEM delivering characters for the systematics of Peloridiidae (Hemiptera: Coleorrhyncha)

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Key words: Peloridiidae, SEM, systematics, Coleorrhyncha, moss bugs, species, sensillae, tarsus, labium, plastron

Only few workers investigated bugs of the family Peloridiidae with methods of electron microscopy, probably due to technical difficulties emerging when dealing with the animals. Here, a wide array of peloridiid species from Australia, New Zealand and South America (each represented by several individuals) was used to access this underrepresented information source. Labial and antennal sensillae, tarsi, microscopic structures on the head, abdomen and tegmina were tested for intra- and interspecific variability. Nymphs of several species were analysed to uncover the ontogenetic development of the characters. Among newly described elements are: 1) pits surrounded (and often filled) by finger-like processes, interpreted as coeloconic sensillae; 2) sculptured dorsal surface of the abdomen combined with wax-like covering of the cuticle, interpreted as plastron-retaining structures. The new characters were found to provide a good source of information to distinguish between taxa. They also offer valuable clues for a cladistic analysis of the intrafamilial relationships and assessment of the position of Peloridiidae within the Hemiptera.

Hemiptera community and species responses to grassland sward islets

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Key words: *Javesella*, *Macrosteles*, Auchenorrhyncha, habitat usage

Grassland sward islets are patches of longer vegetation in pastures produced by a reduction in cattle grazing around dung patches. They are known to affect the abundance and distribution of grassland arthropods. Hemiptera, like other groups, are found in higher densities within islets than the surrounding sward. Does this modify the community composition or is there just a density effect? Evidence from a paired (islets, non-islet) study at an Irish cattle-grazed site, would suggest that although a change in the density of species explains much of the patterns observed, some species respond to islets in different ways. Grassland Auchenorrhyncha were dominated by two genera, *Javesella* (mostly *J. obscurella* and to a lesser extent *J. pellucida*) and *Macrosteles* (mostly *M. viridigriseus* with some *M. laevis* and *M. sexnotatus*). The nymphs and to a lesser extent the adults, showed contrasting distribution patterns in relation to islets. *Javesella* were more common in the islets, whereas *Macrosteles* showed little difference between the two sub-habitats. Possible reasons for the difference in sub-habitat choice between these two Auchenorrhyncha taxa are discussed.

Morphology and phylogeny of the true bug superfamily Pyrrhocoroidea (Heteroptera: Pentatomomorpha) – a preliminary report

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Key words: Heteroptera, Pyrrhocoroidea, morphology, phylogeny

The superfamily Pyrrhocoroidea contains 69 genera with 663 species in two families – Largidae (23 genera, 213 species) and Pyrrhocoridae (46 genera, 450 species). Both families were first recognized by Amyot & Serville (1843). Van Duzee (1916) treated Largidae as a subfamily of Pyrrhocoridae under the name Euryophthalminae, but a separate family status of Largidae was accepted by China (1954), Štys & Kerzhner (1975) and Henry (1988) on the basis of substantial differences in the female genitalia.

According to Henry (1997), Pyrrhocoroidea is closely related to Coreoidea, and more distantly to Lygaeoidea. A shared character of both Pyrrhocoridae and Largidae, distinguishing them from Coreoidea and Lygaeoidea, is the lack of ocelli. Laciniate ovipositor and mesally cleft abdominal sternum VII distinguish Largidae from Pyrrhocoridae with a plate-like ovipositor valvulae and complete abdominal sternum VII.

While Largidae is divided in two subfamilies and six tribes, Pyrrhocoridae currently does not contain any formal taxonomic groupings higher than genera. The Largidae is composed from the Neotropical Larginae and the Palaeotropical Physopeltinae. The main characteristics of Larginae are long and parallel parameres, surpassing ventral rim of pygophore. In Physopeltinae (except for Kmentiini) the parameres are apically obtuse and do not surpass the ventral rim of the pygophore. Pyrrhocoridae is distributed mainly in subtropical and tropical regions of the Old World, with only a very few species reaching into temperate regions. Only one genus (*Dysdercus*) occurs not only in the Old World, but also in the New World.

In our study, we will compare the details of various morphological structures, such as external structures of the metathoracic scent glands, trichobothria, male and female genitalia, pretarsal structures, and wing venation, in the currently recognized higher taxonomic groups and genera of Pyrrhocoroidea and selected taxa from its potential sister groups, Coreoidea and Lygaeoidea. We will analyse the morphological data recorded by cladistic methods with the aim to propose a first detailed hypothesis on the phylogenetic relationships within the Pyrrhocoroidea.

Sakis Drosopoulos - a life for biosystematic research

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Key words: Biosystematics, biography, obituary

Athanasios (Sakis) Drosopoulos, famous greek biosystematist and entomologist and founder of the “International Congresses concerning the Rhynchota Fauna of Balkan and adjacent regions” and its successor series, the “European Hemiptera Congresses”, passed away in March 2014 at the age of 69. We remember him, his life and research, in a pictorial review.

An obituary has been published by H. Hoch, M. Asche and M. F. Claridge in Entomologica Austriaca 22: 149-171 (2015).

Role of contrasting pattern in detectability of a cryptic seed bug *Rhyparochromus pini* (Heteroptera: Rhyparochromidae)

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Key words: camouflage, disruptive coloration, detectability, search image

Camouflage is an important strategy reducing the risk of attack from visually searching predators. The most frequent types of camouflage are background matching and disruptive coloration. Unlike the background matching, the latter involves contrasting pattern elements that increase the prey conspicuousness, but make its outlines hard to detect.

In this study we focused on the role of particular pattern elements and their arrangement on detectability of a seed bug *Rhyparochromus pini* for human 'predators'. The coloration of *R*. *pini* is generally cryptic in the shades of brown, but involves contrasting dark pattern with a large corial spot. We used photographs of live individuals with natural pattern and photographs on which the pattern was manipulated. The pattern was altered by 1) shifting the dark corial spot onto the edge (costal margin) of the forewing, 2) deleting the dark corial spot, and 3) deleting all contrasting pattern elements and creating thus monochromatic light brown coloration. Photographs were taken from two different distances, 10 and 20 cm, on four natural backgrounds. The photographs were presented on a computer touch-screen to human 'predators' and detection times were measured.

We found an effect of a viewing distance on the detection times. The time was longer when the bugs were viewed from 20 cm rather than from 10 cm. The pattern arrangement did not affect the detectability of bugs viewed from 20 cm. The detectability at this distance was influenced only by the bug's background, and the detection times decreased with order of presentation. For viewing distance 10 cm, the detection time was influenced by the interaction of the background and type of pattern arrangement. Detection times of pattern-less monochromatic bugs were longer than those of all the patterned bugs at most backgrounds. The only difference between the natural pattern arrangement and those with corial spots moved or deleted was that the detection times for the natural pattern became shorter with the order of presentation, whereas the detection times for the both manipulated patterns remained long. This suggests that the contrasting spots are important for the bug detectability only at closer distances, and their presence and position probably play a role in the formation of search image of the prey. Moving the corial spots to the body edge did not result in a disruptive effect.

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Contribution to the knowledge of biology and host plants of *Bactericera trigonica* Hodkinson, 1981 (Psylloidea, Triozidae)

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Key words: jumping plant-lice, psyllids, *Bactericera nigricornis* complex, carrot, Serbia

In literature, *Bactericera trigonica* is referred to as a polyphagous pest preferring carrot. Besides the direct damage on plants, it has also been confirmed to be a vector of '*Candidatus* Liberibacter solanacearum' on celery in Spain. It is distributed in a large number of European countries, North Africa and Asia Minor. Together with two other morphologically and biologically very similar species*, B. nigricornis* and *B. tremblayi*, it belongs to the *B. nigricornis* complex, referred to as polyphagous on herbaceous plants from the families Alliaceae, Brassicaceae, Solanaceae, Apiaceae and Chenopodiaceae.

B. trigonica was registered in 2014 for the first time in Serbia, on *Daucus carota* in several localities. To reveal its biology and host plant range, field and laboratory studies were carried out in the period June 2014 – March 2015. Adults of *B. trigonica* were collected by hand aspirator or sweep net, in five localities in Serbia: Trebešinje (Vranje district), Begeč, Bački Brestovac, Gospođinci (Bačka district) and Ilinci (Srem district). The samples from field were collected every two weeks from the beginning of June until the end of August 2014. Biology of *B. trigonica* was studied in laboratory and natural conditions, during winter in glasshouse. The number of generations and the duration of development per stage were observed. For a test of host plant range plants from the families Alliaceae (onion (*Allium cepa*), garlic (*A. sativum*), leek (*A. porrum*)), Apiaceae (celery (*Apium graveolens*), parsnip (*Pastinaca sativa*), carrot (*Daucus carota*), parsley (*Petroselinum crispum*)), Asteraceae (ambrosia (*Ambrosia artemisiofolia*)), Brassicaceae (cabbage (*Brassca oleracea*)) and Solanaceae (paprika (*Capsicum annuum*), eggplant (*Solanum melongena*)), were taken. Single plants were planted in a pot covered with transparent cloth. Two adult females and four males of *B. trigonica* were released into these covered plants to test if they accept these plants as food.

According to these researches, we have determined that among tested plants, *B. trigonica* develops only on the plants from family Apiaceae. Under favourable conditions, *B. trigonica* develops throughout all year. It developed 4 generations per year. It successfully overwintered on isolated plants from family Apiaceae in a glasshouse, but it remained unknown when and where it overwinters under natural conditions.

Parasitoids of jumping plant-lice (Hemiptera: Psylloidea) in Serbia

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Key words: Sternorrhyncha, psyllids, natural enemies, Hymenoptera

Data on parasitoids of jumping plant lice are scarce and largely refer only to economically significant pests (e.g. *Cacopsylla pyri*, *Diaphorina citri*, *Trioza erytreae*). Within intensive research on jumping plant lice in Serbia in 2005 – 2014, the aim of which was to determine the diversity of jumping plant lice's parasitoids in the country, their trophic relationships and natural potential for biological control of economically significant species.

Mummified nymphs and adults of jumping plant lice were collected together with plant material and reared in laboratory until parasitoid adult eclosion. From 33 jumping plant louse species, 40 parasitoid species were reared and identified. All reared species belonged to Hymenoptera from three superfamilies (Chalcidoidea, Ceraphronoidea and Cynipoidea) and six families (Aphelinidae, Encyrtidae, Eulophidae, Pteromalidae, Megaspilidae and Figitidae). The most numerous were Eulophidae with 17 reared species, followed by Encyrtidae (15 species), Aphelinidae and Pteromalidae (2 species each), Figitidae and Megaspilidae (1 species each). Among reared parasitoids, only one species (*Sectiliclava cleone* (Encyrtidae)) parasitized adult, while the other species were determined as parasitoids of nymphs*. Prionomitus mitratus* (Encyrtidae) was reared from eleven psyllid species mostly from genus *Cacopsylla,* while 24 parasitoid species are specific. The largest number of parasitoids was reared from pear jumping plant lice *Cacopsylla pyri* (11 species) and *C. bidens* (10 species).

The psyllids from the genus *Psyllopsis* Löw, 1879 (Hemiptera: Psylloidea) and their natural enemies in Serbia

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Key words: jumping plant-lice, ash, *Fraxinus*, parasitoids, predators

Psyllopsis is a small West Palaearctic genus classified in the Psylloidea: Liviidae. It includes ten species exclusively associated with various ash species (*Fraxinus* spp., Oleaceae). Seven species *P. discrepans*, *P. distinguenda*, *P. dobreanuae*, *P. fraxini*, *P. fraxinicola*, *P. machinosa*, and *P. meliphila* have been known from Europe while three species *P. narzykulovi*, *P. repens* and *P. securicola* are distributed in the Caucasus, Middle East and Central Asia. Three species (*P. discrepans, P. fraxini* and *P. fraxinicola*) have been introduced into North America, two (*P. fraxini* and *P. fraxinicola*) into Australia and New Zealandand one (*P. fraxinicola*) to temperate South America.

