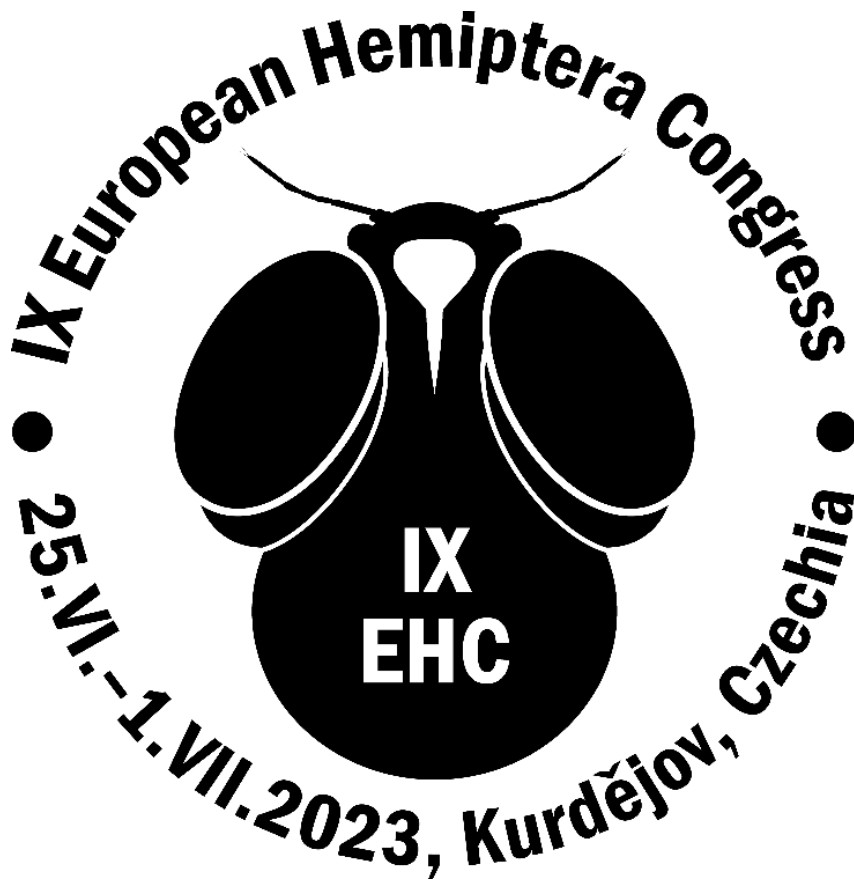


9TH EUROPEAN HEMIPTERA CONGRESS

Kurdějov, Czechia, 25.6.–1.7.2023

Book of abstracts



Editors:

Petr KMENT & Igor MALENOVSKÝ

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Department of Botany and Zoology, Faculty of Science, Masaryk University, Brno
Moravian Museum, Brno
National Museum of the Czech Republic, Prague

Congress venue: Hotel Kurdějov, Kurdějov, Czechia

Date: 25 June–1 July 2023

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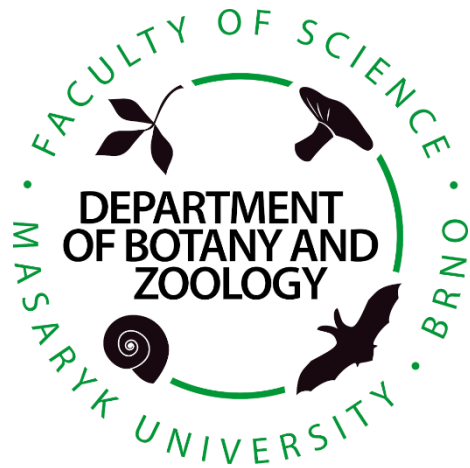
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NÁRODNÍ
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PROGRAMME OF THE 9TH EUROPEAN HEMIPTERA CONGRESS

(student presentations are marked by asterisk)

SUNDAY, 25 June 2023

14:00–19:00 Registration

19:00–21:00 Welcome drink, dinner

MONDAY, 26 June 2023

7:30–9:00 Breakfast

8:30–9:00 Registration

9:00–9:30 Opening ceremony

Session 1: Systematics of Hemiptera – integrating morphological and molecular data

(Chair: Werner Holzinger)

9:30–10:00 Daniel Burckhardt: The state-of-the-art of psyllid systematics

10:00–10:30 Thierry Bourgoin, Yang Luo, Manon Bucher, Jolanta Brozek, Adam Stroiński, Maxime Le Cesne & Birgit Löcker: Reassessment of the classification of Cixiidae based on their molecular phylogeny and morphological characters (Insecta, Hemiptera, Fulgoromorpha)

10:30–11:00 Vladimir M. Gnezdilov, Fedor V. Konstantinov, Valentina A. Panitsina & Semen Yu. Bodrov: Classification of the family Issidae (Hemiptera: Auchenorrhyncha): old story, new words

11:00–11:30 Coffee break

Session 2: Phylogeny and taxonomy of leafhoppers (Chair: Dmitry Dmitriev)

11:30–12:00 Yanghui Cao, Christopher H. Dietrich & Dmitry A. Dmitriev: Phylogeny of the treehopper-like leafhoppers (Hemiptera: Cicadellidae: Megophthalminae and Ulopinae)

12:00–12:30 Qingquan Xue & Yalin Zhang: Molecular phylogeny of the *Idiocerus* group (Hemiptera: Cicadellidae: Idiocerini)

12:30–14:30 Lunch

Session 3: Evolution and diversity of planthoppers (Chair: Jacek Szwedo)

14:30–15:00 *Manon Bucher, Fabien Condamine, Yang Luo, Menglin Wang & Thierry Bourgoin: Exploring the evolutionary history of planthoppers (Hemiptera: Fulgoromorpha) through their wide diversity with a large taxonomic sampling

15:00–15:30 *Maxime Le Cesne, Bernard Reynaud & Thierry Bourgoin: What phylogeny tells us on the subterranean planthoppers: the case of La Réunion island

15:30–16:00 Birgit Löcker & Werner E. Holzinger: The Cixiidae of Australia – a status report

16:00–16:30 Coffee break

Session 4: Exploring and databasing the diversity of Auchenorrhyncha (Chair: Thierry Bourgoin)

16:30–17:00 *Elisabeth Huber, Elisabeth Papenberg, Werner E. Holzinger & Gernot Kunz: New data on the Cixiidae diversity of Central and South America

17:00–17:30 Dmitry A. Dmitriev, Edith Blanco-Rodríguez, Oleg I. Borodin, Yang-Hui Cao, Christopher H. Dietrich & J. Adilson Pinedo-Escatel: TaxonWorks and TaxonPages as new platforms for managing the World Auchenorrhyncha Database

17:30–18:00 Gernot Kunz: iNaturalist – a modern tool for Auchenorrhynchoologists

19:00 Dinner

TUESDAY, 27 June 2023

7:30–9:00 Breakfast

Session 5: Evolution and taxonomy of true bugs (Chair: Attilio Carapezza)

- 9:30–10:00 Ondřej Balvín, Markéta Sasínková, Jana Křemenová, Tomáš Bartonička, Oliver Otti, Klaus Reinhardt, Christian Massimo, Jana Martinů, Masoud Nazarizadeh, Marek Jindra & Jan Štefka: Host associated differentiation and adaptation in the common bed bug (*Cimex lectularius*)
- 10:00–10:30 Viktor Hartung: Family Colobathristidae (Heteroptera: Lygaeoidea) – current state of research and perspectives
- 10:30–11:00 Petr Kment, David A. Rider, Marcos Roca-Cusachs, Salini S., Cristiano F. Schwertner & Gerry Cassis: Villain's family: progress in revision of *Halyomorpha* complex (Hemiptera: Heteroptera: Pentatomidae)
- 11:00–11:30 Coffee break

Section 6: Comparative morphology (Chair: Viktor Hartung)

- 11:30–12:00 *Anna Romaniak-Janusz, Jolanta Brożek & Adam Stroiński: In-depth morphological studies of chemoreceptive antennal sensilla in selected species of the Cixiidae and Delphacidae (Fulgoromorpha, Hemiptera)
- 12:00–12:30 Agnieszka Nowińska, Barbara Franielczyk-Pietura & Dan A. Polhemus: The leg sensilla of Nepomorpha – comparison of strictly aquatic and more riparian taxa (Corixidae, Ochteridae, Gelastocoridae: Nepomorpha: Hemiptera)
- 12:30–14:30 Lunch

Session 7: Biology and microbiome of Hemiptera (Chair: Petr Kment)

- 14:30–15:00 *Elizaveta Kvinikadze, Jernej Polajnar & Igor Malenovský: Vibrational communication in *Cacopsylla* spp. (Hemiptera: Psyllidae): mechanism and signal structure
- 15:00–15:30 Liliya Štarhová Serbina: Seasonal wild dance of dual-obligate symbionts in the pear psyllid *Cacopsylla pyricola* (Hemiptera: Psylloidea): Titters of symbionts tell different stories
- 15:30–16:00 *Šimon Zeman, Jan Votýpka & Jiří Skuhrovec: Wanted: Alive – Using citizen science to explore the diversity of trypanosomatids in invasive true bugs (Hemiptera: Heteroptera)

Session 8: Poster session

- 16:00–18:00 Poster session (with time for a cup of coffee; for list of posters see after Programme)
- 19:00 Dinner

WEDNESDAY, 28 June 2023

- 7:30–8:30 Breakfast
- 8:30 Bus transfer from the Kurdějov Hotel to the village of Pavlov
- 9:00–10:30 Visit of the "Archeopark Pavlov" museum on the prehistory of the site
- 10:30–16:00 Walk to the ruins of the Děvičky castle and Děvín hill with the possibility of collecting insects (up to 7 km)
- 16:30 Bus transfer to the Kurdějov hotel
- 19:00 Dinner

THURSDAY, 29 June 2023

7:30–9:00 Breakfast

Session 9: Psyllids all over the world (Chair: Daniel Burckhardt)

9:30–10:00 Dalva Luiz de Queiroz: Overview on adventive eucalypt psyllids in the world

10:00–10:30 *Monika Pramatarova, Igor Malenovský & Ilia Gjonov: Fauna of jumping plant-lice (Hemiptera: Psylloidea) in Bulgaria

10:30–11:00 *Diana Isabel Rendón-Mera & Daniel Burckhardt: A taxonomic revision of the jumping plant-louse genus *Leuronota* (Hemiptera: Psylloidea: Triozidae)

11:00–11:30 Coffee break

Session 10: Auchenorrhyncha of economic importance (Chair: Alvin Helden)

11:30–12:00 *Zoi N. Thanou, Anastasia P. Magklara, David Theodorou, Eleni V. Raidou, Giorgos Konidis, Georgia Stamatakou, Sofia Tribonia, Christos Liberopoulos & Antonios E. Tsagkarakis: Faunistic study of Auchenorrhyncha species in olive orchards in Greece

12:00–12:30 Sándor Koczor, Zsolt Galli & Miklós Tóth: Study of colour preference of *Scaphoideus titanus* (Hemiptera: Cicadellidae) and *Metcalfa pruinosa* (Hemiptera: Flatidae)

12:30–14:30 Lunch

Session 11: Community ecology and conservation biology (Chair: Verena Rösch)

14:30–15:00 Alvin Jonathan Helden: Auchenorrhyncha biodiversity and coexistence on rainforest trees in Kibale National Park, Uganda