Psyllopsis spp. share a similar adult and larval morphology, all overwinter in the egg stage and have two (in some regions only one) generations per year. The larvae of *P. fraxinicola* and *P. meliphila* live freely on the underside of leaves while the other species produce leaf roll galls, each inhabited by several larvae. The galls are often colonised by various arthropods including predators.

A survey on the occurrence and distribution of jumping plant-lice on ash was carried out in the period 2005–2013 in Serbia. Six species were determined in 49 localities: *Psyllopsis discrepans, P. fraxini, P. fraxinicola, P. machinosa, P. meliphila* and *P. repens*. Predators and parasitoids of *Psyllopsis* spp. were studied at the same time. Five parasitoid species were reared: *Psyllaephagus procerus*, *Psyllaephagus smaragdinus*, *Syrphophagus taeniatus*, *Tamarixia pronomus* and *Pachyneuron muscarum* which is referred to as a hyperparasitoid. Seventeen predatory species were reared or collected, of which 11 species are insects, mainly Heteroptera: nine species from two families, Anthocoridae (*Anthocoris nemoralis*, *A. nemorum, Orius majusculus*, *O. minutus*, *O. niger* and Miridae (*Psallus assimilis*, *P. quercus*, *Deraeocoris lutescens* and *Pseudoloxops coccinea*). One species of Neuroptera, Chrysopidae (*Chrysopa* sp.) and two Coleoptera: Coccinellidae (*Adalia bipunctata* and *Harmonia axyridis*) were also observed predating on *Psyllopsis* spp., as well as five species of mites (Arachnida: Acari) from the families Phytoseiidae (*Euseius finlandicus*, *Amblyseius andersoni*, *Paraseiulus soleiger*), Trombidiidae (*Allothrombium* sp.) and Anystidae (*Anystis baccarum*).

Among six species determined in Serbia, the most distributed is *P. fraxinicola* which is registered in 42 localities, while *P. repens* is determined only in Belgrade area. The most diverse and numerous natural enemies were observed on *P. fraxinicola*.

Morphology of the representatives of the genus *Cinara* Curtis, 1835 (Aphididae: Lachninae) – a comparative study

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Key words: aphids, chaetotaxy, CPD, Eulachnini, morphology, SEM, Sternorrhyncha

The genus *Cinara* Curtis is the largest genus of aphids associated with conifer trees and shrubs from the families Pinaceae and Cupressaceae with 30species in Europe. Many *Cinara* species are regarded as serious pests and, in opposite to other Eulachnini, they can create large colonies, feeding mostly on roots, trunks, branches and twigs. The most characteristic features of all species of *Cinara* are the large body, the long and stiletto-shaped apical segment of the rostrum, and the siphunculi placed on large sclerites. The genus has been divided into three subgenera, which differ in body sclerotization and chaetotaxy. Scanning Electron Microscopy is one of the best methods for studies of external morphology of unmounted, small and delicate insects like aphids. Very little is known about the differences in morphological characters of aphids except for light microscopy data based on slides; however slide-mounting can destroy or disrupt important morphological structures on the aphid body.

We used SEM for the first time for a comparative morphological analysis of the most common European species belonging to all *Cinara* subgenera: *Cedrobium*, *Cupressobium* and *Cinara* s. str. One of the species studies, *Cinara* (*Cedrobium*) *laportei* (Remaudière), is characterized by remarkable differences in the number of antennal segments, body sclerotization, and the extraordinary shape of setae and thereby it appears as the most derived taxon within the genus. Characters differentiating the other species are the length and shape of the setae on the head, antennae, dorsum and legs, as well as the surface of dorsal cuticle and the shape and arrangement of wax filaments on body which could reveal important taxonomic information and phylogenetic signal.

Taxonomy and biology of the genus *Eulachnus* Del Guercio, 1909 (Aphididae: Lachninae)

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Key words: aphids, CO I, new species, *Pinus*, SEM, Sternorrhyncha, revision

The genus *Eulachnus* Del Guercio, 1909 (Hemiptera: Aphididae: Lachninae) is after *Cinara* Curtis, 1835 the most speciose of the European Eulachnini genera. European *Eulachnus* species are revised to include 10 species and 2 subspecies, using an integrative taxonomy approach based on morphological, molecular and biological traits. One new species and a permanent colour form of *E. brevipilosus* are described and three new synonyms are proposed Neotypes are designated for three species and lectotypes for another three species. The sexual morphs (oviparous female and alate male) of *E. brevipilosus* and the alate male of *E. tuberculostemmatus tuberculostemmatus* are described as well as fundatrices (stem mothers) of *E. tuberculostemmatus tuerculostemmatus*, *E. brevipilosus*, *E. cembrae* and *E. rileyi*. A new host plant – *P. cembra* – is reported for *E. brevipilosus*, as well as the first record of this species in the Czech Republic.

For the first time a comparative SEM analysis has been used to demonstrate differences among species groups in the European *Eulachnus* fauna. A first preliminary result on phylogenetic relationships among the most common *Eulachnus* species based on molecular markers is presented and discussed.

Additional Notes on Delphacidae, Tettigometridae and Cixidae fauna in East and Southeast Anatolia Region of Turkey

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Key words: Delphacidae, Tettigometridae, Cixidae, Turkey

This study was carried out to determine the Delphacidae, Tettigometridae and Cixiidae (Hemiptera) fauna in the East and Southeast Anatolia Region of Turkey in 2013-2014. In this region; we determined *Hyalesthes obsoletus* (Signoret), *Sogatella vibix* (Haupt, 1927), *Laodelphax striatella* (Fallen, 1826) in Elazığ location, *Laodelphax striatella* (Fallen, 1826), *Pentastiridius leporinus* (Linné, 1761), *Laodelphax striatella* (Fallen, 1826), *Tettigometra atra* (Hagenbach, 1825) and *Tettigometra macrocephala* Fieber,1865, in Siirt location, *Pentastiridius leporinus* (Linné, 1761), *Sogatella vibix* (Haupt, 1927), *Laodelphax striatella* (Fallen, 1826) and *Toya propinqua* (Fieber,1866) in Şırnak region of Turkey. These species were new records in these regions.

Evaluation of the Turkish Delphacidae Fauna

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Key words: Delphacidae, Turkey, fauna

The Delphacidae is an economically important family of Hemiptera because they cause damage on plants by feeding and as vector of plant disease. Turkey is an agricultural country and located in the intersection of three floristic regions, Circumboreal, Irano-Turanian, and Mediterranean. For these reasons, determination of delphacids is important both for pest control and biodiversity research of Turkey. In this study, the delphacid fauna of Turkey and the distribution of species within the country were evaluated by examining the published studies on delphacids up to date. As a result, it was determined that 62 species belonging to 34 genera of the family Delphacidae occur in Turkey. There are only few faunistic studies on delphacids in Turkey. Thus the real number species may be higher. This study is considered to summarize our present knowledge to determine needs for future research.

Taxonomic review of the genus *Capsus* Fabricius (Heteroptera: Miridae) from the Korean Peninsula

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Key words: Heteroptera, Miridae, taxonomy, Korea, plant bug

The genus *Capsus* Fabricius (Hemiptera: Heteroptera: Miridae: Mirinae) includes 24 extant species in the world, including 2 fossil taxa. The genus is generally known as being phytophagous, and most species use Poaceae (true grasses) as their host plant. Within the genus, 6 species are recorded in the Palaearctic Region and 3 species are known from the Korean Peninsula: *Capsus cinctus* (Kolenati, 1845), *C. pilifer* Remane, 1950, *C. wagneri* Remane, 1950. However, there are few taxonomic studies, and research has focused on *C. ater*, which is widely distributed in the Western Palaearctic Region. In this talk, a new species of the genus *Capsus* from the Korean Peninsula is presented, and the congeners *C. pilifer* and *C. wagneri* are taxonomically reviewed and compared with the new species. Photographs of the Korean species, illustrations of the male genitalia, and diagnoses based on main characters with a key to the Korean species are provided.

Species richness of Auchenorrhyncha in highway rest areas in Hungary

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Key words: road ecology, biodiversity, collecting methods

Plant-covered highway margins and rest areas provide suitable habitats for a number of invertebrate species, however, biodiversity of highway verges is poorly studied in literature. In our previous works we have shown that typically 30-40% of the Hungarian fauna can be found in highway verges in different arthropod taxa (e.g. orthoptera, heteroptera, araneae), but in some exceptional cases, like in scale insects or in bruchids, more than 60% of the species occur in these special habitats. In the present study, 33 sampling sites were investigated along Hungarian highways applying 4 different sampling methods in three different periods of the year. Altogether close to 10,000 Auchenorrhyncha individuals were collected and identified, and 200 species, approximately 37% of the Hungarian Auchenorrhyncha fauna, were shown to occur in highway rest areas. 130, 97, 57 and 40 species, respectively, were caught by sweep netting, suction sampling, branch beating and pitfall trapping, but we have to notice that the sampling efforts by different methods were not comparable. The dominant species by collecting methods were: sweep netting: *Philaenus spumarius* (20.3%), *Zyginidia pullula* (9.2%), *Euscelis incisus* (6.2%); suction sampling: *Z. pullula* (12.4%), *Anaceratagallia ribauti* (9.5%), *Graphocraerus ventralis* (9.4%), *Turrutus socialis* (9.4%); branch beating: *Opsius stactogalus* (44.0%), *Liguropia juniperi* (19.4%) , *P. spumarius* (9.5%); pitfall trapping: *Anoscopus serratulae* (33.3 %), *Aphrodes bicincta* (20.1 %), *Doratura homophyla* (12.0 %). Within the framework of the project three species (*Liguropia juniperi*, *Opsius smaragdinus*, *Tamaricella tamaricis*) were found for the first time in Hungary. *L. juniperi* was shown to be widespread in the country.

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Heteroptera of the Socotra Archipelago

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Key words: Heteroptera, taxonomy, biodiversity, zoogeography, ecology, endemism, Socotra

Socotra Archipelago is situated in the western part of the Arabian Sea and consists of the main Socotra Island (3,625 km^2), two smaller islands of Samha (41 km^2) and Darsa (10 km^2), and the more detached Abd el Kuri (133 km^2) which lies about 100 km southwest of the main island. All four islands are closer to east Africa (232 km) than to the Arabian Peninsula (351 km). The archipelago is of continental origin in east Gondwana. Socotra lies within boundaries of the monsoonal precipitation regime and harbours diverse vegetation from coastal mangroves, salt-marshes and sand dunes through sparse bush, woodland and succulent vegetation on slopes of mid elevations to cloudy evergreen forests high in the Hagher Mts. (1200–1550 m a.s.l.). There are about 843 species of vascular plants, including 15 genera and 311 species (i.e. 37%) regarded as endemic.

Until recently 60 species of Heteroptera were recorded from the Socotra Island, classified in 51 genera and 22 families. Of this number, 1 genus (Socantestia) and 18 species (i.e. 30%) were considered endemic. Based on the recently acquired material, the knowledge of Heteroptera of Socotra Archipelago has substantially increased. We currently register 196 species in 153 genera and 31 families, with high proportion of endemics – 10 genera and 57 species (i.e. 29%).