15:00–15:30 Attila Torma, Balázs Deák, Nikolett Gallé-Szpisjak, Dávid Korányi, Tamás Lakatos, Brigitta Palotás, Katalin Szitár, Edina Török, András Báldi, Zoltán László, Jenő J. Purger, Dragica Purger, Gábor Seress, Krisztina Sándor, Béla Tóthmérész, István Urák, Róbert Gallé & Péter Batáry: Villages located in agglomeration zones of cities can still harbour species-rich true bug assemblages

15:30–16:00 Jelena Šeat, Csaba Tölgyesi & Attila Torma: The role of drainage canals in conservation of grassland true bugs (Heteroptera) in the Pannonian Region

16:00–16:30 Coffee break

16:30–17:00 *Martin Vašíček, Igor Malenovský, Ondřej Machač, Kryštof Chytrý & Jakub Těšitel: Response of Hemiptera (Auchenorrhyncha and Heteroptera) to experimental restoration of grasslands invaded by the expansive grass *Calamagrostis epigejos*

17:00–17:30 *Zdenko Večerík & Igor Malenovský: Succession of Auchenorrhyncha assemblages in abandoned military training areas

18:30 Dinner

20:00 Wine tasting

FRIDAY, 30 June 2023

7:30–9:00 Breakfast

Session 12: Fossil record of Hemiptera (Chair: Jolanta Brożek)

- 9:00–9:30 Jacek Szwedo: The bugs in a-gadda-da-vida – evolutionary paths, models and conundrums of the Hemiptera
- 9:30–10:00 *Beata Bieszczad & Jacek Szwedo: Hemiptera of the European Jurassic World – unique and informative
- 10:00–10:30 *Bartosz Ogłaza & Piotr Wegierek: Cretaceous aphids from the Far North
- 10:30–11:00 Jacek Szwedo & Błażej Bojarski: The first damsel bug (Heteroptera, Nabidae) from Eocene Lublin amber
- 11:00–11:30 Coffee break
- 11:30–12:30 Closing ceremony
- 12:30–14:00 Lunch
- 14:00–19:00 Visit of the fortified church in Kurdějov (in groups of 30 persons) walk to Kurdějov surroundings with the possibility of collecting

SATURDAY, 1 July 2023

- 7:30–9:00 Breakfast
Departures

LIST OF POSTER PRESENTATIONS

(student presentations are marked by asterisk)

- Angelova R., Gjonov I. & Trichas A.: A project for the inventory of the Cretan Auchenorrhyncha fauna
- Bugaj-Nawrocka A., Ramirez J., Tazsakowski A. & Weirauch C.: Where do I belong? Determining the taxonomic position of *Koenigsbergia* (Hemiptera: Reduviidae)
- Drohojowska J. & Szwedo J.: Whiteflies (Hemiptera: Aleyrodidae) of the Eocene succinite – hidden diversity, unknown disparity
- Feng L., Yu R., Yuan F., Dietrich C.H., Yuan X.: Study on population genetics of invasive pest *Stictocephala bisonia* (Hemiptera: Membracidae: Smiliinae)
- Fryč D., Tóth P., Rychlý S. & Víchová L.: Comparison of three methods of catching aphidomorph insects (light trap, suction trap and Möericke trap)
- Gjonov I. & Hristozov A.: 3D printable model of an entomological block, designed for precise positioning of entomological glue boards and labels
- Hemala V. & Kocorek A.: When one species is significantly different from the other – a case of the genus *Colpoproctus* (Hemiptera: Heteroptera: Dinidoridae)
- Hradil K., Malenovský I., Fryč D., Rychlý S., Tóth P., Tománková Z. & Čermák V.: Heteroptera and Psylloidea caught with aerial suction traps in the Czech Republic
- Jovičić I., Eros G. & Petrović-Obradović O.: Diversity of aphids (Hemiptera: Aphidomorpha) landing on nectarine trees in the orchards in Serbia
- Kanturski M., Bugaj-Nawrocka A. & Petrović-Obradović O.: Going north. Morphology, new records of *Cinara cedri* (Hemiptera, Aphididae: Lachninae) in Europe and its potential distribution in future
- Kobiałka M., Świerczewski D., Walczak M., Urbańczyk W. & Tomacha A.: The endomicrobiomes of Eurymelinae and Typhlocybinae leafhoppers (Hemiptera: Cicadomorpha: Cicadellidae) – composition and distribution
- Kosovac A., Čurčić Ž., Rekanović E., Stepanović J. & Duduk B.: *Reptalus quinquecostatus* (Dufour, 1833) (Fulgoromorpha: Cixiidae) plant preferences in Serbia

- Lyu K. & Zhang Y.: Comparative morphology of the internal organs in Cicadellidae (Hemiptera: Auchenorrhyncha) – work in progress
- *Malik K., Bugaj-Nawrocka K. & Wieczorek K.: Taxonomical study of the genus *Drepanaphis* del Guercio (Hemiptera, Aphididae: Drepanosiphinae) based on morphological analysis
- *Masłowski A., Tazsakowski A. & Brożek J.: Cuticular structures on the legs of *Himacerus apterus* (Hemiptera: Heteroptera: Nabidae)
- Massimino Cocuzza G., Rizzo D. & Jovičić I.: The quiet spread of *Aleurocanthus spiniferus* (Quaintance, 1903) (Hemiptera, Aleyrodidae) in Europe
- *Mazáčková N. & Kment P.: Comparative morphology of the external male genitalia in Pyrrhocoroidea (Hemiptera: Heteroptera)
- Morkel C.: Monitoring of True Bugs (Heteroptera) reveals climate-driven change of arthropod communities in Kellerwald-Edersee National Park
- Neimorovets V.V., Labina E.S. & Gnezdilov V.M.: Type specimens of the superfamily Psylloidea (Insecta: Hemiptera) in the collection of the Zoological Institute of the Russian Academy of Sciences, Saint Petersburg
- Novoselsky T. & Carapezza A.: Preliminary results of research on the Miridae (Hemiptera: Heteroptera) of Israel
- Nowińska A.: Preliminary study of antennal sensilla in Lygaeoidea
- *Phauk S.: Bacterial composition of mutualistic insects (Membracidae-Formicidae) and the dominance of bacterial endosymbionts *Candidatus Sulcia muelleri*
- Ramsay A.J.: The Hemiptera of Salisbury Plain, Wiltshire, UK
- Rösch V.: A newly introduced species and genus in Europe: Records of *Draeculacephala robinsoni* Hamilton, 1967 (Auchenorrhyncha: Cicadellidae) in France and Spain
- Špryňar P.: Spread of *Tautoneura polymitusa* in the Czech Republic (Hemiptera: Auchenorrhyncha: Cicadellidae)
- *Švancarová E., Lauterer P. & Malenovský I.: Long-term changes in Auchenorrhyncha assemblages in a floodplain forest in southern Moravia (Czech Republic)
- Świerczewski D., Orłowska K. & Walczak M.: Planthopper and leafhopper communities (Hemiptera: Fulgoromorpha et Cicadomorpha) of the post-mining coal slagheaps in the Upper Silesia region (southern Poland)
- Tazsakowski A., Masłowski A. & Wolski A.: Cylapinae (Heteroptera: Miridae) of Madagascar
- Wang D. & Zhang Y.: Monophyly of Penthimiini and species delimitation of *Penthimia* (Hemiptera: Cicadellidae: Deltocephalinae)
- Wen H., Xian Z., Dietrich C. & Huang M.: Morphometric analysis of forewing venation does not consistently differentiate the leafhopper tribes Typhlocybini and Zyginiini
- *Zeman Š., Hartung V. & Kment P.: Hidden life in the interstices: On biology and taxonomy of Dipsocoridae occurring in Central Europe
- *Zygała J. & Chłond D.: Morphology of the stridulatory apparatus of Peiratinae

ABSTRACTS

O oral presentation

P poster

A project for the inventory of the Cretan Auchenorrhyncha fauna [P]

ANGELOVA R. (1), GJONOV I. (1) & TRICHAS A. (2)

(1) Department of Zoology and Anthropology, Faculty of Biology, Sofia University, Sofia, Bulgaria; (2) Arthropods Department, Natural History Museum of Crete, University of Crete, Heraklion, Greece

The fauna of plant- and leafhoppers in Crete is relatively poorly studied, with only 34 scientific publications containing records of 137 species belonging to 11 families: Aphrophoridae – 3; Cercopidae – 1; Cicadidae – 6; Cicadellidae – 71; Achilidae – 3; Cixiidae – 9; Delphacidae – 29; Issidae – 11; Meenoplidae – 1; Ricaniidae – 2 and one unclear species of Tettigometridae. It can be concluded that, considering the normal species ratios within the group, some families, such as Cicadidae, Achilidae, Delphacidae, Issidae, and Ricaniidae are relatively well-studied, while all other families require further investigations. At the same time, as expected for a large island, a considerable number of species recorded from Crete is endemic. These species amount to 14, representing approximately 10% of the known species on the island: Cicadidae – 2; Cicadellidae – 6; Achilidae – 2; Cixiidae – 1; Issidae – 2. Furthermore, the species *Tettigometra pallipes* (Lucas, 1853), originally described only as a nymph under the name *Issus pallipes* and later moved to the genus *Tettigometra* by Gnezdilov in 2017, remains poorly defined. It is possible that it represents a nymphal stage of another *Tettigometra* species, but no other species have been identified in Crete. The project for this investigation entails preparation and identification of the Auchenorrhyncha material at the Natural History Museum of Crete (NHMC), primarily collected through soil traps. It involves the identification of the material already collected in May 2022, consisting of approximately 1300 specimens, which have been deposited in the Zoological Collection of Sofia University (BFUS). Additionally, new material will be collected throughout the entire summer season of 2023. The anticipated outcome of the investigation will be a significantly more comprehensive checklist of plant- and leafhoppers on Crete, as well as an enhancement of the data concerning their distribution on the island.

Host associated differentiation and adaptation in the common bed bug (*Cimex lectularius*) [O]

BALVÍN O. (1), SASÍNKOVÁ M. (1), KŘEMENOVÁ J. (2), BARTONIČKA T. (2), OTTI O. (3), REINHARDT K. (4), MASSIMO CH. (4), MARTINŮ J. (5), NAZARIZADEH M. (5), MAREK J. (5) & ŠTEFKA J. (5)

(1) Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Czech Republic; (2) Department of Botany and Zoology, Faculty of Science, Masaryk University, Brno, Czech Republic; (3) Animal Population Ecology, Animal Ecology I, University of Bayreuth, Germany; (4) Applied Zoology, Department of Biology, Technische Universität Dresden, Germany; (5) Institute of Parasitology, Biology Centre CAS, České Budějovice, Czech Republic

The common bed bug is likely the best known representative of Heteroptera for being an important blood feeding ectoparasite of people. The populations that attack humans are an independent evolutionary lineage that is derived from bat associated populations. The bed bug has been recorded from a broad range of other hosts, but all these hosts are domestic or

synanthropic animals, and most these association might represent temporary associations. Pigeon- and poultry-associated populations also exist in long term. The first genetic evidence available connects the pigeon lineage to the bat- not human-associated lineage. We examined how the bat- and human-associated lineage keep separated genetically and morphologically, although being sympatric. We found, however, no evidence for reproductive isolation, i.e. all crosses between bat- and human-associated populations were fully fertile. The bat-associated lineage is capable of longer sperm storage, likely reflecting interrupted seasonal host availability. However, bat blood increases fertility, sperm storage time and sperm competitiveness in human associated lineage too, compared to human blood. The two host lineages also differed in gene expression, possibly reflecting adaptation to diet. However, when bat- or human associated lineages were forced to feed the blood of not their own but the other hosts, changes in gene expression in response to bat or human blood were larger than to the genetic component of the bat- or human-associated lineages per se. The bed bug lineages thus represent an interesting case of incipient host driven speciation.