Among the plant feeding Miridae and Tingidae the endemism reaches 52%. First data on host plants of the phytophagous Heteroptera are given; some species seem polyphagous, but some of the endemic Tingidae and Miridae were found to be associated with a single endemic plant taxon. First cases of probable adaptive radiations are documented in Miridae (e.g. *Volumnus* – 3 endemics, Orthotylinae gen. & sp. nov. – 3 endemics) and Tingidae (*Cysteochila* – 2 endemics on *Cissus*). From a zoogeographical point of view, most of the collected taxa represent the following elements: Eremian (Saharo-Sindian) element, followed by the Afrotropical (mainly in mountain forests) and Mediterranean (mostly in coastal regions); minority of species has relations to Indian fauna.

Heteroptera communities of dry meadows in Southern Styria (Austria)

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Key words: Mesobromion, characteristic species, site management, biodiversity indicators

Mesobromions are known to be regional centers of biodiversity and are protected by the conservational legislation of the European Union.

Despite a severe decline in surface area, a relatively high density of this habitat type can still be found in Southern Styria. Heteroptera communities of these dry meadows were studied in summer 2013. Eleven Mesobromions and one species-rich mesic meadow were sampled four times with a suction sampler. Altogether, 2581 bugs from 105 species were recorded; 103 of them being open-land species and two forest species.

Three species *(Tinicephalus hortulanus, Omphalonotus quadriguttatus* and *Scolopostethus lethierryi)* were recorded for the first time from Styria.

Differences in incidence and abundance between the sites were high, ranging from 10 to 40 species and 34 to 1042 individuals. At least one of the totally 22 red list species were recorded in each sample site.

The eight actually endangered species however, were restricted to five Mesobromions. Intra- and extrapolation of species richness predicted undetected species for all sites. Suction sampling was observed to noticeably deviate within the sites, therefore placement of the device plays a crucial role on the results of sampling. Mesobromion sites reveal high heterogeneity with respect to high differences in dominance structure, species abundance and incidence. Correlation between species numbers and plant species number or surface area is absent. Differences between the coenoses are mostly influenced by species and individual richness, while other signals seem absent. Similar is observed using ecological information (ecological types, ecological guilds and habitat requirements). True bug densities are higher in pastures (n = 3) than in hay meadows (n = 8). Mesophilous open-land species are more frequent in pastures than in meadows. Significant differences between different management types according to the composition of ecological types were not observed, although grass dwellers and to some extent also edge species are less frequent in pastures. Consequently, differences between mown and grazed Mesobromions seem to be more influenced by quantitative than by qualitative traits. 32 species are identified as characteristic species for Styrian Mesobromions.

Diversity of symbiotic organs and bacterial endosymbionts of lygaeoid bugs (Hemiptera:Heteroptera: Lygaeoidea)

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Key words: FISH, Artheneidae, Blissidae, Geocoridae, Lygaeidae, Gammaproteobacteria

We present comparative data on the localization and identity of intracellular symbionts among the superfamily Lygaeoidea (Insecta: Hemiptera: Heteroptera: Pentatomomorpha). Six different lygaeoid species of the families Artheneidae, Blissidae, Geocoridae and Lygaeidae (sensu stricto; including the subfamilies Ischnorhynchinae, Lygaeinae and Orsillinae) were analyzed. Fluorescence *in situ* hybridization (FISH) revealed that all studied bugs possess paired bacteriomes that are differently shaped in the abdomen and harbor specific endosymbionts therein. The endosymbionts were also detected in female gonads and at the anterior poles of developing eggs, indicating vertical transmission of the endosymbionts via ovarial passage, in contrast to the posthatch symbiont transmission commonly found among pentatomoid bugs (Pentatomomorpha: Pentatomoidea). Phylogenetic analysis based on 16S rRNA and *groEL* genes showed that the endosymbionts of *Kleidocerys resedae*, *Chilacis typhae*, *Ischnodemus sabuleti*, *Henestaris halophilus*, *Arocatus longiceps*, *Belonochilus numenius*, *Orsillus depressus* and *Ortholomus punctipennis* constitute at least six distinct clades in the Gammaproteobacteria (Enterobacteriaceae). The diverse endosymbionts and the differently shaped bacteriomes may reflect independent evolutionary origins of the endosymbiotic systems among lygaeoid bugs.

Phylogenetic structuration along an altitudinal gradient in Papua New Guinea (Hemiptera; Fulgoromorpha)

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Key words: Cixiidae, Derbidae, altitudinal gradient, Papua New Guinea, phylogenetic structure

A first approach on how the communities of Auchenorrhyncha were structured was conducted by Dem (2011). Those first results were confirmed by Le Cesne (2013). The modification of the communities compositions, along the Mount Wilhelm's slopes, were observed. The involvement of biotic and abiotic factors was highlighted in order to explain the compositions changes along this altitudinal gradient.

From those preliminary observations, we would like to understand how throughout time the phylogenetic structuration of those hemipteran communities took shape and which factors were involved. Two main hypotheses can be advanced. 1) The diversification of the studied group is constrained by some environmental factors which limit its dispersion. It is then expected to see on the phylogeny, that taxa from the same altitude are more closely related to each other than they are to taxa found on different altitudes. 2) The interspecific competition is driving the evolution of the group, we can then expect that taxa, collected on the same altitude, will be scattered across the phylogeny.

Using molecular data, a phylogeny, for three fulgoromorphan families present on Mount Wilhelm, was built in order to test those hypotheses. If for the Achilidae nothing can be said since the number of specimens collected was not big enough, we can notice that the Cixiidae diversification was constrain by environmental factors while the interspecies competition was at the origin of the actual community structure of the Derbidae.

Responses of Auchenorrhyncha and Heteroptera communities to restoration of species-rich grasslands in the White Carpathians (Czech Republic)

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Key words: leafhoppers, planthoppers, true bugs, grassland restoration, central Europe

The White Carpathians (= Bílé Karpaty), a UNESCO Biosphere Reserve situated in the eastern part of the Czech Republic, harbours large areas of well-preserved semi-natural grasslands. Local hay meadows belong to the most-species rich plant communities in the world. During the second half of the 20th century many meadows and pastures were turned into arable land. Since 1980's there has been a growing effort to restore them through spontaneous succession and sowing of commercial (species-poor, containing several grass species) and regional (species-rich, composed of ca. 20–30 local herb and grass species) mixtures.

In two projects in 2012–2014, we surveyed insect communities including Auchenorrhyncha and Heteroptera in restored and original species-rich grasslands to assess their biodiversity and restoration success in newly re-created grasslands. Insects were collected with sweep netting (3 sampling dates/season) and vegetation and soil data were recorded.

In the first project, we compared 16 pairs of plots, each composed of a site of ex-arable land restored (5–13 years ago) with the regional species-rich seed mixture and the nearest patch of a well-preserved (original) species-rich grassland as a reference site. Both Auchenorrhyncha and Heteroptera assemblages in the restored sites did not significantly differ in their total number of species, individuals, and threatened species, as well as generalist/specialist ratio from the reference sites which suggests a rapid colonization of the restored grasslands. However, there was a significant difference in species composition of the assemblages between the two types of grasslands, reflecting a difference in the vegetation cover, associated with the occurrence of some xerothermophilous species and the absence of some specialized tall grass and dicotyledon herb feeders.

In the second project, we compared 17 sites of grasslands restored 8–25 years ago with different methods and well-preserved original grasslands as reference sites. Number of Auchenorrhyncha species and individuals did not significantly differ among all types of sites while the species richness and abundance of Heteroptera were lower in sites sown with regional species-rich mixture compared to other types of plots. Multivariate analysis of species data showed that both Auchenorrhyncha and Heteroptera assemblages of restored sites differed in their species composition from the reference sites.

Auchenorrhyncha communities in Czech mining and post-industrial sites – man-made deserts or oases for threatened biodiversity?

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Key words: leafhoppers, planthoppers, ecology, biodiversity conservation, anthropogenic sites, spontaneous succession

Anthropogenic sites such as quarries, open-cast mines, sand-, gravel- and clay pits, spoil heaps created by mining, ash and slag deposits, etc. represent common landforms in many European countries. Traditionally, such sites have been viewed negatively by ecologists and conservationists but an increasing number of studies have recently demonstrated their great potential for biodiversity conservation.

Within several projects in 2007–2013 investigating invertebrate communities in various types of mining and post-industrial sites and their response to restoration measures, Auchenorrhyncha material was collected in several regions of the Czech Republic. Despite the various nature and geographical situation of the sites studied, Auchenorrhyncha were always represented by large numbers of species and individuals, forming an important component of local invertebrate communities.

Auchenorrhyncha assemblages in mining and post-industrial sites were usually dominated by grass-feeding species. Especially fly ash deposits and sand pits with fine substrate and large proportions of bare ground were highly attractive for some species showing the "colonisation syndrome" (combination of traits such as polyphagy, macroptery and bivoltinism) and affinities to frequently disturbed sites or early successional stages of all kinds. On the other hand, in most localities and regions, we found a large proportion of species of conservation importance, representing specialists of dry grasslands, inland sand dunes, or riverine gravel beds, i.e. habitats which largely vanished from central European landscapes in the past century. At least for some of them (*Circulifer haematoceps*, *Ebarrius cognatus*, *Paralimnus rotundiceps*, *Pinumius areatus*, *Platymetopius guttatus*, *Pleargus pygmaeus*, *Psammotettix excisus*, *P. poecilus*, *Rhytistylus proceps*), quarries, sand pits, spoil dumps and fly ash deposits nowadays probably constitute major strongholds in the Czech Republic as these species are extremely rare or went extinct at natural sites. Also in mining and post-industrial sites, they are, however, threatened by technical reclamation, typically comprising covering the sites with fertile topsoil, sowing grass-herb mixtures and planting trees. Such technically reclaimed plots were generally shown inferior in conservation value for Auchenorrhyncha to plots left for spontaneous succession in our studies.

Biodiversity of jumping plant-lice (Psylloidea) on the island of Socotra

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Key words: Sternorrhyncha, psyllids, Yemen, taxonomy, distribution, host plants, endemism

The island of Socotra (Yemen) is located in the Indian Ocean close to the Horn of Africa and the southern tip of the Arabian Peninsula. It has been separated from the mainland for at least 15 million years. Its geomorphology, geology and climate are diverse and the habitats are generally weakly influenced by man. Socotra is well-known among biologists for its unique biodiversity and high proportion of endemic plant and animal species. However, due to its remoteness and the political instability of the Middle East, the fauna of the island is still incompletely known, in particular that of invertebrates.

The jumping plant-lice (Psylloidea) are such a previously neglected taxon in Socotra. Based largely on targeted collections of psyllids by the Czech expedition in 2012, 8 species from 5 families of Psylloidea are currently known from Socotra, including data on the host plants and immature stages at least for some of them.

The four species described by Malenovský & Burckhardt (2014), *Colposcenia dioscoridis*, *Diaphorina caliginosa*, *D. hagherensis* and *Pauropsylla jarmilarum*, as well as the two species recorded previously by Burckhardt & Mifsud (1998), *Diaphorina elegans* and *Diaphorina* sp., are currently known only from Socotra but their status as endemics is difficult to assess. While the psyllid fauna of the Arabian Peninsula is fairly well-known, that of East Africa definitely is not. A likely endemic is *Diaphorina elegans*, as its host plant is the endemic *Lycium sokotranum*. The species so far known only from Socotra are members of a palaeotropical genus confined to *Ficus* spp. (*Pauropsylla*) and species-rich genera *Colposcenia* and *Diaphorina* distributed mostly in arid regions of Africa, Asia and the Mediterranean. The former is associated with *Tamarix* spp., the latter with plants of at least 18 families belonging to 10 orders. The remaining two species recorded from Socotra represent widely distributed Afrotropical taxa (*Pseudophacopteron verrucifrons* on *Commiphora* spp. and *Cacopsylla* sp. on *Pittosporum viridiflorum*).

In comparison with the Psylloidea fauna of mainland Yemen (54 species; Burckhardt & van Harten, 2006), the Socotran fauna appears as species-poor but future collecting, particularly during different seasons may yield additional species.

Aphid fauna of Algeria (Sternorrhyncha: Aphidoidea)

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Key words: Aphids, diversity, faunistics, distribution, North Africa, Palaearctic region

Algeria is the largest country in Africa. It is known for its climatic and floristic diversity. Like most other groups of insects in Algeria, aphids remain poorly studied and were subject of only few works, which is especially true for those species associated with natural ecosystems. Previous surveys started in 1990s identified about 150 species of aphids in Algeria. This new study has been intended to explore other areas and habitats of the country to enrich this list. Recent collections have documented the presence of 30 additional species, bringing the number of aphids known from Algeria to 180. Of these, 20 species are newly recorded also for the Maghreb and North Africa. The Algerian aphid fauna is similar to that of Europe and is very different from the sub-Saharan Africa despite the geographical proximity of the latter region. Records of additional aphid species, however, can be expected in Algeria in future, probably resulting in a change of the general characteristics of the regional fauna.

Monitoring flat bugs (Heteroptera: Aradidae) as indicators of natural forest development in a European beech forest reserve

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Key words: European Beech forest, monitoring, natural forest development, indicators

The German Kellerwald-Edersee National Park (NLPKWE) is located in the center of the European beech distribution range. 97% of the 57.4 km² area is covered by forest with more than 91% free of any human activity. Natural forest development processes have to be monitored by suitable indicator organisms. In the present study, flat bugs (Heteroptera: Aradidae), characterized by a highly adapted, prevalently subcorticolous and mycetophagous lifestyle associated with dead wood, were chosen for observation.

Time-standardized sampling including targeted search mainly by hand on dead wood in the years 2012-2014 at 412 sites. Additionally, selected habitat parameters were documented.

Flat bugs were recorded on 27.7% (n=114) of the sites. Eight species and 734 specimens were registered, with three species categorized as endangered according to Germany's Red List. Apart from *Aradus cinnamomeus*, which feeds on the phloem of pine, all species feed on fungi infesting dead wood. *Aneurus laevis*, *Aradus betulae*, *A. depressus* and *A. serbicus* were rarely found. *Aradus betulae* was only recorded at nighttime, *A. serbicus* only by a single eclector trap. *Aneurus avenius* (n=134 specimens*), Aradus betulinus* (n=281) and *A. conspicuus* (n=263) were recorded abundantly and consistently across sites. All of the species display distinct ecological niches regarding habitats and biotopes. *Aradus conspicuus* represents an indicator species of naturally occurring and developing deciduous forest stands, while *A. betulinus* acts as an indicator species for non-indigenous spruce stands.

In comparison to numerous Central European forest areas, the flat bug species diversity of NLPKWE is high. Preliminary evaluation reveals specific preferences in terms of site selection, tree species, type, dimension, decomposition grade and humidity of dead wood, shadowing by trees and occurrence of fruiting bodies of fungi. *Aradus betulinus* and *A. conspicuus* are capable of colonizing new ecological niches comparatively quickly.

The study demonstrates that flat bugs are suitable organisms for monitoring purposes. Future monitoring is intended to reveal the spatio-temporal dynamics as well as the factors which are essentially driving the occurrence and ecological adaptations of flat bugs. One major target is the derivation of recommendations for sustainable forestry to promote the biodiversity of saproxylic forest dwellers.

The preabdominal cyclopean vibration-receptor in typhlocybine leafhoppers: A re-discovery, a re-interpretation and its evolutionary implications (Hemiptera: Tymbalia: Cicadellidae)

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Key words: Typhlocybinae, Vondráček, sound producing organ, vibrational communication

Vibrational signals in leafhoppers play a crucial role in their intraspecific communication. For some decades this fact is well known and documented but still little is known about the mechanism in producing and, especially, receiving vibrational signals. The Swedish Entomologist Frej Ossiannilsson published in 1949 the fundamental work 'Insect Drummers' describing not only songs but also anatomical details of the sound producing organ of several Auchenorrhyncha (Hemiptera) species. Not aware of Ossiannilsson's work until publication the Czech Hemipterist Karel Vondráček was publishing in the same year an article on the sound producing apparatus in a typhlocybine leafhopper (*Ribautiana ulmi*). Unfortunately Vondráček's excellent work was written mainly in Czech, appeared in a local journal and has obviously never been noticed by other specialists until now.

Most notably, Vondráček not only described the sound producing apparatus, but also identified a 'hearing organ' in the abdomen. Regrettably, this was his only publication on this topic, although he announced further studies in his paper. Posthumously, we are going to present his findings and try a functional interpretation in the frame of up-to-date morphological methods such as microCT imaging and 3D reconstructions. Additionally, we will discuss the implications for the understanding of vibration reception (and 'hearing') and its evolution in the Tymbalia.

Taxonomic review of the genus *Arboridia* Zachvatkin (Auchenorrhyncha: Cicadellidae: Typhlocybinae) in Korea

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Key words: Hemiptera, Cicadellidae, Typhlocybinae, *Arboridia*, grape pest

Leafhoppers are one of the important insect pests on various crops including grapevines. Among them, the genus *Arboridia* Zachvatkin, 1946 (Hemiptera: Auchenorrhyncha: Cicadellidae: Typhlocybinae) was known as insect pests against grape farming in Korea. Seventy species of the genus were described in the world, and eleven species were recorded in the Korean Peninsula so far, which are: *Arboridia agrillacea*, *A*. *apicalis*, *A*. *kakogawana*, *A*. *koreacola*, *A*. *koreana, A*. *lunula*, *A*. *maculifrons*, *A*. *okamotonis*, *A*. *septempunctata*, *A*. *silvarum*, *A*. *suzukii*. Among them, *A*. *apicalis*, *A*. *kakogawana*, *A*. *maculifrons*, *A*. *suzukii*, *A*. *septempunctata* have been known as important insect pests on grapes from Korea. In this study, we provide taxonomic review of the genus *Arboridia* Zachvatkin in Korea, and we also present differential diagnoses of the *Arboridia* species damaging on grapevines for the field of applied biology. Additionally, we also give a briefing on recent taxonomic works on the Korean Typhlocybinae including new taxa and new records with their biological information.

Additional Notes on Cicadellidae (Auchenorrhyncha) fauna in Iraq and Syria border (Silopi, Cizre/Şırnak province) in Turkey

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Key words: Cicadellidae, Fauna, Cotton, Maize, Şırnak, Turkey

This study was carried out to determine the Cicadellidae (Hemiptera) fauna in Şırnak province of Turkey in 2014. The samples were collected by light traps in cotton and maize fields. In these the species *Orosius orientalis* (Matsumura), *Psammotettix striatus* (Linnaeus, 1758), *Euscelidius variegatus* (Kirschbaum, 1858), *Asymettrasca decedens* (Paoli), *Empoasca decipiens* were determined on cotton field in Cizre locality. The species *E. variegatus*, *Exitianus capicola* (Stal, 1855), *A. decedens, E. decipiens* and *Agallia* sp. were found in cotton field in Silopi locality, *E. capicola, Psammotettix alienus* (Dahlbom, 1850), *P. striatus* on maize field in Cizre province, *P. striatus, E. capicola, P. alienus* on maize field in Silopi fields . Among these species; *Orosius orientalis* and *P. alienus* are important vectors of many viruses and phytoplasmas.

New data on early spring Auchenorrhyncha species in *Bozdağ Montain (Turkey)*

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Key words: Auchenorrhyncha, Fulgoromorpha, Cicadomorpha, Bozdağ Mt., Turkey

Results on early spring Auchenorrhyncha species from a joint Turkish-Bulgarian expedition, held in April 2014 are presented. The *Bozdağ* Mountain is located in several provinces - Izmir, Manisa and Aydin of western Anatolia, which implies great biodiversity. Data on Auchenorrhyncha from this area is scarce. This study is the beginning of a large-scale study of the mountain. As a result more than 40 species of the families *Cixiidae, Delphacidae, Issidae, Caliscelidae, Tettigometridae, Aphrophoridae, Cercopidae and Cicadellidae* were established. This study was partly supported by the National Museum of Natural History, Sofia. We are very grateful to our colleagues Rostislav Bekchiev, Sinan Anlaş, Ersen Aydın Yağmur and Semih Örgel for the opportunuty to collect the materials.

Contributions to the Cicadellidae (Hemiptera) fauna in Elazığ province of Turkey

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Key words: Cicadellidae, fauna, Elazığ, Turkey

In this study, 643 samples of Cicadellidae specimen were collected between 2013-2014 in Elazığ region in east Anatolia, Turkey. The specimens were collected by light traps method. 22 species are found to be distributed in this region. These species are: *Alebra albostriella* (Fallen, 1826), *Circulifer haematoceps* (Mulsant & Rey, 1855), *Cicadula frontalis* (Herrich-Schäffer, 1835), *Balclutha confluens* (Rey, 1894), *Euscelis alsius* Ribaut, 1952, *Euscelidius schenckii* (Kirschbaum, 1868), *Dryodurgades anatolicus* (Dlabola, 1957), *Edwardsiana rosae* (Linnaeus, 1758), *Edwardsiana avellanae* (Edwards, 1888), *Neoaliturus fenestratus* (Herrich-Schäffer, 1834), *Platymetopius filigranus* (Scott, 1876), *Platymetopius rostratus* (Herrich-Schäffer, 1834), *Platymetopius guttatus* (Fieber, 1869), *Psammotettix pallidinervis* (Dahlbom, 1850), *Psammotettix provincialis* (Ribaut, 1925), *Psammotettix striatus* (Linnaeus,1758), *Ribautiana tenerrima* (Herrich-Schäffer, 1834), *Zyginiella pulchra* Löw, 1885, *Zygina flammigera* (Fourcroy, 1785), *Zygina rhamni* Ferrrari, 1882*, Empoasca decipiens* Paoli, 1930 and *Eupteryx cypria* (Ribaut, 1948). Among these species, *Psammotettix pallidinervis* (Dahlbom, 1850) is a new record for Turkey.

Redescription of *Merocoris (Merocoris) bergi* Mayr (Heteroptera: Meropachyinae) from Argentina

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Key words: *Merocoris*, coreids, distributions, *M. bergi*, Argentina

Knowledge on the South American fauna of coreids is poor; Argentina lies in the Neotropical Region and covers an area of almost 2,800,000 km^2. Approximately 75% of the country is occupied by arid and semiarid areas, but rainforests also occur in the northeast. Members of the family Coreidae are heavy-bodied insects, usually strongly elongate or broadly elliptical known as "leaf-footed bugs". This family includes a total of 2,559 species worldwide, assigned to 436 genera, of which 125 species in 48 genera were recorded in Argentina. Body length ranges from 7 to 45 mm; color is variable; posterior femur thickened; some species are also characterized by sheet-like projections on the hind tibia; the third antennal segment often shows a similar foliation. The subfamily Meropachyinae Stål, tribe Merocorini Stål, genus *Merocoris* includes eight species in the Neotropical region, of which three occur in Argentina, i.e. *M.* (*M*) *bergi* Mayr, *M.* (*M*) *elevatus* (Spinola) and *M.* (*M*) *tristis* Perty. Available descriptions of these species are brief and outdated. In this work we provide a new description of *M.* (*M*) *bergi* based on material collected in La Pampa (S 36º 38.69 W 64º 14.54), central Argentina, and material housed in the Museo de La Plata (MLP), Argentina. A total of five specimens were collected. Photographs were taken with a digital camera (KODAK easyshare 4X WIDE). The new material collected is added to the collection of the Museo de La Plata. *M* (*M*) *bergi* is characterized by abundant hairiness, grayish coloration, thickened femurs and curved tibias. Adult specimens and genitalia of *M* (*M*) *bergi* are redescribed. The gepgraphical range of the species is expanded.