Hemiptera of the European Jurassic World – unique and informative [O]

BIESZCZAD B. & SZWEDO J.

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The Hemiptera is a very diverse and numerous taxon, both in modern-day as in past, with species inhabiting all terrestrial environments and some marine ones. These insects appeared in the fossil record in the Carboniferous, with the oldest known members of this order coming from European deposits: Protoprosbolidae (upper Namurian, ca. 319.9 Ma) and Aviorrhynchidae (Moscovian, ca. 307 Ma). Since then, the Hemiptera fruited in various lineages resulting in their current evolutionary success. The Jurassic times were very important for the diversification of the Hemiptera and its lineages, external factors, as climatic changes, natural disasters, as well as biotic interactions shaped their diversity. On the one hand, trends initiated in the Triassic, miniaturisation, cryptic form and lifestyle continued, while on the other, environmental challenges resulted in the development of new strategies and taxonomic differentiation. Most of the known Jurassic fossil taxa come from the Asian lacustrine deposits, but several European localities (in England, France, Belgium, Luxembourg, Germany) brought fossils of various hemipteran groups. The fossil sites yielding the Hemiptera are mostly marine deposits, both coastal and open sea, and in some fossils could be up to 15% of all insect remains. The groups represented in the Jurassic fossil state cover Sternorrhyncha, Fulgoromorpha, Coleorrhyncha, Cicadomorpha and Heteroptera. Despite their numbers, their state of preservation varies from vestigial to almost complete. The latter is the result of taphonomic conditions during the deposition. One of the most important events during the Jurassic was Toarcian Oceanic Anoxic Event (TOAE), which took place about 183 mya. This event had a huge impact on climatic conditions in marine as well as terrestrial ecosystems. Rapid changes in climatic conditions, weather catastrophic events, as heavy rains and storms, rapid fires, fast transportation and burial, and lack of oxygen in the sediments resulted in good preservation, often as complete specimens of small and fragile organisms as insects. These fossils gave a unique opportunity to look through the time window to the European Jurassic World.

Reassessment of the classification of Cixiidae based on their molecular phylogeny and morphological characters (Insecta, Hemiptera, Fulgoromorpha) [O]

BOURGOIN T. (1), LUO Y. (2), BUCHER M. (1), BROŹEK J. (3), STROIŃSKI A. (4), LE CESNE M. (1) & LÖCKER B. (5)

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The family Cixiidae is the most significant taxon within the Hemipteran suborder Fulgoromorpha. Cixiidae are currently classified into three subfamilies: Borystheninae Emeljanov, 1989, Bothriocerinae Muir, 1923, and Cixiinae Spinola, 1839. The subfamily Cixiinae comprises the majority of species, along with 16 tribes. However, new analyses that incorporate comparative morphology and molecular sequencing challenge this traditional view, requiring a reassessment of the position and composition of the Cixiidae within Fulgoromorpha. Previously regarded as a sister-group of the Delphacidae (or including them), and grouped into three subfamilies (Emeljanov 2002), they are now proposed as derived delphacids (Bucher et al. 2023) in three primary lineages: Oecleian, Pentastirinan, and Cixiinan (Luo et al. 2021) grouping different tribal compositions compared to the current classification. Despite the merits of Emeljanov's (2002) classification system, the high degree of homoplasy observed in the limited dataset of morphological characters available for the suprageneric classification of Cixiidae poses challenges in developing a coherent classification that adequately represents the potential evolution of the family. In this study, we present results of a new molecular analysis encompassing approximately 160 taxa of the family. These findings help elucidate the composition of previously proposed main lineages, their relationships, tribal composition, as well as potential relationships among both traditionally recognized and novel, unexpected tribes. The main obstacle for moving from these phylogenetic results to a new classification is the lack of reliable diagnostic characters and morphological descriptions for the emerging taxa identified through molecular analysis, which would, subsequently, confirm their validity. New comparative morphological analyses, particularly of the cixiid metaleg enable us to enhance the descriptions of these distinct groupings toward their future recognition into formal taxa (Luo et al. in prep.).

Exploring the evolutionary history of planthoppers (Hemiptera: Fulgoromorpha) through their wide diversity with a large taxonomic sampling [O]

BUCHER M. (1), CONDAMINE F. (2), LUO Y. (3), WANG M.-L. (4) & BOURGOIN T. (1)

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Planthoppers (Hemiptera: Fulgoromorpha) are a diverse group of insects with more than 14,000 described species. Despite their high diversity and a long evolutionary history dating back to

Carboniferous (Song & Liang 2013, Johnston et al. 2018, Bourgoïn & Swzedo 2023, Bucher et al. 2023), many aspects of their biology, age of origin and diversification process remain poorly known. While the monophyly of extant Fulgoromorpha is widely accepted (Bourgoïn et al. 1997; Yeh et al. 1998, 2005; Yeh & Yang 1999; Urban & Cryan 2007, 2012; Cryan & Urban 2012; Song & Liang 2013; Huang & Qin 2018; Yu & Liang 2018; Wang et al. 2019; Xu et al. 2019; Kim et al. 2021; Bourgoïn & Swzedo 2023; Michalik et al. 2023), their classification and phylogenetic relationships remain uncertain due to limited sampling and biased representations of planthopper diversity in previous works. This study addresses major issues regarding planthopper evolution and proposes a new investigation using an extensive molecular dataset and a comprehensive taxonomic sampling of 531 ingroup taxa, covering 80% of the suprageneric taxonomic diversity currently recognized (Bourgoïn 2023). The study aims to clarify the early cladogenetic events, identify large clades within superfamilies, determine monophyletic family pairs, reassess the monophyly of certain families, and suggests new placements for ambiguous taxa. Additionally, we conducted a dating analysis to estimate divergence and diversification times of Fulgoromorpha based on a set of duly verified fossil taxa. By addressing these questions, we aimed to refine the temporal dimension of planthoppers evolutionary history and enhance our understanding of this diverse insect group. We emphasize the importance of comprehensive taxonomic sampling and data quality, and discuss theoretical and methodological biases that could have contributed to the lack of consensus in understanding the evolutionary history of Fulgoromorpha.

Where do I belong? Determining the taxonomic position of *Koenigsbergia* (Hemiptera: Reduviidae) [P]

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The amber fossil *Koenigsbergia* Popov, 2003 was originally classified as Phymatinae, Themonocorini. Popov made this assessment based on several features that were similar to the genus *Themonocoris* Carayon, Usinger & Wygodzinsky, 1958, including bucculae, short antennae and legs, a carinate pronotum and two-segmented tarsi. However, Popov had some doubts about the validity of this classification. On the other hand, the systematic position of Phimophorinae has also been problematic and widely debated. Traditionally, it has been thought to belong to the Phymatine Complex, but a new combined analyses suggest it belongs to the Higher Reduviidae. This subfamily currently comprises two genera: *Mendanocoris* Miller, 1956 and *Phimophorus* Bergroth, 1886. Representatives of Phimophorinae are, among other characters, characterized by an aradid-like body shape that is covered with waxy secretions, bucculae present, antennal segments thickened, small two-segmented tarsi or second labial segment much longer than segments three and four combined. The discovery of a new fossil species of *Koenigsbergia* allows us to describe it as a new species, document the first immature specimen of *Koenigsbergia*, and document and compare the morphology of *Themonocoris* and *Phimophorus*. For the first time, SEM micrographs were prepared for both taxa. Literature review and comparison with Themonocorini and Phimophorinae suggests that *Koenigsbergia* belongs to the Phimophorinae.

The state-of-the-art of psyllid systematics [O]

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Psyllids or jumping plant lice are characterised by their generally very narrow host ranges, i.e. the plants on which the immatures complete their development. Among the slightly over 4000 described species, there are a few major and several minor pests in agriculture and forestry. A few species are used or considered for the biological control of alien invasive weeds. The analysis of the evolutionary patterns of the psyllid–host plant relationships is as much of academic interest as it helps in understanding and controlling pest species. A prerequisite for these analyses is a well-corroborated phylogeny of the psyllids. Up to the 1970s, psyllid classifications, aiming at reflecting evolutionary patterns, were based on morphological characters, mostly of adults, with a stark underrepresentation of the tropical and south temperate faunas. Due to the high degree of homoplasy, these classifications were unstable and varied considerably between authors. Since the 1980s, cladistic methodology, the incorporation of immature characters and new material from the tropics and Southern Hemisphere helped to define monophyletic groups and support phylogenetic relationships between these groups. In the last two decades, molecular studies became increasingly more frequent and comprehensive. A molecular phylogenetic analysis, published in 2018, included 400 species (i.e. 10% of the described species) and, together with morphological evidence, served as base for the currently accepted classification published in 2021. Currently, seven families are recognised of which the support for four (Calophyidae, Carsidaridae, Mastigmatidae and Triozidae) is strong and for three (Aphalaridae, Liviidae and Psyllidae) weak or moderate. Although this revised classification is similar to those recognised by previous authors, there are some notable differences in the placement of some taxa. While the internal relationships of most families are well characterised, the Triozidae is, in this respect exceptional. With some 1200 described species, it is the second largest family of Psylloidea and lacks well-diagnosed subfamilies, tribes and genera. Some recent molecular and/or morphological phylogenetic/taxonomic studies are presented including a discussion of host associations.

Phylogeny of the treehopper-like leafhoppers (Hemiptera: Cicadellidae: Megophthalminae and Ulopinae) [O]

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The leafhopper subfamilies Megophthalminae and Ulopinae are closely related to treehoppers and exhibit some morphological characters present in the latter, such as reduced leg chaetotaxy and facial ocelli. Phylogenetic relationships within these two treehopper-like leafhopper subfamilies have not been well explored. Our phylogenomic analyses of datasets comprising >650 anchored loci and 79 terminal taxa representing all tribes in these two subfamilies except Evansiolini yielded well-resolved trees with highly congruent topologies, although the deepest divergences between Megophthalminae, Ulopinae and the treehopper lineage are unstable. Both subfamilies are consistently recovered as monophyletic with strong support, but some tribes previously defined based on morphology, including Agalliini, Megophthalmini, Ulopini and Cephaleni, are polyphyletic. Ancestral state reconstruction of some morphological characters

indicates convergent evolution in several lineages having species adapted to life in soil. Divergence time estimation suggests Megophthalminae and Ulopinae most likely originated during the early Cretaceous but rapid diversification did not occur until after Cretaceous–Palaeogene boundary. Ancestral area reconstructions slightly favor an Oriental origin of Ulopinae and a Neotropical origin for Megophthalminae, with multiple subsequent colonizations of other regions via rare long-distance dispersal.

TaxonWorks and TaxonPages as new platforms for managing the World Auchenorrhyncha Database [O]

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The World Auchenorrhyncha Database is a collaborative, multidisciplinary resource available to all practicing systematics and ecologists. At the moment, the nomenclature of the suborder Auchenorrhyncha covers 71 valid families, 6855 valid genera, and 47166 valid species as well as synonymy and subsequent combination. Started in 2003 as a MS Access database, in 2018, all the data were migrated into a new platform, TaxonWorks (<https://taxonworks.org/>). In addition to basic nomenclature, many taxon records include the original citation, bibliography, type information, etymology, part of speech, etc. The bibliography of the group includes 39,537 sources, about 1/3 of which are associated with PDF files. Species have distribution records, either derived from individual specimens or as country and state level asserted distribution based on literature references, as well as biological associations indicating host plants, predators, and parasitoids. Observation matrices are used to build interactive identification keys as well as to be used to perform phylogenetic analysis. At the moment, the project include 36 morphological matrices, the largest one, associated with Deltocephalinae, covers 798 taxa by 210 descriptors. Illustrations are provided for 9.886 taxa and organized in the specialized image matrix and could be used as a pictorial key for determination of species and taxa of a higher rank. The public interfaces for the new database are generated with TaxonPages software. The test version of the World Auchenorrhyncha Database could be accessed at the following address: <https://proceps.github.io/auchenorrhyncha/#/>, but this is a temporary link which may change in the future. The main advantage switching to TaxonWorks platform is that it makes the project truly collaborative. At the moment, there are 25 registered users, and many of them are very active. Data in TaxonWorks could be exported in raw format, get accessed via Application Programming Interface (API). Morphological matrices could be exported in Nexus, NeXML, and TNT formats and be used for phylogenetic analysis. A taxonomic checklist could be exported as a paper catalogue. The data are shared with external data aggregators like Catalogue of Life, GBIF, iDigBio.

Whiteflies (Hemiptera: Aleyrodidae) of the Eocene succinite – hidden diversity, unknown disparity [P]

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Baltic amber is a collective name of fossil resins deposited in various parts of Europe: Gulf of Gdańsk area, Saxony and Lusatia in Germany, Latvia, Lithuania, Belorussia, Ukraine, Denmark, United Kingdom. The most prolific in inclusions is a resin named succinite, which is covering the vast majority of fossil resins from the above-mentioned deposits. However, this type of resin is to be found also far in the north, in Spitsbergen and Canadian Arctic. Presence of fossil resins, distributed and deposited in various places and under various conditions, probably originated in different times and palaeohabitats need a new look at inclusions enclosed in amber. Whiteflies (Sternorrhyncha: Aleyrodidae) are named due to the presence of powdery secretion preened over the bodies and wings of the adults of almost all species. Their fossil record reaches back to the Late Jurassic. Most of the fossils known come from resins, including the first fossil described by Menge in 1856, under the name ‘Aleyrodes’ aculeatus from the Eocene Baltic amber. The number of fossils known from this resin is now counted as five, representing both subfamilies Aleyrodinae and Aleurodicinae. But these known, cover only a very small fraction of their real taxonomic diversity, presenting only a part of morphological disparity. Amber preserved whiteflies have been often overlooked or ignored, being preserved as imagines and difficult to compare with the recent ones, of which disparity is weakly elaborated. On the other hand, these inclusions present very important part of the fossil record, providing a lot of new data, not only on taxonomy or morphology, but also information of importance for palaeoecosystems and palaeohabitat reconstructions, paleoclimates, and evolutionary traits. New and rich in whiteflies inclusions samples of amber from Denmark, Germany, Ukraine, and the Gulf of Gdańsk present a lot of new genera and species to be described. These fossils present also a high morphological disparity and their distribution can give a better understanding of the palaeobiogeographic and palaeoenvironmental differentiation of Europe during the Eocene. Whiteflies could be good indicators for local faunas on one hand, on the other, could be helpful for the understanding of taphonomy, transportation, and deposition of amber.

Study on population genetics of invasive pest *Stictocephala bisonia* (Hemiptera: Membracidae: Smiliinae) [P]

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Stictocephala bisonia Kopp & Yonke, 1977 is native to the United States of America; it was introduced to Hungary in 1912. Since then, it has spread in Europe, North Africa and other regions. In 2017, *S. bisonia* was first discovered in Taibai County, Shaanxi Province, and in 2019 it was found in parts of Xinjiang Uyghur Autonomous Region. *Stictocephala bisonia* is a potential economic pest that feeds on 60 species of plants from 16 families, especially economic

fruit trees such as apple and cherry. While previous studies have focused on the morphology and life history of *S. bisonia*, population genetics research has been limited. This study aimed to determine the previously unknown source of invasion and diffusion path of the population of *S. bisonia* in China. Mitochondrial molecular markers (COI, Cytb, and ND5) and mitochondrial whole genome data were used to study the genetic diversity and population genetic structure of *S. bisonia* in 9 different geographical populations located in Treviso (Italy), Pomerania (Poland), Basel (Switzerland), Oregon (USA), Rushka (Serbia), Taibai (China), Yining (China), Xinyuan (China), and Wild Apple Reserve (China). The world transmission history of *S. bisonia* was also summarized, and the population historical dynamics were analyzed. The main results are as follows: (1) Analysis of the COI+Cytb+ND5 tandem gene fragment of 133 individuals from 9 geographic populations of *S. bisonia* revealed a total of 37 haplotypes, with a total haplotype diversity of 0.8909 and a total nucleotide diversity of 0.007. (2) Analysis of the whole mitochondrial genome of 34 individuals from the same 9 geographic populations of *S. bisonia* showed a total of 27 haplotypes, with a total haplotype diversity of 0.9715 and a total nucleotide diversity of 0.01029. These results indicate relatively rich genetic diversity in various groups. Genetic structure analysis revealed that the main source of overall genetic variation of *S. bisonia* was within populations, with frequent gene exchange among different groups and low level of genetic differentiation. The haplotype relationships between the populations in Xinjiang and Europe were similar, as were populations in Shaanxi and America.

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Comparison of three methods of catching aphidomorph insects (light trap, suction trap and Möericke trap) [P]

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The study took place from 28/4/2022 to 31/10/2022 in Olomouc, Czech Republic. The daily occurrence of winged females and males of aphidomorph insects (Aphididae, Adelgidae, Phylloxeridae) defined by the Aphid Bulletin*) of the Czech Republic was evaluated for three trapping methods (light trap, suction trap and Möericke trap). A total of 76 475 specimens were analysed during the study. The light trap was the most effective method for capture of females (42 632 specimens), followed by the suction trap (29 816 specimens) and the Möericke trap (1 950 specimens). For males, the most effective method was the suction trap (1 528 specimens), followed by the light trap (453 specimens) and the Möericke trap (96 specimens). The highest number of captures by all three methods was recorded for individuals from the family Aphididae, followed by Adelgidae and Phylloxeridae. The most effective method for the family Aphididae was the light trap (42 265 specimens), followed by the suction trap (29 828 specimens) and the Möericke trap (2 020 specimens). For the family Adelgidae, the suction trap method was the most effective (1 361 specimens), followed by the light trap (811 specimens) and the Möericke trap (26 specimens). For the family Phylloxeridae, the most effective method was the suction trap (155 specimens), then the light trap (9 specimens), and no individual of this family could be caught in the Möericke trap.

*) https://eagri.cz/public/app/srs_pub/fytoportal/public/#rlp|so|aphb|uvod

3D printable model of an entomological block, designed for precise positioning of entomological glue boards and labels [P]

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The entomological block is a device widely used by entomologists to facilitate the mounting of card boards and labels on entomological pins. The most commonly used entomological blocks are wooden blocks with steps of varying heights, allowing the placement of individual glue boards and labels at different levels. Models of entomological blocks ready for 3D printing are scarce on the Internet. The proposed model of an entomological block is ready for printing on a standard 3D printer. In addition to the usual positioning of glue boards and labels along the Z-axis, the model also offers sighting devices that enable precise positioning of the entomological pin along the X and Y axes. The model is offered in two variants - one for immediate use after printing and another that requires the fabrication of an additional metal rail measuring 100×30×5 mm, against which the tip of the pin rests during positioning along the Z-axis. The rail also serves to increase the overall mass of the device. When printed with Polylactic acid (PLA) or Polyethylene terephthalate glycol (PETG), the device has a mass of 40 to 50 grams, depending on the slicer settings. The overall dimensions of the device are length 100, width 35, and height 37 mm. Free software for 3D modeling, Blender under the General Public License (GPL), was used to create the model. The model has been successfully printed multiple times on a Creality Ender-3 Pro 3D printer using both PLA and PETG materials, yielding stable results.

Classification of the family Issidae (Hemiptera): old story, new words [O]

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The family Issidae is a worldwide distributed group of planthoppers established by Spinola (1839) and currently containing more than 1000 species assigned to nearly 200 genera. Many species of the Issidae are flightless, with peculiar coleopterous forewings. Melichar (1906) provided the first world review of the family and proposed its subdivision into three subfamilies, Issinae, Hysteropterinae, and Thioniinae, while the Hemisphaeriidae were treated as a separate family. Recent phylogeny of the Issidae (Gnezdilov et al. 2020, 2022) inferred with Bayesian and Maximum Likelihood analyses of a nine-gene molecular dataset (4702 bp) and morphological data (35 characters) across a broad sample of taxa (99 terminals) revealed a well-supported monophyly of the group, with its basal dichotomy into two clades, corresponding to the subfamilies Issinae and Hysteropterinae. Within Issinae, the tribes Issini, Thioniini, Sarimini, Hemisphaeriini, Parahiraciini, and Kodaianellini were recovered as monophyletic units with high support. Although molecular data for the tribes Cordelini, Eupilisini, and Guianaphrynini are still unavailable, these groups were also included in the subfamily Issinae based on the hind wing structure. The tribe Thioniini, with 12 genera and species included, were never recovered as a sister group to the remaining issids as was postulated by Wang et al. (2016); it always formed a sister group to the tribe Issini within the subfamily Issinae. The Afrotropical tribe Chimetopini originally erected in the subfamily Issinae (Gnezdilov 2017) is nested in the subfamily Hysteropterinae according to the newly obtained sequence data (unpublished). It takes sister position to the genera *Falcidius* Stål and

Numidius Gnezdilov, Guglielmino et d’Urso (Clade C sensu Gnezdilov et al. 2022), which corresponds with a hypothesis that tropical African Issidae may be considered as close to the ancestral form of the Western Palaearctic Issidae (Gnezdilov 2016a, 2016b). The family Issidae demonstrates unique geographical connections of the main groups. It seems that all American taxa belong to Thioniini and all Oriental ones belong to Sarimini, Hemisphaeriini, Kodaianellini, or Parahiraciini, with a shift of Sarimini to Australia (Gnezdilov & Fletcher 2010), while the main part of Palaearctic taxa belong to Hysteropterinae and some to Issini. Our data contradict with the early Cretaceous origin of the Issidae and the basal split of the family between New World (Thioniini) and Old World taxa proposed by Wang et al. (2016) and Bourgoïn et al. (2018). In our opinion, Issidae is a more recent group of Fulgoroidea most probably of Oriental origin, subsequently dispersed into the Palaearctic, tropical Africa, New World, and Australia (Gnezdilov 2016a, 2016b; Gnezdilov et al. 2022). The absence of issid planthoppers in the South and Southeast Africa, in Madagascar and neighboring islands (except for a few adventive species of Oriental origin), in New Zealand and in Tasmania, favors this hypothesis (Gnezdilov 2013, 2016).