Ultrastructure of stridulatory structures in some aquatic Heteroptera of the Western Ghats, India (Heteroptera: Nepomorpha)

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Key words: *Anisops*, Notonectidae, stridulatory comb, rostral prong

Sound production by stridulation of aquatic bugs has been studied in detail for many years. It involves two components: a plectrum or a scraper and a pars stridens or a file. Stridulation is used for the production of a wide variety of calls such as courtship/mating calls, intra-specific communication, attraction of conspecifics and male-male antagonism. Aquatic bugs possess a variety of stridulatory structures, which are also considered to be taxonomically important. Though the mechanisms have been worked out, the microstructure of the participating structures is unknown for most of the species. Such structural details will be useful in acoustic studies and taxonomy. Therefore, here we present the scanning electron microscopy ultrastructure of the stridulatory structures (pars stridens and plectrum) in some species of the genus *Anisops* Spinola belonging to the family Notonectidae, collected in the Western Ghats of Maharashtra, India.

Since June 2013, we have collected six species of *Anisops*. Scanning electron microscopy images of the stridulatory comb (pars stridens) on the fore tibia of males of *Anisops* spp. reveal that the microstructure and orientation of the comb varies widely from species to species. It is apparent that the number/shape of the teeth of the comb is different in each species; the shape varying from triangular, broad and spatulate to curved and flattened teeth. The individual teeth of the comb also possess fine ridges. Among the different species, *A. campbelli* Brooks seems to possess a comparatively simple comb. The shape and length of the rostral prong (plectrum) of each species also vary widely. The rostral prongs possess an elevated ridge at midline along their length, which might be striking the teeth of the stridulatory comb when the tibia comes in contact with the prong. We intend to carry out a similar study for the species of the family Corixidae, in which both males and females are reported to possess a peg field on the fore femur for stridulation.

Brachycaudus divaricatae in central Europe: invasive or naturally spreading (Aphididae)?

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Key words: Aphididae, invasivity, distribution, Europe

Aphid species *Brachycaudus divaricatae* Shaposhnikov 1956, originally described from Turkmenistan and earlier known from the Middle East and Eastern Europe (Caucasus and Crimea) only, is a recent (starting from 2002) invader to Central Europe. It has already reached Estonia in the North, Bulgaria in the South and Denmark in the West. Central European populations differ from those of the native distribution area in their life cycle and host specificity mode – they are monoecious on cherry plum avoiding migration to *Silene alba*. Shortening of life cycle due to early deposition of winter eggs in June is another specific feature of invasive populations of *B. divaricatae*. Despite the high invasiveness, *B. divaricatae* appeared to be highly monomorphic in its partial sequences of mitochondrial *COI* and nuclear *EF-1α* fragments analysed. The ranges of intraspecific pairwise sample divergences (K2P model) in this species (n = 155) were 0.08% (range 0.00 – 0.52) for *CO-I* (565 bp), and 0.02% (0.00 – 0.89) for *EF-1α* (471 bp) genes.

Incorporation of *B. divaricatae* into plum aphid guild of the eastern Baltic region of Europe is suggested to have a little (if any) negative effect on the local community due to the increase of the stability of the guild. Such an effect is explainable by the diversification of the guild structure (one more species incorporated in the food chain) and increased effectivity of the use of resources (cherry plum was underexplored before the arrival of the new aphid species). Originally, cherry plum was distributed in Central Asia and Near East, and also in submeridional and meridional zones of the South Eastern Europe; afterwards it was introduced to other regions of Europe for ornamental and fruit purposes. Nowadays, cherry plum is distributed widely in Europe, from South Karelia to Italy, and from Sub Caucasus Russia to the British Isles. Due to monophagy, *B*. *divaricatae* concentrates on the cherry plum, whilst native to Central Europe aphid species prefer domestic plums. From the viewpoint of horticulture, invasive populations of *B. divaricatae* might stabilise population dynamics of the local pest plum aphid species by creating an important additional resource for the local aphidophagous species. Therefore, it is suggested to be a naturally spreading, but not invasive species in the eastern Baltic region and possibly the entire Central Europe.

Feeding ecology of European shieldbugs (Pentatomoidea)

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Key words: Pentatomoidea, Diet breadth, Hostplant selection factors, Europe

Within the Pentatomoidea (Pentatomidae, Acanthosomatidae, Scutelleridae, Cydnidae, Plataspidae, Thyreocoridae) in Europe a wide range of plants are utilized as both breeding sites (hostplants) and feeding sites (foodplants). Here the utilization of hostplants only is considered. In most cases species of European Pentatomoidea are not strictly monophagous on a single plant species, although exceptions to this do exist. The majority of Pentatomoidea occurring in Europe can be considered monophagous on plant families, such as species of *Eurygaster* (Scutelleridae) which are monophagous on Poaceae. Where restriction to a single plant species occurs, this is usually at range margins or where no other plant species are available. Where additional plant families are utilized as hostplants they are likely to be structurally similar and are often in closely related plant families. Such flexibility can allow rapid expansion by utilization of different plant species at range margins by hostplant switching. In contrast some groups such as the Carpocorini (Pentatomidae) are highly polyphagous and capable of feeding and breeding on a variety of plants within several families.

Factors which will influence hostplant selection include plant structure and microstructure (including overall growth form, leaf shape and pubescence), plant species, flowering/seeding period, presence/absence of fruiting bodies (on male or female plants), habitat, geographic range of hostplants, egg mass shape, and aggregation mechanisms to maximize chance of breeding success. Within the Pentatomidae the zoophagous diet selection of the predatory Asopinae is considered with reference to factors for habitat selection in this group in relation to prey availability and abundance.

Cryptic alien species in the genus *Fulvius*: The case of *F. borgesi* vs. *F. imbecilis* (Miridae: Cylapinae), and clarification of the species of *Fulvius* present in Europe

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Key words: Miridae, *Fulvius*, taxonomy, cryptic species, alien species

With about 80 species in the world, *Fulvius* Stål, 1862 is the largest and widespread genus within the Cylapinae. It is currently divided into three groups: the *anthocoroides* group (31 species of Old World), the *bifenestratus* group (6 species from the Oriental region), and the *bisbistillatus* group (43 species of New World).

Recently, several alien *Fulvius* species have been unintentionally introduced in Europe: *F. anthocoroides* (Reuter, 1875), *F. carayoni* Pluot-Sigwalt & Cherot, 2013 (both from West Africa) and *F. subnitens* Poppius, 1909 (from Southeast Asia). One species of the *bisbistillatus* group, *Fulvius borgesi* Chérot, Ribes & Gorczyca 2006, was recently described from Azores Islands, and later reported from the Iberian Peninsula.

Several specimens of *Fulvius* species from Canary Islands were identified as *F. borgesi* by our team after the male genital structures were examined. The general appearance of some *Fulvius* species in the *bisbistillatus* group is extremely similar and can be distinguished only by studying male genitalia. These species are considered cryptic.

Recently, several *Fulvius* specimens from the northern part of the Iberian Peninsula have been identified on the basis of pictures uploaded onto biodiversity photograph websites. These pictures show the dorsal view of specimens labeled as *F. imbecilis* (Say, 1832). Unfortunately, *F. borgesi* and *F. imbecilis* are so similar that they cannot be easily separated on external appearance alone; therefore the identity of the online images, representing the only specimens determined as *F. imbecilis*, cannot be verified until male genitalia are examined.

The purpose of this poster is to provide diagnostic information to help with the identification of the following *Fulvius* species: *F. anthocoroides*, *F. carayoni*, *F. oxycarenoides* (belonging to *anthocoroides* group), *F. subnitens* (belonging to *bifenstratus* group), *F. borgesi* and *F. imbecilis* (belonging to *bisbistillatus* group). Dorsal habitus images, biometric information, illustrations of male genitalia, and an identification key are provided to help recognize the European species of this difficult group of plant bugs.

Four new species of *Paravelia* Breddin, 1898 from Brazil (Heteroptera: Veliidae)

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Key words: Neotropical Region, taxonomy, Veliinae

The genus *Paravelia* Breddin, 1898 (Heteroptera: Gerromorpha: Veliidae: Veliinae) currently comprises 59 valid species, all of them recorded in the Neotropical Region, except *P. taipiensis* (Chessman, 1926) described from the Eastern Pacific. Despite of the recent taxonomic studies on the genus, four additional new species from Brazil have been discovered. Two of the new species have been collected in bromeliads at the states of São Paulo and Santa Catarina, and share the general brownish color, and shape of the pubescence on anterior portion of pronotum, maculae on forewing, and posterior leg. They differ mainly by the shapes of male genital segment I and proctiger. The third species has been found in caves at the states of Rio Grande do Norte and Bahia, northeastern Brazil, and represents an interesting and hitherto unknown life habit for the genus. It differs from the congeners mainly by the presence of a distinct upward directed process at the apex of the pronotum. In addition, the new species also has small black denticles on the ventral region of head, prosternum, abdominal sternites III–IV, and male genital segment I. Males display a row of spines on hind femur and a pair of nodules on the posterior region of abdominal sternite VII, both features absent from females. The fourth species has been collected in the Brazilian Atlantic Forest, at the state of São Paulo. It can be separated from other species of the genus mainly by the body length (5.59–6.10 mm), dark brown color of body, anterior lobe of pronotum without pruinosity or pubescence, posterior angle of pronotum rounded, basal and apical maculae of forewing yellowish, absence of spines or teeth on the legs, absence of rounded punctations on abdominal sternites, absence of small black denticles on the body, and male without lobes or projections on abdominal sternite VII.

Does more really always necessarily mean more? The secret of the bed bug karyotype revealed

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Key words: *Cimex lectularius*, cytogenetics, flow cytometry, sex chromosomes, chromosome number variation, DNA content, Heteroptera, Cimicidae

Recently, our team has analysed the current chromosomal variability within European population of serious human ectoparasite *Cimex lectularius* Linnaeus, 1758 (Heteroptera: Cimicidae). The variation in number of fragments originating from sex chromosomes X is simply stunning. We presented many populations with the basic karyotype with two X chromosomes ($2n = 29,X_1X_2Y$) on the one hand and also one population with as much as 20 X chromosomes on the other hand. We found 12 distinct karyomorphs which differed each from other only in number of X chromosome fragments. But the mechanism of an origin and distribution of X chromosome fragments remained still unclear.

In our present study, we combined classical cytogenetic methods with the flow cytometry, which is one of the most commonly used methods in plant karyotype studies (surprisingly not frequent in zoology). Such unusual method fusion should bring us an explanation of what had happened with the X chromosome fragments during evolution. We analyzed karyotypes of more than 200 individuals from 40 localities in the Czech Republic using the basic cytogenetic approach. The identical individuals were then measured by the flow cytometry for nuclear DNA content. Subsequently we are able to compare volume of nuclear DNA among *C. lectularius* individuals with different karyomorphs or even compare whole populations from particular localities. An average amount of the nuclear DNA for individuals with basic karyotype is 2.097 pg for females and 2.017 pg for males, however, the differences between the highest and the lowest DNA amounts are really high: from 1.467 pg to 2.338 pg of DNA in females and from 1.516 pg to 2.262 pg DNA in males.

The DNA content of *C. lectularius* is presented for the first time and the connection with the chromosome number of the identical individual provide completely unique data set. This project was supported by the grants no. 277815/2015 of the Grant Agency of Charles University and of Ministry of Education, Youth and Sports of the Czech Republic no. SVV 260208/2015.

The participation of lysine decarboxylation in biochemical plant responses to infestation by aphids

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Key words: Sternorrhyncha, Aphididae, lysine decarboxylase, biochemical aphid-plant interactions

Lysine decarboxylase (LDC) plays a double role in plant metabolism. The enzyme participates in biodegradation of an important essential amino acid, lysine. On the other hand, LDC takes part in biosynthesis of cadaverine as a biomolecule involved in plant defense against pathogens. However, there are a few data in literature on LDC participation in biochemical plant responses induced by herbivorous insects. Our work was aimed on detection of changes in LDC activity within tissues of plants infested by *Sitobion avenae* F., *Rhopalosiphum padi* L. and *Acyrthosiphon pisum* Harris (Hemiptera: Sternorrhyncha: Aphididae).

Results showed that feeding of cereal aphids (*S. avenae* and *R. padi*) caused a decrease of LDC activity within winter triticale tissues after infestation. However, two weeks later the enzyme activity was induced but only within a more resistant cultivar. Strong induction of the enzyme activity was proved within tissues of less accepted maize and wheat cultivars, especially during the first week of *R. padi* infestation. Moreover, pea aphid (*A. pisum*) infestation increased the LDC activity in pea tissues just after the infestation and decreased later on.

Presented data suggest that LDC may play an important role in molecular plant defense towards the aphid attack, however, importance of this mechanism seems to be dependent on aphid species and their host-plant genotype as well as the duration of infestation.

Taxonomy and host-plant patterns of the potato pest *Russelliana solanicola* Tuthill (Hemiptera: Psylloidea)

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Key words: psyllids, vector of plant pathogens, polyphagy, Solanaceae, multivariate analysis, CAP

Psyllids or jumping plant-lice are generally monophagous or narrowly oligophagous on dicotyledonous plants. A few species are economically important, particularly those vectoring plant pathogens. One of these species is the Neotropical *Russelliana solanicola*, a pest on potatoes. During extensive field work in temperate South America specimens, morphologically similar to the holotype of *R. solanicola*, were collected on various plant species which, together with literature records, represent at least 46 species of 10 families. As polyphagy is very unusual in psyllids the possibility of a complex of several cryptic species had to be considered. For testing this hypothesis a multivariate analysis was performed which suggested that *R. solanicola* is indeed polyphagous. Among the plant records 12 species are confirmed with immatures as hosts and 24 are likely hosts whereas 10 seem improbable. The confirmed and likely hosts belong to the families Amaranthaceae, Asteraceae, Escalloniaceae and Solanaceae which are part of the monophyletic clade Caryophyllales and asterids, with one exception, i.e. *Citrus* (Rutaceae, rosids). *R. solanicola* is documented from central and western Argentina, Bolivia, Chile and Peru where it was mostly collected on native plants in natural habitats. The species was also collected in Brazil but on introduced or cultivated plants in man-made habitats. Specimens are also available from eastern Argentina and Uruguay but without information. This suggests that *R. solanicola* is native to the Andes and was introduced into eastern South America (eastern Argentina, Brazil, Uruguay).

Taxonomy and life history of Kermesidae species in Israel (Hemiptera: Coccoidea)

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Key words: scale insects, oak, taxonomy, life history, Israel

The Kermesidae family includes 10 genera with about 100 species of scale insects that are distributed in the Nearctic, Oriental and Palaearctic regions of the northern hemisphere. These species develop only on trees of the Fagaceae, mainly on oak (*Quercus* spp.). Nine species of Kermesidae, belonging to the genera *Kermes* Boitard and *Nidularia* Targioni Tozzetti, have been recorded from Israel. Some of these species were described only from the first-instar nymph or only from the post-reproductive female. Little information was available about the species' life histories. A taxonomic revision was undertaken in order to clarify the diversity of Kermesidae species in Israel. We established that there are six species, including the recovery of a new species of *Kermes*. Our findings indicate that the Kermesidae species in Israel are host-specific to *Quercus* spp. and they develop on *Q. calliprinos, Q. ithaburensis* or *Q. look*. Observations of the life histories and phenology of the kermesids in Israel reveal that all six species are univoltine and appear to be non-pestiferous to the local oak trees. Nine species of ants, found in association with the various Kermesidae species, were collected and identified. Parasitoid wasps that emerged from kermesid species in the present study belong to the Encyrtidae and Eulophidae.

Dictyopharidae planthoppers from Madagascar (Hemiptera: Fulgoromorpha) – paucity of knowledge or paucity of fauna?

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Key words: Dictyopharidae, Madagascar, fauna, biogeography

Dictyopharidae Spinola, 1839 is a moderately large family of planthoppers (Hemiptera: Fulgoroidea) with 167 genera and 739 species recorded (Bourgoin 2015). These planthoppers are gathered in two subfamilies: Dictyopharinae Spinola, 1839 – generally macropterous and usually with anteriorly prolonged head and distributed worldwide; and Orgeriinae Fieber, 1872 – brachypterous (flightless) and smaller, with thickened short tegmen and rounded body, distributed in the arid regions of the Holarctic.

Continental Sub-Saharan Africa hosts 104 known species of Dictyopharidae tribes: Aluntini, Capenini, Orthopagini, Nersiini, Hastini, and majority of 80 known species is placed within Dictyopharini.

Contrary, the Dictyopharidae of Madagascar are extremely scarce: – *Aluntia hova* Nast, 1949 (Aluntini) and *Zaputala bourgoini* Emeljanov, 2008 (Dictyopharini) were known so far. A few more taxa were found recently comprising another species of Aluntini, transferred together with *Aluntia hova* to the newly established genus (Song et al. in press), and two new genera of Dictyopharini.

The Dictyopharidae of Oriental Asia are also quite numerous and diversified, with 95 species reported of the tribes: Aluntini, Arjunini, Dictyopharini, Hastini, Nersini and Orthopagini, and with majority of species divided between Orthopagini (50 species) and Dictyopharini (25 species).

Then the reasons for extremely low diversity of Dictyopharidae in Madagascar claims for attention. Is it the taxonomic bias in collecting and elaborating the fauna?
Could be reasons of such an image in biological properties of Dictyopharidae? Maybe ecological factors are limiting dictyopharid diversity in Madagascar? Or it is biogeographical history of the island, resulting in paucity of Dictyopharidae in Madagascar? These questions are raised, but for the moment only a few hypotheses could be presented, urging for testing and verification.

Gynotraumatic insemination in Heteroptera: Review, origins, and function

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Key words: Cimicomorpha, traumatic insemination, evolution, function

Gynotraumatic insemination (G-TI) is a copulatory insemination during which the female is obligatorily injured. It is known to occur in Heteroptera: Cimicomorpha (evolved at least six times). It is combined with functionally altered or reduced spermatheca, newly evolved female paragenitalia, and it may co-occur with several kinds of analogous androtraumatic TI (*Coridromius bulbopeda* and Afrocimicinae). The phallus of species concerned is provided with a spike-like acus (A), or the male intromittent organ is formed by spike-like left paramere enclosing a membranous phallus (P). The spike is pushed through the wall of (1) female genital ways (endogenous G-TI) or (2) abdominal or metacoxal (Polyctenidae only) body wall (exogenous G-TI) through (2a) an unmodified integument (integumental G-TI) or (2b) ectodermal ectospermalège (spermalègial G-TI) often provided with a copulatory tube. The spermalège may be sinistral, central or dextral, paired or unpaired, situated on one or more abdominal segments, and dorsal or ventral. The ejaculation takes place in body cavity or in paragenitalia, usually in mesodermal mesospermalège.

G-TI occurs in some species of *Coridromius* (Miridae: Halticinae; 2b-P) and most Nabidae: Prostemmatinae (1-A). In the Cimicoidea, it evolved independently in Plokiophilidae (2a,b-A), Lyctocoridae (2b-A), Anthocoridae & Cimicidae (2a,b-P), and Polyctenidae (2a-P); it is only absent in Heissophilinae (Plokiophilidae) and Lasiochilidae. A shift from the abdominal to metathoracic site of insemination that occurred in the Polyctenidae is one of the few intertagmatic shifts known among insects. The likely candidates for occurrence of hard-to-detect endogenous G-TI are Dipsocoromorpha and many Miridae. As selective agents responsible for evolution of G-TI, the male/female conflict, sperm competition, and nutritive value of superfluous sperm were evoked. However, shortening and simplifying the copulation, a period during which the mating couple is particularly vulnerable, may also be interpreted in antipredatory terms.

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Antennal ultrastructures in Flatidae (Hemiptera: Fulgoromorpha) – a preliminary report

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Key words: Fulgoromorpha, Flatidae, antenna, ultrastructure

The Flatidae constitute one of the largest families within planthoppers (Fulgoromorpha, Hemiptera), distributed worldwide, with 1420 species and 297 genera. These phytophagous insects are highly diverse in terms of their colour and size (from 4.5 up to 32 mm), and are found on all continents, but are especially common in the tropics. They are divided into two subfamilies – Flatinae and Flatoidinae, and in most cases, can be easily distinguished from each other by the shape of the body – Flatinae hold their wings vertically, in contrast to Flatoidinae which place their wings horizontally. Flatinae are further divided into 13 tribes. About 20 species of Flatidae are regarded as serious pests of economically important crops such as coffee, tea, cacao, mango, citrus, apple and cherry. In Europe the only recognized pest is a native Nearctic species *Metcalfa pruinosa* (Say, 1830), firstly recorded in France in 1970.

The ultrastructure of Flatidae is only poorly known. The first paper was published by Bugnion & Popoff (1907) who studied the wax pores of *Flatida marginella* Olivier, 1791. A further contribution was made by Lucchi and collaborators who described the ultrastructures of wax pores, male and female genitalia, nymphs, eggs and egg-burster of *M. pruinosa*.

With respect to the ultrastructure of antennae, there are works referring to such families of Fulgoromorpha as Fulgoridae (Lewis & Marshall 1970), Tettigometridae (Bourgoin 1985), Meenoplidae and Kinnaridae (Bourgoin & Deiss 1994), Ricaniidae (Stroiński et al. 2011) and Tropiduchidae (Wang et al. 2012).

Our previous studiestogether with new data referring to almost all tribal representatives reveal a rich set of antennal characters, which might be useful in the establishment of a modern classification of Flatidae, including species, generic and tribal levels. Thus, the following characters have a potential value in taxonomic and phylogenetic analyses of Flatidae and Fulgoromorpha in general: placement of the antenna in respect to the compound eye; length ratio and the shape of the first and second antennal segments; types, structure and location of the sensillae and plate organs on the pedicel. The scanning electron microscopy (SEM) applied here is an advanced tool which enables a deeper understanding of the comparative morphology and ultrastructure of the family.

Diversity out of the blue – fossil Aleyrodomorpha (Hemiptera: Sternorrhyncha)

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Key words: whiteflies, Aleyrodidae, fossils, taxonomy, evolution, phylogeny

The earliest fossil record of Aleyrodomorpha comes from the Middle Jurassic of China. They appear out of the blue, and these fossils are surprisingly not very different from the more recent representatives of the group and can be placed in Aleyrodidae. Other fossils are reported from the Lower Cretaceous, Upper Cretaceous, Palaeogene and Neogene. Most of extinct whiteflies are known from fossil resins.