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Family Colobathristidae (Heteroptera: Lygaeoidea) – current state of research and perspectives [O]

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Colobathristidae are a group of lygaeoid bugs, with a unique morphology and poor representation in collections. At present, they number around 100 species, many of these belonging to monotypic or species-poor genera. Only a few workers studied them regularly, the research since the works of Pavel Štys in the 1970s being mostly limited to occasional descriptions of singular new species. At the same time, there is a plenty of questions still worth asking about the family, pertaining not only to the taxonomy, but also to morphology, ecology or phylogeny of the group. The research is made complicated by the fact that the bulk of the species had been described in the beginning of the 20th century in Latin, without illustrations or genital preparations. This circumstance makes the work on Colobathristidae strongly dependent on the access to the types that are concentrated in several major European collections, whereas the insects themselves occur in the Oriental, Australian and Neotropical Regions. The talk summarizes the current state of knowledge of Colobathristidae and points out some of the promising directions for future research: description of new taxa (some examples illustrating the yet unknown diversity of the family are provided); publication of easily accessible and photographically illustrated keys; phylogenetic study of the family.

Auchenorrhyncha biodiversity and coexistence on rainforest trees in Kibale National Park, Uganda [O]

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Since 2017 I have been working to produce an inventory of the Auchenorrhyncha of Kibale Forest in western Uganda. Amongst other sampling approaches, specimens have been sampled from different tree species. Doing so, has enabled a comparison with a similar approach in the UK, and plotting species accumulation curves suggests significantly higher species diversity per tree species at Kibale. Observation of high species diversity gives rise to the question of the mechanisms enabling species to co-exist. One possible factor may be differences in the mouthpart length of co-occurring species. Taxonomic sub-divisions of the Auchenorrhyncha show significant differences in the slope of the mouthpart length, body size relationship. This was found to be the case with the two most speciose tribes of Typhlocybinae in Kibale Forest. So far 58 species have been found from this mesophyll feeding subfamily of Cicadellidae. Can such mouthpart length differences be found between species pairs co-existing on a host tree species? Might there be differences in the spatial arrangement of species on individual host trees?

When one species is significantly different from the remaining – a case of the genus *Colpoproctus* (Hemiptera: Heteroptera: Dinidoridae) [P]

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Aspongopus circumclusus Distant, 1911, currently included in the genus *Colpoproctus* Stål, 1870, is recognized to be significantly different in several morphological characters (antennae and external male genitalia) from all other species of the African *Colpoproctus* (*C. limbatus* (Signoret, 1851), *C. femoralis* (Stål, 1865), *C. pullus* (Stål, 1853) and *C. vilis* (Walker, 1868)). The most important differences are in the morphological structures of the external male genitalia (genital capsule, parameres) which considerably differ in shape, size and various morphological details between *A. circumclusus* and other *Colpoproctus* species. *Aspongopus circumclusus* also differs from the genus *Cyclopelta* Amyot & Serville, 1843: females of *A. circumclusus* have large expanded tibia, but female tibia of *Cyclopelta* are narrow. The morphological study of *A. circumclusus* has not been completed yet. For justifying its separation from *Cyclopelta*, examinations of aedeagus and spermatheca will be necessary; therefore, we plan to study these structures in the near future. The result of these examinations should help to clear the systematic position of *A. circumclusus* (which apparently does not belong to *Colpoproctus*): either it will be moved to *Cyclopelta* or a new genus will be described to accommodate it.

Heteroptera and Psylloidea caught with aerial suction traps in the Czech Republic [P]

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Material of true bugs (Hemiptera: Heteroptera) and psyllids (Hemiptera: Psylloidea) was evaluated from samples caught with permanent Johnson-Taylor suction traps (12.2 m high) operating from the beginning of April to the end of November 2020 at five sites in the Czech Republic (Čáslav, Dobřichovice, Chrlice, Lípa and Věrovany). The traps operate 24 hours a day as part of the monitoring of aphid flight and detection of the potato psyllid *Bactericera cockerelli* organised by the Central Institute for Supervising and Testing in Agriculture, Czech Republic. The data from the traps are indicative for areas within a radius of 25 km. A total of 1809 specimens of 119 species (13% of the Czech fauna) of Heteroptera were collected and identified. Among the 23 families recorded, Miridae, Rhyparochromidae and Anthocoridae were represented with the most species. The most abundant species in traps were *Kleidocerys resedae* (35%), *Orius* spp. (21%) and *Trigonotylus caelestialium* (11%). The material of the Psylloidea included 1484 specimens of 42 species (31% of the Czech fauna). The most abundant psyllid species were *Trioza urticae* (23%), *Cacopsylla melanoneura* (16%), *Trioza remota* (15%) and *Cacopsylla saliceti* (10%), all of which fly from their host plants to coniferous trees to overwinter as adults. In addition to *C. melanoneura*, the following known vectors of *Ca. Phytoplasma* and *Ca. Liberibacter* spp. were recorded in relatively few specimens: *Cacopsylla picta*, *C. pruni*, *C. pyri*, *C. pyricola*, *C. pyrisuga*, and *Bactericera nigricornis*. In both Heteroptera and Psylloidea, females slightly outnumbered males in the material. Eleven Heteroptera species and four Psylloidea species in the material are classified as alien species in the Czech Republic, of which *Spanioneura fonscolombii* Foerster, 1848 (Psyllidae) was newly recorded for the country.

New data on the Cixiidae diversity of Central and South America [O]

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The rainforests in the New World are spectacular hotspots of entomological biodiversity. Currently about 450 Cixiidae species are known from Central and South America. Some species are of economic importance due to the ability to transmit plant pathogens. Despite this, many species lack sufficient descriptions, and their taxonomy and distribution are poorly known. Our project focuses on the morphological biodiversity of the Cixiidae fauna of Costa Rica and Ecuador. The study material was collected mainly by Gernot Kunz (Costa Rica) and Terry Erwin (Ecuador), other sources are the collections of the Natural History Museum in London (BMNH), of Lois O'Brien and the Oekoteam. More than half of the species in our material are presumably new to science. Redescriptions of many taxa, descriptions of new species (and genera) as well as a key to the Cixiidae genera of the New World are in preparation; first results of this work will be presented.

Diversity of aphids (Hemiptera: Aphidomorpha) landing on nectarine trees in the orchards in Serbia [P]

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Several aphid species (Hemiptera: Aphididae) can cause direct feeding damage to nectarines. Many winged aphid species fly over from other plants, making short feeding trials on nectarine in search of a host plant. Some of them play an important role in the transmission of plant viruses and cause indirect damage to this plant. This study aimed to evaluate the diversity of aphids landing on nectarine trees, with particular reference to the species described in the literature as known vectors of Plum Pox Virus (PPV). The study was conducted in important nectarine growing areas in Serbia, at Topola and Sr. Mitrovica sites, during the three-year study (2020–2022). The sticky shoot method was used to capture winged aphids that landed on the nectarine leaves during the growing season. Every 10–15 days, two shoots on five randomly selected trees were sprayed with glue. The aphids from the shoots were treated with turpentine and soapy water and preserved in 70% ethanol. Aphids were identified morphologically and molecularly through PCR techniques. During the study, 388 aphid specimens were collected (286 in Topola and 102 in Sr. Mitrovica). The highest total number of aphids was caught in 2020 (309). In the two following years, a much lower number of aphids was recorded (18 in 2021 and 61 in 2022). Aphid population dynamics fluctuated greatly during the growing season. Maximum population density of aphids and maximum potential vector activity were detected in May–June at both sites in all three years. The highest density (5.2 specimens per shoot) was detected at the Topola site on 10th May 2020. The collected specimens were classified into 43 different taxa. The most abundant species belong to the genera *Aphis*, *Rhopalosiphum*, and *Therioaphis*. One of the most abundant species at the Topola sites was *Viteus vitifoliae* (Phylloxeridae). The identification of this species was confirmed by molecular techniques. Several species collected in this study (*Aphis craccivora*, *A. fabae*, *A. gossypii*, *A. pomi/spiraecola*, *Hyalopterus pruni*, *Macrosiphum rosae*, *Myzus persicae*, *Phorodon humuli*, *Rhopalosiphum maidis*, *R. padi*) are potential vectors of PPV. The proportion of known PPV vectors in the total number of detected aphids on nectarine was 8.03, 33.33 and 20.75% in Topola, and 17.60, 33.33, and 50% in Sr. Mitrovica in 2020, 2021 and 2022, respectively.

Going north: Morphology, new records of *Cinara cedri* (Hemiptera, Aphididae: Lachninae) in Europe and its potential distribution in future [P]

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The genus *Cinara* Curtis, 1835 is the largest in Lachninae and one of the largest genera in Aphididae as a whole. Species of this genus are very characteristic and specialized to feed on green or woody parts of coniferous trees and shrubs. *Cinara cedri* Mimeur, 1936 is a well-known *Cedrus* pest native to the Mediterranean. Apterous viviparous females of this species are dark bronze or reddish-brown with darker segmental markings and a distinctive but variable pattern of white wax, usually comprising a spinal stripe and paired dorsolateral segmental patches, as well as a ventral dusting of wax powder. They live on branches between needles in

small to larger colonies and are always visited by ants. The species is widely distributed in Europe and North Africa (Morocco, Algeria), the Mediterranean area including Cyprus, southwest and Central Asia, North America (California, New York), and Argentina. In Europe, the species have been recorded from Belgium, Denmark, France, Hungary, Italy, Spain, Switzerland and the UK. Here, we present new records of *Cinara cedri* in several countries in Europe like Austria, Czech Republic, Poland and Serbia. We used light and scanning microscopy to show the characters of the species, its morphology and preliminary results of investigation of its sensilla. We also prepared ecological niche modelling to see how potential climate change might affect the distribution of this species in the future.

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Villain's family: progress in revision of Halyomorpha (Hemiptera: Heteroptera: Pentatomidae) [O]

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The East Asian Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål), is a notorious invasive pest species of significant economic importance, now spread throughout North America, the Euro-Mediterranean region, and Chile. It is intensively studied, with dozens of papers published annually. However, nearly all of this research seems oblivious of the fact that *H. halys* is merely one of the 37 valid species recognized within the genus *Halyomorpha* Mayr. Some of the species from SE Asia are morphologically very similar to *H. halys*, and examination of the male genitalia is a prerequisite for their correct identification. Lack of knowledge of the species limits of *Halyomorpha* species has already led to false reports of *H. halys* in India and *H. picus* in Egypt. This also precludes the use of a citizen science approach for correctly identifying SE Asian species of *Halyomorpha*. As most of the species are inadequately described (26 of them being published prior to 1950), lacking necessary details of the male genitalia, the genus is in urgent need of a modern revision. Our preliminary results identify 7 new junior synonyms, 1 species restored from synonymy, 8 species to be transferred to other genera, and several new species to be described within *Halyomorpha*. The types of 14 species still remain to be examined, are insufficient to proper species recognition or lost, and designation of a neotype is needed. After removing the misplaced taxa, the Afrotropical species of *Halyomorpha* could be divided into five “species groups“ in accordance with Linnavuori (1982), while Asian species belong to two large groups, the *Halyomorpha halys*-species group, a group of species resembling the genus *Prytanicoris*, and two other species of isolated position yet to be clarified. The available Cappaeini barcodes in public databases contain considerable amount of misidentification, including specimens wrongly identified as *H. halys*. The phylogeny of the Pentatomidae is still unresolved, nonetheless understanding the limits and boundaries of Cappaeini within a phylogenetic context using an integrative approach is necessary. Such understanding will allow not only to determine specific and generic limits in *Halyomorpha* and related genera of Cappaeini, but also to understand their biogeographical patterns and evolution of the different groups currently recognized in the tribe.