Aleyrodidae are currently subdivided in four subfamilies: the extinct Bernaeinae, and the extant taxa Udamoselinae, Aleurodicinae and Aleyrodinae. The Bernaeinae are reported from the Middle Jurassic to the Cretaceous/Palaeogene boundary of Asia (*Bernaea, Burmoselis, Heidea, Juleyrodes*). The fossil representatives of the Aleyrodinae were recorded first from the Lower Cretaceous Lebanese amber (*Baetylus*) and Eocene Baltic amber (a new genus under description). A single fossil of the extant genus *Aleurochiton* is reported from the Pliocene deposits of Germany. Aleurodicinae present much richer fossil record, comprising several genera from the Lower Cretaceous Lebanese amber: *Aretsaya*, *Gapenus*, *Milqartis*, *Shapashe* and *Yamis*. Also the earliest Eocene Oise amber entombed a number of Aleurodicinae genera, i.e. *Clodionus*, *Isaraselis*, *Lukotekia* and *Oisedicus*. Surprisingly, mid-Eocene Baltic amber inclusions revealed only a single genus of Aleurodicinae, i.e. *Paernis*. The other supposed member of the subfamily – '*Aleurodicus*' *burmiticus* Cockerell, 1919 from the mid-Cretaceous Burmese amber needs to be reexamined. The status of '*Aleyrodes*' *aculeatus* Menge, 1856 from Baltic amber is not clear. New materials from the Palaeogene are under examination revealing a high diversity of Aleyrodinae and Aleurodicinae. Fossil Udamoselinae were mentioned (alas not found by us yet!) from the Lower Cretaceous Lebanese amber, however, the status of group has been challenged.

Findings of fossil Aleyrodidae, very ancient ones, as well as younger fossils, have brought a couple of answers, but also raised new questions on evolutionary history, morphological disparity, taxonomic diversity, ecology and biogeography of whiteflies in the past.

Hemiptera in the collection of Museum of Amber Inclusions, University of Gdańsk, Poland

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Key words: Hemiptera, fossils, inclusions, amber, fossil resins, collection

The University of Gdańsk Museum of Amber Inclusions (MIB UG) was established as laboratory unit at Department of Invertebrate Zoology by UG Senate decision of 29 May 1998. Seventeen years on, the collection contains more than 14,000 zooinclusions. This is a great deal, considering that almost all the collection's items were donated by amber artists, researchers, students and other individuals who support the idea of the University of Gdańsk amber collection. The collection in vast majority covers inclusions in the Eocene Baltic amber, but also inclusions in other fossil resins, e.g. Miocene Dominican amber, as well as collection of fossil resins from all over the World. The exhibition –diorama of first life-size three-dimensional model of the amber forest covers 52 m^2. It presents the story of Baltic amber— from liquid resin, forming various kinds of traps which captured animals and plants, to inclusions. The specially designed displays present, in detail, 41 animal inclusions.

The Hemiptera inclusions are entombed in 454 lumps with 471 inclusions and syninclusions, covering almost all infraorders except Coleorrhyncha. The most numerous inclusions are aphids, encircling nearly ¼ of all hemipteran inclusions, a little less represented group are scale insects and coccids. Planthoppers, leafhoppers and true bugs are much less numerous, and whiteflies and psyllids are rare. It must be noted that such an image do not reflect the diversity of the Hemiptera in taphocoenoses, but taxonomic bias in collecting. Among 40 new species already described from the specimens preserved in the collection of MIB UG, 11 inclusions are holotypes or paratypes of various Hemiptera: *Glisachaemus jonasdamzeni* Szwedo, 2007 (Cixiidae); *Hoffeinsia foldii* Koteja, 2008 (Xylococcidae); *Loricula polonica* Popov et Herczek, 2008 (Microphysidae); *Paernis gregorius* Drohojowska et Szwedo, 2011 (Aleyrodidae); *Patollo natangorum* Szwedo et Stroinski, 2013 (Tropiduchidae); *Protodikraneura ferraria* Szwedo et Gębicki, 2008 (Cicadellidae); *Thionia douglundbergi* Stroiński et Szwedo, 2008 (Issidae); *Worskaito stenexi* Szwedo, 2008 (Dictyopharidae). The collection is growing with new specimens and a number of Hemiptera inclusions are under study. New species are going to be described from MIB UG collection, which enrich also the type material housed in the collection.

Monitoring populations of *Cacopsylla pruni* (Hemiptera: Psyllidae), a vector of European stone fruit yellows in Hungary

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Key words: Sternorrhyncha, psyllids, jumping plant-lice, phytoplasma, ESFY, apricot orchards, applied entomology

During the last decades, European stone fruit yellows (ESFY) caused by the phytoplasma '*Candidatus* Phytoplasma prunorum' has become a major concern in apricot growing areas in Hungary. A univoltine psyllid species*, Cacopsylla pruni* (Scopoli, 1763), has been reported as the vector of ESFY from Italy and other European countries. Only a limited amount of scientific data concerning the life cycle, migration and behaviour of *C. pruni* and other *Cacopsylla* species in Hungary has been at hand so far, and there has been only one survey available about *C. pruni* as the vector of '*Ca.* P. prunorum' in Hungary. *Cacopsylla pruni* is frequently found in the country, but it usually occurs in stone fruit orchards in low numbers of specimens. Researchers in Hungary have characterized the ESFY disease only in terms of plant pathology, but the significance of the vector has not been studied intensively yet.

A survey was conducted at six locations in Hungary with high ESFY incidence to confirm the presence of *C. pruni* in these areas, to determine the preferred host plants, and to obtain data on the seasonal activity of *C. pruni.* A further objective was to determine the infection rate of natural *C. pruni* populations with '*Ca.* P. prunorum'.

Insects were collected from March till end of June with the beating tray method. *C. pruni* was found throughout the whole period in all localities studied. The most psyllid specimens (mostly adults) were collected in April. The ratio of immatures increased till the end of May. Sex ratio varied in this period, with a substantial decrease of males in late spring.

Immatures of *C. pruni* were first detected on *P. spinosa* at the end of April, and later from other *Prunus* species. *Prunus spinosa* appeared to be the preferred host plant in Hungary compared to other *Prunus* spp. studied (*P. armeniaca, P. domestica*)*,* which is in agreement with previous records from other countries. Adults and immatures of *C. pruni* were collected more often on *Prunus* rootstocks than on the apricot varieties themselves.

Phytoplasma infection was detected with an ESFY-specific primer pair, a nested PCR and, in uncertain cases, with a real-time PCR protocol. The ratio of the ESFY infected psyllids was 14% in the overwintering adults and 10% in the immatures. The presence of the vector in all the investigated localities and the high infection rates reveal a high spread risk of '*Ca.* P. prunorum' by *C. pruni* in Hungary and the necessity of taking precautions by applying integrated pest management.

Review of the sexual generation in *Drepanosiphum* Koch, 1855 (Aphididae: Drepanosiphinae)

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Key words: aphids, Sternorrhyncha, maple, sexuales, taxonomy

The holarctic genus *Drepanosiphum* Koch comprises eight species trophically associated with plants from the genus *Acer* spp. (maple). Although the viviparous generations are generally well known, sexual morphs have never been properly described (*D. acerinum* (Walker), *D. aceris* Koch, *D. bragii* Gillette*, D. dixoni* Hille Ris Lambers*, D. oregonensis* Granovsky*, D. platanoidis* (Schrank)), have remained undescribed (*D. iranicum* Hille Ris Lambers) and even still unknown (*D. caucasicum* Dzibladze). As little is known about this generation of the genus *Drepanosiphum* (which some taxa are treated as pests of ornamental maples and their identification is important for devising control measures) the aim of the study is a review of the sexual generation. Oviparous females and males of *D. iranicum* are described and figured in detail. Poorly known sexuales of *D. acerinum, D. aceris, D. bragii, D. dixoni, D. oregonensis* and *D. platanoidis* are re-described and figured in detail. Biometric data for the oviparous females and males are reported and keys for the sexual generation of the studied taxa are provided. Notes on distribution, biology and host plants are presented.

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The identity of little-known aphid species *Periphyllus acerihabitans* Zhang and *P. viridis* Matsumura (Aphididae, Chaitophorinae)

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Key words: Sternorrhyncha, aphids, distribution, maple, taxonomy

The genus *Periphyllus* van der Hoeven belongs to the subfamily Chaitophorinae and consists of approximately 50 monoecious and holocyclic species associated with *Acer* spp. (maples). In East Asia 13 species have been recorded so far and among them *P. acerihabitans* Zhang is regarded as extremely rare and sporadic in occurrence, known only from one locality in China. The life cycle of this species is not known and only wingless and winged viviparous females have been briefly described.

During the field study *P. acerihabitans* has been collected from several localities in Matsuyama City, Ehime Prefecture, Japan to allow observations of the life cycle of this species which is presented here. In particular, viviparous generation is re-described and illustrated in detail, aestivating morph and oviparous female of the sexual generation are described. Notes on the distribution and host plants are presented as well as additional taxonomic data on the closely related *P. viridis* Matsumura are given.

Sexuales of aphids (Aphididae, Drepanosiphinae, Chaitophorinae) – the crucial generation

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Key words: Sternorrhyncha, phylogeny, reproductive system, taxonomy

Approximately 5,000 species of aphids (Hemiptera, Aphididae) have been described so far (Aphid Species File, Version 5.0/5.0, http://aphid.speciesfile.org/), all characterised by apomictic parthenogenesis (clonal or asexual reproduction), as the main or exclusive mode of reproduction. Aphids are among the organisms which exploit this way of reproduction (otherwise fairly rare in animals) to the highest extent. This adaptation leads to a higher population growth in a very short time and allows rapid niche exploitation in a changed habitat. Oviparous sexual reproduction, on the other hand, leads to the production of genetically recombined individuals and an array of new genotypic combinations each year. Furthermore, the eggs resulting from sexual reproduction, allow aphid populations to resist harsh winters. The switch between the parthenogenesis (viviparous females) and the sexual reproduction (sexuales – oviparous females and males) can be found in almost all aphid lineages. However, as the sexual generation occurs only for a short period of time (usually in autumn), sexuales, the key morphs in the life cycle of aphids, are either unknown or only briefly described for most species. Our poor knowledge in this respect can be attributed to the considerable rarity of the sexuales and difficulties in their collecting and identification.Despite this, the features of the sexuales could provide useful information for the aphid phylogeny which has not been analysed so far.

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A remarkable sampling machine for cereal Pentatomidae in Turkey: 70 years on

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Key words: Pentatomidae, historic sampling technique

This year is the 70th anniversary of a publication on a remarkable sampling and collection device for sun bugs (*Eurygaster* spp.) in cereal crops in Turkey. The machine was developed as a way of effectively removing the bugs from crops, where they were causing considerable damage. The machine was pushed through the crop by horse or donkey and the bugs combed out of the crop by revolving brushes. It was claimed that the machine could do the work of 50 people.

It would be interesting to know if any examples of this machine exist and indeed how widely the machine was used in Turkey.

Planthopper-Palm relationships: The case of the Sikaianini (Hemiptera: Fulgoroidea: Derbidae)

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Key words: Derbidae, Arecaceae, Auchenorrhyncha, host-plant relationship

Within planthoppers (Hemiptera, Fulgoromorpha), Derbidae is a worldwide distributed family that is mostly associated with monocots, and particularly palms – Arecaceae. Within Derbidae, the tribe Sikaianini Muir, 1917 comprises a few, but widely distributed taxa, in the Afrotropical (Sierra Leone, Ghana, Seychelles), Australasian (American Samoa, Fiji, New Caledonia, Queensland, Solomon Islands), Indo-Malayan (Philippines, Taiwan), Nearctic (Florida, Mississippi, Illinois, North Carolina, Delaware), and Neotropical (Saint Lucia) regions, with most of the genera and species recorded from the Philippines. This rather large distributional pattern not only questions the monophyly of the tribe and the relationships between its members, but also how this phytophagous group was able to evolve in so different regions and respectively adapt its diet to host-plants.