The endomicrobiomes of Eurymelinae and Typhlocybinae leafhoppers (Hemiptera: Cicadomorpha: Cicadellidae) – composition and distribution [P]

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The basic aim of our research is a comprehensive exploration of the symbiotic endomicrobiomes of leafhoppers (Hemiptera: Cicadomorpha: Cicadellidae). As other plant sap-feeders, these insects are characterized by diverse symbiotic communities. As a model, we choose leafhoppers belonging to two closely related subfamilies: Eurymelinae and Typhlocybinae, which, despite being closely related, seem to be characterized by completely separate symbiotic systems. The Typhlocybinae is regarded as the only group of leafhoppers that does not harbor obligate symbionts, whereas members of the closely related subfamily Eurymelinae live in a mutualistic association with obligate and facultative bacterial and/or fungal microorganisms. Since most hemipterans feed on phloem or xylem sap of plants deficient in essential nutrients, they are hosts to obligate symbiotic microorganisms: bacteria or fungi (termed yeast-like symbionts). In our studies, we examined six Typhlocybinae species so far. These are *Chlorita paoli*, *Eupteryx cyclops*, *Eupteryx aurata*, *Forcipata forcipata*, *Kybos virgator* and *Notus flavipennis*. In the mentioned taxa none obligate (= bacteriome associated) symbionts were observed. However, small, rod-shaped bacteria were present in the cytoplasm of the cells of the midgut epithelium, fat body and internal glands. Using the FISH technique these bacteria were identified as the representatives of the genus *Wolbachia*. Within the Eurymelinae subfamily, individuals from the genus *Idiocerus*, *Populicerus*, *Oncopsis* and *Macropsis* have been investigated so far. Paired organs termed bacteriomes composed of bacteriocytes filled with *Sulcia* bacteria are present in the bodies of these leafhoppers. *Sulcia* is an ancestral symbiont of Cicadomorpha and Fulgoromorpha. Additionally, many yeast-like symbionts from the genus *Ophiocordyceps* occupy fat body cells of examined Macropsini insects. We detect also complex symbiotic systems with additional symbionts such as bacteria *Arsenophonus* and *Sodalis*.

Study of colour preference of *Scaphoideus titanus* (Hemiptera: Cicadellidae) and *Metcalfa pruinosa* (Hemiptera: Flatidae) [O]

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Invasive species pose a serious threat to agriculture globally. Thus, tools for their detection and monitoring are of great value. Yellow sticky traps are routinely used for monitoring many pestiferous species. Nevertheless, several studies highlight the potential importance of other colours, for instance red in case of *Scaphoideus titanus* Ball, 1932 (Hemiptera: Cicadellidae), an important vector of grapevine flavescence dorée disease. In our studies we focused on two invasive pest species, *S. titanus* and *Metcalfa pruinosa* (Say, 1830). Field experiments were conducted in vineyards at Balatonlelle and Soltvadkert in Hungary, with standard colour sticky traps. The light reflectance of the coloured traps were measured with Ocean Optics USB2000+

spectrophotometer. Tested colours included blue, fluorescent yellow, green, orange, red, white and yellow. For each experiment ten replicates of the respective colours were used. In the tests *S. titanus* showed a clear preference for yellow, orange and fluorescent yellow, these attracted more individuals than other colours. Both males and females responded with similar preferences. On the other hand, catches of different coloured sticky traps did not differ significantly for either sex of *M. pruinosa*. The results suggest that yellow, orange and fluorescent yellow sticky traps may be used effectively for monitoring *S. titanus* adults, however, *M. pruinosa* did not show preference for any of the tested colours, therefore other monitoring methods seem necessary.

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***Reptalus quinquecostatus* (Dufour, 1833) (Fulgoromorpha: Cixiidae) plant preferences in Serbia [P]**

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Reptalus quinquecostatus (Dufour, 1833) is one of several species from the planthopper family Cixiidae that are known as vectors of plant pathogenic bacteria that can cause severe agro-economic losses. Records of this species in Serbia by Horváth, Tanasijević and Janković refer to *Oliarus quinquecostatus* Dufour, 1883 [sic]. The species was described as inhabiting meadows and grasslands and reported as caught on *Salix* sp., *Ulmus* sp., *Quercus* sp., and *Malva sylvestris*. Modern-day molecular identification of species, i.e. sequencing of cytochrome oxidase subunit 1 (COI) gene, revealed the presence of *R. quinquecostatus* nymphs in the rhizosphere of *Koeleria macrantha* (Poaceae family) in eastern Serbia. This cixiid has been found in Serbia on various crops affected by ‘*Candidatus Phytoplasma solani*’: corn, grapevine, potato, and most recently, sugar beet. The occurrence on sugar beet was first reported in 2020 in northern Serbia when its population was aggregated on a boundary strip with several weeds: *Convolvulus arvensis*, *Chenopodium album*, *Amaranthus retroflexus*, *Ambrosia artemisiifolia* etc. During the 2021–2022 survey, the presence of *R. quinquecostatus* on sugar beet was confirmed on other localities in Serbia. Moreover, its populations were recorded on parsnip, tobacco and corn. *Prunus spinosa* and *Crataegus* sp. in microhabitats permeating arable land were also found preferable for *R. quinquecostatus* adults. Its several populations on different hosts were repeatedly sampled in June–July 2022. Populations on *P. spinosa* and *Crataegus* sp. were highly abundant and infected with ‘*Ca. P. solani*’, whereas in the agroecosystems, *R. quinquecostatus* is present in mixed population with *R. panzeri*, displaying minor precedence in the emergence of adults. Data on *R. quinquecostatus* plant preferences in Serbia support the polyphagy that has been previously reported throughout Europe. Since the genus *Reptalus* Emeljanov, 1971 has recently undergone nomenclatural and taxonomic revision, the use of the valid species name and proper morphological species identification, which in some cases should be supplemented with molecular tools, are crucial in biodiversity and insect pest research.

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iNaturalist – a modern tool for auchenorrhynchoologists [O]

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iNaturalist has become the most important online platform for species observations. Different examples for scientific use for auchenorrhynchoologists are presented.

Vibrational communication in *Cacopsylla* spp. (Hemiptera: Sternorrhyncha: Psyllidae): mechanism and signal structure [O]

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Psyllids or jumping plant lice (Hemiptera: Sternorrhyncha: Psylloidea) are small phytophagous insects that are usually narrowly host-specific. Some psyllid taxa are pests that damage crops by feeding, excreting honeydew and transmitting plant pathogens. Psyllids communicate by means of pheromones and substrate-borne vibrations. The latter are species-specific and used in courtship to find mates on the host plant. Artificially generated substrate vibrations can potentially be used to disrupt the reproduction of pest species. The exact mechanism of vibrational signal production in psyllids is unclear, but in known cases, the vibrations are accompanied by rapid wing movements (“buzzing”). Most previous morphological observations and experiments suggested that psyllid vibrations are generated by stridulation, i.e. friction of the forewings against other parts of the thorax. As part of a study on the vibrational communication of various Central European *Cacopsylla* spp. (Psyllidae), we recorded the vibrational signals of *Cacopsylla pyrisuga* (Foerster, 1848), *C. pyricola* (Foerster, 1848) and *C. pruni* (Scopoli, 1763), which are pests on fruit trees. Detailed structure of the vibrational signals and wing movement of the males of *C. pyrisuga* recorded with a laser vibrometer and a high-speed camera do not support the hypothesis that the vibrations are produced by wing-thorax stridulation. Instead, we propose that the vibrations are generated by wing buzzing without friction between the wings and the rest of the thorax, where the spectral properties are a result of wingbeat frequency and coupling/decoupling of fore and hind wings. When compared, the known male signals of *Cacopsylla* spp. show a certain shared pattern at the level of genus and significant differences between species.

What phylogeny tells us on the subterranean planthoppers: the case of La Réunion Island [O]

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The subterranean world has long fascinated researchers due to the remarkable morphological and physiological adaptations required for survival in such harsh environments. Despite their feeding habits of obligatorily phytophagous insects, cave-dwelling planthoppers are among the

few species that have adapted to underground life. Indeed, over 60 species are known to inhabit subterranean ecosystems, sucking sap on root networks that develop in these environments (Hoch 2002, Le Cesne 2022). Two hypotheses have been proposed to explain the colonization of hypogean ecosystems. The first, the “climatic relict hypotheses” was described by Vandel in 1964, suggesting that strong climatic changes drove insects to colonize subterranean habitats to survive, leading to their evolution in harsh underground environments. As a side effect, all their epigeal (above-ground) relatives are expected to be extinct. However, Howarth proposed an alternative hypothesis in 1980, the “adaptive shift”, postulating an active colonization where some taxa “try” new ecological niches. To test these hypotheses, Wessel et al. (2007) suggested phylogenetical analyses to measure the degree of relatedness between cave-dwelling species and their closest epigeal relatives. Indeed, an isolated species in the tree topology, often associated with an allopatric distribution with their closest relatives, would support the climatic relict hypothesis, while close relatedness and a parapatric distribution between the species would defend the second hypothesis. In this paper, we will present the case of the Cixiidae of La Réunion island as an example and discuss the contributions and limitations of using phylogeny to understand the evolutionary drivers that led these planthoppers to live in caves.

The Cixiidae of Australia – a status report [O]

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The Cixiidae of Australia represent quite a diverse and interesting group of planthoppers. First studies on this fauna were published mainly by Kirkaldy, Muir and Fennah, but also Stål, Buckton, Jacobi and Distant. The “modern” age of research on the diversity of Cixiidae was started by Hoch, Asche, Howarth & Erbe mainly focussing on cavernicolous species, and Emeljanov, who erected new tribes and described many new taxa from Australia. In the course of a PhD project, supervised by Murray Fletcher, Marie-Claude Larivière and Geoff Gurr, Birgit Loecker (et al.) started to revise all Cixiidae tribes from Australia in 2004. Since then, 12 papers have been published, and, with the exception of Cajetini, all Cixiidae tribes have recently been revised. Additionally, data on the Australian Cixiidae, including identification keys, checklists, distributional information and photographs, have been uploaded to the website of the New South Wales Department of Primary Industries (Fletcher 2009 and updates) as well as the Australian Faunal Directory and the Australian Plant Pest Database. In this presentation, we give an overview on the diversity of Australian Cixiidae, comprising more than 200 species in 55 genera. We are convinced that, despite all this work, many species of the Australian fauna still await their discovery. Fieldwork is urgently needed to close gaps in species knowledge, distributional data and to clarify the biology of the Australian Cixiidae.