We present evidence that the Sikaianini are monophyletic and that the Zoraidini Muir, 1913 are their sister group. We also discuss host plant relationships of Derbidae. In more detail, we analyze for Sikaianini, their diet pattern and its evolution in time and space, particularly in relation with Arecaceae.

Introduction to the Meadow Spittlebug *Philaenus spumarius* (Hemiptera, Aphrophoridae)

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Key words: Hemiptera, Aphrophoridae, spittlebug, *Philaenus spumarius*, polymorphism, polyandry, population genetics

P. spumarius is a widespread Hemipteran insect, occurring in numerous terrestrial habitats in the Holarctic region. Since the nymphs produce spittle-like foam, it is called the meadow spittlebug. It is a well-known insect due to its many interesting aspects.

P. spumarius is generally exaggerated as being a noxious pest, because the nymphs and adults are extremely polyphagous and feed on the xylem sap of a great variety of plant species. As in the ecology, its genetic aspect is also very famous, because the adults exhibit a heritable colour/pattern polymorphism. There is a great geographic variation in the occurrence and frequency of the colour/pattern phenotypes which are associated with evolutionary influences. Some publications regarding *P. spumarius* have included several phylogenetic studies ranging from certain allozymes to recent mitochondrial DNA analyses. Moreover, the content of the froth produced during the nymphal stage has also received attention which is suggested as a chemical protective cover against harmful micro-organisms and predators. The metal content of the froth has also been debated as it may be an indicator of certain changing environmental conditions where the nymphs live. Finally, laboratory genetic crossing experiments with different colour phenotypes have revealed that the progeny of polyandrous females may be fathered by several males and this behaviour has been attributed as being a significant impact on the species evolutionary success for occupying many different geographic areas in the world. As a result, natural populations and also laboratory studies reveal that *P. spumarius* is a very good example for evolution in action.

An Introduction to the Helotrephidae

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Key words: Helotrephidae, diversity, morphology, natural history, distribution

Until the early 20th century the Helotrephidae were an almost unknown water bug family. The first species was described by Carl Stål in 1860. Today the Helotrephidae include about 180 described species distributed in the world's tropics and subtropics except Australasia. The highest species diversity is found in southern China, southeastern Asia, the Greater Sunda Islands, and the Philippines. The faunas of Africa, Madagascar, and South America are comparatively poor – or underexplored.

The "Hemispherical Backswimmers" are the sister group of the Pleidae, both of them together composing the Pleoidea. The most characteristic feature of Helotrephidae is the cephalonotum, a fused plate of head and pronotum. The forewings are elytraceous, veinless hemielytra, the hindwings are frequently reduced. Body size is small, often minute. Reduction of antennal and tarsal segments is frequent.

Helotrephidae inhabit a wide array of habitats, but most commonly slowly flowing streams. In contrast comparatively few genera inhabit stagnant water, e.g. lithotelms. As far as is currently known, Helotrephidae are predators. They take up oxygen via spiracles and the tracheal system from a ventral gas storage that is usually replenished from the water surface. Plastron respiration is supposed for a few benthic genera.

Molecular phylogeny of the tribe Paralimnini (Hemiptera, Cicadellidae, Deltocephalinae)

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The Paralimnini are one of most diverse tribes of leafhoppers, with 139 genera and 931 species described worldwide. They feed on the phloem sap of vascular plants, in particular grasses and sedges, and show varying degrees of host fidelity (Zahniser and Dietrich, 2008). Their phylogenetic relationships are not well understood. Here we represent the first molecular phylogeny of 36 species of 16 genera, based on two nuclear (18S rDNA and H3) and one mitochondrial marker (16S rDNA). Attempts to acquire CO1 sequence data have largely been unsuccessful. Preliminary results show that the investigated genera of Paralimnini are very similar at the nuclear level, indicating rather recent radiations. The mitochondrial marker is more variable and contributes significantly more to a phylogenetic resolution. However, based on single-gene phylogenies, nuclear and mitochondrial trees are controversial for some taxa, indicating interesting evolutionary pathways. Interestingly, the morphologically very similar genera are distantly related. According to our data the genera *Cosmotettix* and *Psammotettix* separate early from the remaining Paralimnini. An inclusion of more taxa, particularly from Africa and the New World, and a combination of molecular data with morphological data will help to clarify if major radiations of Paralimnini coincide with their evolution and geographical distribution in Eurasia.

Distribution Atlas of the Miridae (Hemiptera: Heteroptera) of the Netherlands

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Key words: Miridae, Netherlands, fauna

A distribution atlas of the 240 Dutch Miridae was recently published by the authors. Each species is treated on a separate page with text and diagrams; the text covers synonyms where applicable, references for identification, comments on general distribution, ecology, status in The Netherlands, and relevant publications. Various diagrams support the text. Two dot-maps show the geographical distribution in the Netherlands on a 5x5 square km grid, one showing records prior to 1980, the other records from 1980 onwards. A bar chart shows the seasonal distribution of adults, plotting the number of records for each 10-day period (three per month) through the year, for males and females. In addition, a distribution map covering the whole of Europe shows in which countries the species has been recorded.

Morphology and modification of the labial segments in the Fulgoromorpha with notes on the phylogenetic characteristics

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Key words: morphology, labium, Fulgoromorpha

Abstract: The labium of Fulgoroidea (Hemiptera: Euhemiptera: Fulgoromorpha) is strongly variable in its shape, but presents distinct patterns within families. Existing data have demonstrated the morphological heterogeneity of the external labial structures across a few different fulgormorphan groups. Patterns observed seems to be useful for resolving phylogenetic relationships among higher lineages of planthoppers. Examination of labial structures of 27 species of 13 planthoppers families obtained using SEM and light microscopy, allowed to review distinguished shapes and sizes of these elements. Several inconsistencies as well as several congruencies between previous descriptions of the external characters of the labium of the Fulgoroidea were revealed. Several new, internal and external morphological characters were identified.

Three morphologically distinct forms of the labium have been identified: three segmented (Cixiidae, Delphacidae, Meenoplidae, Derbidae, Tropiduchidae, Lophopidae, Flatidae, Ricaniidae, Issidae and Tettigometridae), four segmented (Nogodinidae and Dictyopharidae) and five segmented (Fulgoridae). Subsequent segments of the labium (I, II, III, and IV or V) are shaped similarly in all investigated taxa but carry individual characters in some families. Additionally, three various types of the division on the ventral side of the first and second segments are interpreted as the new characters. The first type is characterized by presence of small and narrow band of the membrane (Cixiidae, Delphacidae, Meenoplidae, Derbidae, Lophopidae, Nogodinidae and Flatidae). In the second type a thick, undulated layer of the membrane is visible in Ricaniidae, Issidae, Tropiduchidae and Tettigometridae. The third type: membranous connection reinforced by two lateral small sclerites, is treated as the most specialized and it is characteristic for Dictyopharidae and Fulgoridae.

The presence of the apodemal labial process on the distal edge of the first segment and connection with the head has been reanalysed. The evaluation of these characters has revealed characteristic homologies for the labium in Fulgoroidea in relation to the mandibulate insects.

A light, electron and confocal microscopic study of the forewing articulation among Sternorrhyncha

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Keywords: forewing articulation, SEM, CLSM, Sternorrhyncha

The forewing articulation among the representatives of the suborder Sternorrhyncha (Aphidomorpha, Aleyrodomorpha, Coccidomorpha, Psyllomorpha) is very poorly understood. Therefore, the aim of this study was to examine its structure to know the shape and the relations between axillary sclerites and it also was the first attempt to compare the wing base structure between Sternorrhyncha lineages. Figures obtained from scanning electron microscope showed the forewing articulation from the outside and revealed big differences in the number and appearance of those elements. The internal parts were shown using light microscope. This one revealed the shape and degree of sclerotization of each element and its position. On the basis of the axillary sclerites`s shapes of Sternorrhyncha representatives, obtained by using those microscopes, we cannot distinguish the specific sequence of those insect emergence. As a matter of the fact, there are four independent directions specific to each group.

Additionally used confocal microscope showed the forewing articulation in three-dimensions (3D). This method made it possible to show the exact shape and position of axillary sclerites in the wing membrane.

Preliminary morphological studies of mealybug nymphs (Coccoidea: Pseudococcidae)

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Species identification of scale insects is based almost entirely on morphological features of the adult females. Nymphs of many species of Pseudococcidae have not been studied intensively.

These studies are an attempt to recognize the taxonomic utility of morphological characters of pseudococcid nymphs.

The faunistic research was conducted in southern Poland between years 2012-2014. Adult females were collected with their progeny in the field. Microscope slides of the cuticule of females and nymphs were prepared.

Morphological features of immatures of some mealybug species occurring in Poland were studied. Immature stages of species belonging to two subfamilies of Pseudococcidae were examined. Nymphs of *Ceroputo pilosellae* Sulc, *Coccura comari* (Kunow) and *Rhodania porifera* Goux (subfamily Phenacoccinae), *Balanococcus boratynskii* Williams, *Metadenopus festucae* Sulc and species of *Trionymus* Berg (subfamily Pseudococcinae) were studied in detail.

Genus *Cicadivetta* of Greece: acoustics, morphology and distribution

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Keywords: Cicadas, speciation, Greece

At present there are known in Greece the following species of the genus *Cicadivetta: C. flaveola, C. carayoni, C. goumenissa* and at least two species from Peloponnese and Naxos island, which have yet to be described. Some of these species have very small distribution areas. Most of them have very complex, species specific songs. However, two morphologically clearly distinct species have very similar song patterns. This could be despite of differences in carrier frequency and behaviour a case of acoustic mimicry, worth to be further evaluated.

Phylogenetic Divergences of the True Bugs (Heteroptera), with Emphasis on the Aquatic Lineages

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Keywords: aquatic and semi-aquatic bugs; Heteroptera; divergence time; fossil calibration; paleoenvironment

Heteroptera are among the most diverse hemimetabolous insects. Heteroptera consists of more than 40,000 described species in approximately 89 families worldwide and is composed of seven infraorders. Apart from the well-established sister group relationship between Cimicomorpha and Pentatomomorpha (= Terheteroptera), i.e., the two terminal lineages, the relationships between the other five infraorders are still controversial. In particular, the basal positions of Enicocephalomorpha and Dipsocoromorpha have been challenged by some recent studies. Most members of the remaining three infraorders, (i.e., Gerromorpha, Nepomorpha, and Leptopodomorpha), are intimately connected to aquatic environments. However, the various and often conflicting available phylogeny hypotheses do not offer clear background for a connection between diversification and paleoenvironments. In this work, we used Bayesian inference (BI), maximum likelihood (ML), and maximum parsimony (MP) to infer the phylogeny of the seven infraorders of Heteroptera based on the complete sequences of two nrDNAs (18S rDNA and 28S rDNA) and all 13 protein coding genes (PCGs) in mitochondrial genomes. The results of phylogenetic inferences largely confirm the widely accepted phylogenetic context. Enicocephalomorpha together with Dipsocoromorpha formed a monophyletic group with high support values. This clade was strongly supported as the basal heteropteran lineage. The relationships among the remaining five infraorders are (Gerromorpha + (Nepomorpha + (Leptopodomorpha + (Cimicomorpha + Pentatomomorpha)))). Estimation of the divergence time based on the phylogenetic results revealed that Gerromorpha, Nepomorpha and Leptopodomorpha originated successively during the timespan from the late Permian to early Triassic (269–246 million years ago). Our results indicate that the aquatic and semi-aquatic true bugs evolved under environmental conditions of high air temperature and humidity in an evolutionary scenario similar to that of the aquatic holometabolans.

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