Reference: Fletcher M. J. (2009 and updates): Identification keys and checklists for the leafhoppers, planthoppers and their relatives occurring in Australia and neighbouring areas (Hemiptera: Auchenorrhyncha). <https://idtools.dpi.nsw.gov.au/keys/leafhop/index.html>

Comparative morphology of the internal organs in Cicadellidae (Hemiptera: Auchenorrhyncha) – work in progress [P]

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Research on the systematics of Cicadellidae (Hemiptera: Auchenorrhyncha) mainly focuses on the external morphology and molecular biology. However, this study comprehensively compares the morphological structures of the digestive, excretory, and reproductive systems to find the relationship among higher taxa from the perspectives of anatomy and ultrastructure, using optical and electron microscopy. Fresh specimens collected in the field, including 32 leafhopper species from 28 genera and 13 subfamilies were used. Their salivary glands, digestive tracts, and male and female reproductive systems were dissected and photographed. Significant differences in the morphology of the Malpighian tubules in taxa from different subfamilies were found. The third segment of the Malpighian tubules from Cicadellinae, Eurymelinae, and Ledrinae were selected and photographed using transmission electron microscopy, to detect the relationship among the taxa in morphology, functions and feeding habits. We encode the obtained morphological characteristics and generate a phylogenetic tree based on a sample covering various subfamilies of Cicadellidae and outgroups in Auchenorrhyncha. We discuss the phylogenetic relationships among the subfamilies of Cicadellidae based on internal morphology and provide new evidence for exploring evolutionary relationships of the subfamily and tribe-level clades of Cicadellidae.

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Taxonomical study of the genus *Drepanaphis* del Guercio (Hemiptera, Aphididae: Drepanosiphinae) based on morphological analysis [P]

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The aphid subfamily Drepanosiphinae comprises 40 species divided into five genera occurring in the Holarctic Region. This monoecious and holocyclic subfamily is a sister group of the Chaitophorinae, with similar morphology, anatomy and biology. In various studies on the Drepanosiphinae, the genera *Drepanosiphoniella*, *Drepanosiphum*, *Yamatocallis* and *Shenahweum* were thoroughly verified for their morphology, distribution or ecological preferences. However, the most numerous genus *Drepanaphis* is a neglected group and has not been studied in detail since more than 50 years. *Drepanaphis* encompasses 17 species distributed in North America. The most pervasive species *Drepanaphis acerifoliae* was also reported in Europe. Representatives of this genus are narrow oligophages, associated mainly with plants of the genus *Acer*. The most distinctive feature of *Drepanaphis* is the presence of dorsal abdominal tubercles on the abdomen. A comparative study of the viviparous and sexual generations of all species of *Drepanaphis*, supplemented by Principal Component Analysis (PCA) and Canonical Analysis (CCA) indicates, that the species in this genus have very similar morphometry and qualitative features are crucial in their identification and species delimitation.

The quiet spread of *Aleurocanthus spiniferus* (Quaintance, 1903) (Hemiptera, Aleyrodidae) in Europe [P]

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After its first discovery in Europe, in Apulia (Italy) in 2008, the citrus spiny whitefly (CSW), *Aleurocanthus spiniferus* (Quaintance, 1903) (Hemiptera Aleyrodidae) spread throughout the Italian peninsula, as well as in Albania, Bulgaria, Croatia, Greece and Montenegro. The species has been established mainly in urban areas, infesting ornamental plants in public and private gardens. Recently, CSW is also infesting some important cultivated plants. In Apulia, increasingly intense infestations are reported on grapevines, while in Basilicata, Calabria, Sicily as well as Apulia, the pest is present in commercial groves of *Citrus × sinensis*. The CSW is a polyphagous species, easily adaptable to various environmental conditions. For example, in 2022, the pest was found in a greenhouse in Holland, showing its potential to spread throughout Europe. The main pathway is transportation with infested plant material. From 2021, the diffusion, biology and natural enemies of *A. spiniferus* in Sicilian citrus cultivation areas were investigated through field surveys carried out by direct plant sampling and yellow sticky traps. First observations showed that the pest developed three generations in 2022. The adults of the first generation emerged from the overwintering nymphs in late March, while a second generation followed in late June–early July. The third generation occurred in the middle of October. The presence of the adults lasted for a period ranging from one to almost two months. In one case, overlapping generations were observed, as adults were recorded throughout the period from April to October. Several natural enemies were collected, such as *Zelus renardii* (Kolenati) (Hemiptera, Reduviidae) and *Campyloneura virgula* (Herrich-Schaeffer) (Hemiptera, Miridae). The most interesting species in terms of its abundance and activity was *Serangium montazerii* Fürsch (Coleoptera, Coccinellidae), a predator recorded for the first time in Italy and known as a specific natural antagonist of whiteflies. Studies are underway concerning the development of bio-molecular diagnostic methodologies for a rapid identification of *A. spiniferus* in areas where it has been found as well as for the detection of new outbreaks. These systems support morphological identification and would guarantee a timely genetic identification of the species.

Cuticular structures on the legs of *Himacerus apterus* (Hemiptera: Heteroptera: Nabidae) [P]

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Nabidae or damsel bugs is a family of predatory true bugs (Heteroptera) characterized by their fossorial fore- and middle legs. The legs of nabids are densely covered in a great variety of cuticular structures that serve different purposes, like forming part of the fossorial mechanism, facilitating movement, or they have a sensory function. Most of these structures are highly variable between different taxa of Nabidae. The grasping mechanism consists mainly of modified femur and tibia on which there are various cuticular structures that serve to hold the

prey: throne-like, hook-like, or very thin and dense hair-like projections. This huge morphological diversity of clingy and holding structures remains mostly undescribed in the literature. On the distal end of the pro- and mesotibia, most nabids have a structure called fossula spongiosa. Some authors suggested that this organ forms part of the grasping mechanism and others stated that it facilitates movement, and some proposed that they may have both of these functions. Most of the cuticular structures that serve other roles are hair-like mechanosensilla which also show remarkable diversity on different parts of the leg and between different taxa. Our poster presents preliminary results of the study of the abovementioned structures of Nabidae on the example of *Himacerus apterus* (Fabricius, 1798). The diversity of cuticular structures (on all three pairs of legs) and their different purposes will be shown and discussed.

Comparative morphology of the external male genitalia in Pyrrhocoroidea (Hemiptera: Heteroptera) [P]

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The superfamily Pyrrhocoroidea is a quite small lineage of pentatomomorph true bugs, currently comprising approximately 660 species in 71 genera and 2 families, Largidae and Pyrrhocoridae, with many of its representatives possessing a distinctive aposematic coloration. The group includes some notorious agricultural pests such as the cotton stainers, *Dysdercus* spp. (Schaefer 2015), along with the well-known European firebug *Pyrrhocoris apterus*, used as a model organism for physiological and ethological research (e.g., Socha 1993; Exnerová et al. 2015). Despite its importance in both economical and scientific field, our knowledge of relationships within Pyrrhocoroidea is still very limited due to the absence of a comprehensive phylogenetic analysis. Hemala et al. (2020, 2021) conducted an extensive comparative morphological studies of the metathoracic scent gland efferent system (= MTG) and pregenital abdomen in the superfamily suggesting some groups of genera based on shared morphological characters. This study aims to examine and compare external male genitalia of Pyrrhocoroidea as another set of morphological characters that may help our understanding of the internal relationships within this group. The plan is to document these structures in at least one representative of each genus and subgenus available in collections, mainly from the Moravian Museum in Brno and National Museum of the Czech Republic in Prague. So far, 27 genera have been studied and documented using the environmental scanning electron microscopy (= ESEM) with emphasis on some significant traits such as the shape and position of the pygophore opening, its inner structures (Schaefer 1977; Ahmad & Perveen 1985), the shape of parameres and proctiger (Stehlík 1965). The structures of phallus will also be inspected in uninflated and inflated state under an optical stereomicroscope. Outgroup taxa for comparison will be selected from the two closely related superfamilies, Lygaeoidea and Coreoidea, which, together with Pyrrhocoroidea, form a monophyletic Eutrichophora. The examined characters of the external male genitalia will be used in a data matrix for a cladistic analysis, along with the characters studied by Hemala et al. (2020, 2021), and may be later used also in analyses of Pyrrhocoroidea phylogeny combining both morphological and molecular characters.

Monitoring of True Bugs (Heteroptera) reveals climate-driven change of arthropod communities in the Kellerwald-Edersee National Park [P]

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Background: The Kellerwald-Edersee National Park is located in the state of Hesse (Germany). The 76 km² colline to montane landscape is dominated by woodland, interspersed with open landscape. The climate can be characterized as subatlantic with low subcontinental influence. In order to evaluate management measures and generally document changes in species assemblages, a monitoring of true bugs as invertebrate bioindicators was established in 2011 and carried out twice since then. Here, pooled data on overall effects of climate change on α -diversity and abundance are presented. Material and methods: Sample sites comprised dry pastures (n = 6) and fresh meadows (n = 6), grazed by sheep or mown, and one site with ruderal vegetation. Heteroptera were sampled in a standardized and stratified scheme on the ground, herb, and in adjacent shrub and tree layers by vacuum-suction, sweep-netting and beating. After an initial test period (I: 2011–2016), sampling was repeated (II: 2018/2019), with all specimens (adults and nymphs) identified and ecologically classified. Results: A total of 337 Heteroptera species covering an amount of 32 885 individuals were sampled (I: nspec = 291, nind = 17 635; II: nspec = 296, nind = 15 250). Comparing sampling periods I and II, the α -diversity of hygro- and mesophilic taxa remained the same, while the proportion of xerothermophilic species increased by 19%, mainly concerning species living predominantly in open habitats. In contrast, abundance decreased by 62% and 16% for hygro- and mesophilic taxa, respectively, and increased by 23% for xerothermophilic species. Notably, 22 xerothermophilic taxa were documented for the first time compared to basic inventory and monitoring data. Discussion: Data from standardized monitoring show a trend of species communities shifting towards a higher demand for warm climate. No effects on cold-stenothermic species α -diversity have been visible so far, but are expected for future monitoring periods with regard to their declining abundance and further climate warming. The documented changes for α -diversity and abundance are consistent with the changes observed for arthropod communities in neighbouring European regions. They show that observing alterations in biodiversity on a small scale can contribute to the comprehension of underlying impacts such as climate change.

Type specimens of the superfamily Psylloidea (Insecta: Hemiptera) in the collection of the Zoological Institute of the Russian Academy of Sciences, Saint Petersburg [P]

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The collection of Hemiptera of the Zoological Institute of the Russian Academy of Sciences in Saint Petersburg (ZIN RAS) is one of the largest in the world, and definitely the largest one in terms of the Palearctic fauna. This collection contains nearly 4 000 species of Auchenorrhyncha, more than 10 500 species of Heteroptera, and more than 700 species of Psylloidea. A. N. Kiritschenko supposed that the total number of Hemiptera specimens stored in the ZIN RAS is at least 10 millions (I. M. Kerzhner, pers. comm.). The superfamily Psylloidea are represented in ZIN RAS by seven families (Aphalaridae, Calophyidae, Carsidaridae,

Homotomidae, Liviidae, Psyllidae, and Triozidae) and contains nearly 500 type specimens including the holotypes, lectotypes, and paratypes of the species mainly described by M. M. Loginova, Z. A. Konovalova, V. G. Baeva, and A. M. Gegechkori. Our current project aimed at getting high quality images of every psyllid type specimen retained in ZIN RAS including the lateral view, frontal view of the head, antenna, and the labels. All photographs and associated data will be available under the Creative Commons Attribution – Noncommercial – Share Alike (CC BY-NC-SA) license through the web portal of the Zoological Institute which will be released within the next few months at <https://www.zin.ru/collections/brc/collections.html>.

The project is financially supported by the grant of Ministry of Science and Higher Education of the Russian Federation (N 075-15-2021-1069).

Preliminary results of research on the Miridae (Hemiptera: Heteroptera) of Israel [P]

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The insect collection at the Steinhardt Museum of Natural History, Israel National Center for Biodiversity Studies, Tel Aviv University in Tel Aviv, Israel (SMNHTAU) was established around 1960 by J. Kugler who served as its curator until 1980 when A. Freidberg replaced him. In 2012 he was succeeded by N. Dorchin, who is the current chief curator of entomology at the museum. It is continuously increased through additions made by the staff, and donations from organizations and individuals. The Hemiptera of the collection, including representatives of the suborders Heteroptera, Auchenorrhyncha and Sternorrhyncha collected between 1898 and the present, are currently curated by Tania Novoselsky.

Miridae are the largest family of Heteroptera with more than 11.000 species described. They are mostly phytophagous and occur in a great variety of natural environments. Documenting their presence in Israel is particularly relevant, considering its exceptionally high biodiversity. The first mention of a mirid from Palestine goes back to Douglas & Scott (1868), but the main milestones of the species accumulation for Miridae are Bodenheimer's *Prodromus Faunae Palaestinae* (1937), which mentioned 90 species, and a series of papers by Rauno Linnavuori (1951–1952, 1960–1962, 1965, 1973, 1989, 1992) described 27 species and one subspecies as new for science, besides reporting 73 new records. Presently, according to the *Catalogue of Palaearctic Heteroptera* (online), the family of Miridae of Israel is known to include 91 genera and 253 species, subdivided into six subfamilies: Bryocorinae (5 genera, 13 species), Deraeocorinae (5 genera, 11 species), Isometopinae (2 genera, 2 species), Mirinae (27 genera, 60 species), Orthotylinae (16 genera, 44 species), Phylinae (36 genera, 123 species). A project aimed to reach a thorough knowledge of the Miridae living in Israel was undertaken by the authors in 2022, based on the study of the rich material preserved in the SMNHTAU and reaching the following preliminary results: 5–6 species new for science were discovered; 42 species never recorded from Israel were identified; several misidentifications, mainly due to E. Wagner, were corrected. The final step will be the publication of an illustrated identification key of all the Israeli Miridae species arranged by subfamilies.

Preliminary study of antennal sensilla in Lygaeoidea [P]

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The superfamily Lygaeoidea is a taxon of true bugs (Heteroptera), consisting of 16 families. Most species display seed feeding habits, while some others are typical phytophagous sap-suckers. The antennal sensilla of various families of Lygaeoidea were analyzed with the use of a scanning electron microscope (SEM). Studies showed the presence of sensilla morphologically similar to those present in other terrestrial bugs (sensilla trichodea, sensilla basiconica, sensilla campaniformia). In general, mechanosensilla are the most dominant type of antennal sensilla in Lygaeoidea, especially trichoid sensilla. Along with them there are leaf-like sensilla and campaniform sensilla. Between trichoid sensilla, there are usually hidden basiconic sensilla. The sensillar sets on the antennae of the studied taxa of Lygaeoidea display great uniformity which further supports the concept of the superfamily.

The leg sensilla of Nepomorpha – comparison of strictly aquatic and more riparian taxa (Corixidae, Ochteridae, Gelastocoridae: Nepomorpha: Heteroptera) [O]

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Insects from Nepomorpha, despite being referred to as aquatic bugs, live in various environments – some are associated strictly with water and some are mostly terrestrial. Specimens from the aquatic Corixidae and two riparian families – Ochteridae and Gelastocoridae were examined with the use of a scanning electron microscope (SEM). Apart from the differences in general leg morphology (legs adapted for swimming in Corixidae and for walking in Ochteroidea), eight main types of sensilla were found on the legs. From those, mechanosensilla displayed the most observed variability. Some cuticular structures with an unknown function were also observed, and a role was hypothesized for some of them. The leg sensilla of Nepomorpha had not been studied until now, therefore this is the first attempt to describe their sensory structures.

Cretaceous aphids from the Far North [O]

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In contrast to most other insect groups which flourish in tropics, aphids are most diverse in temperate climate zones of the Northern Hemisphere. However, relatively few representatives expand beyond the Arctic Circle. It might have been different in the past when the climate was much warmer. Fossil materials from Taimyr amber have revealed aphid diversity at that time. The term Taimyr amber refers to a group of fossil resins collected from Taimyr Peninsula. The variously-aged resins also differ in their fauna composition. The oldest faunas date back to the

Upper Albian (the Lower Cretaceous) and the youngest to the Santonian (the Upper Cretaceous). So far, a considerable number of insects have been described from different sites (mainly Yantardakh) including 18 aphid species, mostly representing extinct families. While examining new materials from Taimyr amber, we found more aphid inclusions described as two new genera and three new species. In addition, we reported the first apterous aphid morph of a species belonging to the family Eriosomatidae. Due to taphonomic processes, hardly ever could apterous morphs be preserved in sedimentary rocks and they are almost exclusively found as inclusions in fossil resins. The species described here is the second oldest represented by an apterous morph. The only older apterous morph comes from the Lower Cretaceous Lebanese amber. In younger fossil resins apterous specimens become more abundant. Basing on aphid fauna from Taimyr amber, it is possible to assume that in the Late Cretaceous aphids in the Far North were diverse and abundant. It may be connected with the fact that the climate then was much milder and also that aphids were associated with gymnosperms, the plants which have remained dominant at high latitudes.

Fauna of jumping plant-lice (Hemiptera: Psylloidea) in Bulgaria [O]

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The taxonomy and distribution of the superfamily Psylloidea has been relatively intensively studied in Europe, but knowledge of the psyllid fauna in Bulgaria is quite scarce. Previous publications mentioned the occurrence of 100 species in Bulgaria. We give a comprehensive overview of records from the literature, as well as unpublished data based on numerous specimens from Bulgaria kept in the Moravian Museum, Brno (MMBC), and in the Zoological Collection of Sofia University (BFUS). As a result, three genera (*Arytainilla* Loginova, 1972, *Aphorma* Hodkinson, 1974, and *Strophingia* Enderlein, 1914) and 29 species of the Psylloidea are newly reported from Bulgaria. Of these, *Colposcения bidentata* Burckhardt, 1988, *Dyspersa kantshavelii* (Gegechkori, 1977), *Eryngiofaga* cf. *babugani* (Loginova, 1964), and *Heterotrioza eurotiae* (Loginova, 1960) are reported from Europe for the first time. The following four species should be excluded from the Bulgarian fauna as their previously published records from Bulgaria are most likely based on misidentifications: *Aphalara sauteri* Burckhardt, 1983, *Craspedolepta conspersa* (Löw, 1888), *Eryngiofaga mesomela* (Flor, 1861), and *Dyspersa viridula* (Zetterstedt, 1828). With a total of 125 documented species from 30 genera, the psyllid fauna in Bulgaria is now relatively well studied compared to neighbouring countries. However, we expect that future fieldwork will reveal even more taxa, especially of species occurring in the Balkan Mountains and Danube Plain regions of Bulgaria.

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The Hemiptera of Salisbury Plain, Wiltshire, UK [P]

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Salisbury Plain is the largest single tract of unimproved calcareous grassland in western Europe, and is a stronghold for many species of bird and invertebrates which are rare and declining elsewhere. The site is owned and managed by the MOD and has largely escaped the agricultural improvements of other grassland sites. Studies on the Hemiptera fauna were undertaken in 2022 at sites across the Plain as part of condition assessment monitoring on behalf of Natural England and several scarce and previously unrecorded species were found, including first records of the mirid bugs *Hallodapus rufescens* and *Deraeocoris scutellaris*, both species with poorly understood ecological preferences and not usually recognised as chalk habitat species. A small but characteristic suite of species were also recorded which are generally scarce in Britain. Current findings are compared with previous surveys conducted in 2002 and 2008 in order to provide an up to date representation of the Hemiptera fauna of Salisbury Plain.

A taxonomic revision of the jumping plant-louse genus *Leuronota* (Hemiptera: Psylloidea: Triozidae) [O]

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The plant-louse genus *Leuronota* Crawford currently includes species from America, Southeast Asia, and Oceania. Though there is evidence supporting the monophyly of the American species but not for the genus as presently perceived. This assumption was, however, not tested, owing to the lack of a formal generic revision, inadequate original descriptions of many of the species and insufficient material in general. Thus, we conducted this long-pending revision of *Leuronota* to achieve a better resolution of the group and to explore its internal relationships, as well as to properly classify several apparently new species recently collected in Brazil and Costa Rica. To do so, we revised over 1,000 specimens including relevant type material. Species delimitation was based mainly on characters of the forewing and male terminalia and, to a lesser extent, the genal processes and female terminalia. We described, photographed, and produced drawings for all species, and constructed an identification key for adult specimens. As a result, we (1) transferred the non-American species to other genera; (2) synonymised four described species; (3) revised the generic diagnosis; and (4) formally described 28 new species. Our study almost doubled the number of described species of *Leuronota*, highlighting the importance of taxonomy as a fundamental discipline not only for cataloguing biodiversity but also for understanding it. Furthermore, we created the foundation for examining the evolutionary patterns of insect-plant associations, an important question one could not answer without a sound taxonomic base.

In-depth morphological studies on the diversity of chemoreceptive antennal sensilla in selected species of the Cixiidae and Delphacidae (Fulgoromorpha, Hemiptera) [O]

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The study aims to compare the antennal chemosensory organs in species representing the most basal evolutionary lineage of extant Fulgoromorpha. Although their representatives are well known and distributed worldwide, the diversity of their antennal sensilla remains to be investigated. The shape of the antenna, the types of mechano- and chemosensillae, their distribution on the pedicel, their presumed function and the patterns of their profile have been characterised in several species. Nevertheless, a comparative study of the sensory system of planthoppers is still pending. The antennal sensory system is probably crucial for the recognition of host plants and sex pheromones. The study of chemosensilla types and their distribution is also essential for the systematics and phylogeny of the planthoppers. The antennae consist of three main segments; scape, pedicel, and flagellum (with a bulbous base and one or two arista). A characteristic phenomenon of planthoppers is that the pedicel, is covered mainly with differently shaped chemosensory plate organs and conical sensilla, in addition to several mechanosensilla that respond to air currents. In previous studies, it was assumed that the antennal sensilla within a family were the same in all species. However, in the current study, the differences in antennal sensory structures and their distribution appear to be substantial. The main differences between the subfamilies of Cixiidae and within the subfamilies of Delphacidae were observed in the size and shape of the pedicel, distribution of the chemosensory area, the profiles of the pores of the plate organs and in the conical sensilla. The outlines and number of cuticular denticles, which frame the porous chemosensory plate organs, were also analysed.

A newly introduced species and genus in Europe: Records of *Draeculacephala robinsoni* Hamilton, 1967 (Auchenorrhyncha: Cicadellidae) in France and Spain [P]

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In 2021, the New World leafhopper genus *Draeculacephala* Ball (Hemiptera: Cicadellidae: Cicadellinae) was recorded for the first time in the Palearctic Region, in France (Pyrénées-Orientales) and Spain (Catalonia). The species present in both countries is *Draeculacephala robinsoni* Hamilton 1967, one of the most common and widespread species of the genus in eastern North America. The species already seems to be firmly established in the region since it was found in 2021 at 11 different sites with a maximum distance of 86 km between them. Host plants are grasses but a certain affinity for *Paspalum distichum* could be noted, especially at sites where nymphs were found in 2021. Subsequent surveys in 2022 revealed the presence of the species in other locations in Catalonia. However, surveys conducted in coastal wetlands

such as Tordera and Llobregat yielded negative results. Additionally, in Catalonia in 2022, the species was detected in fields of barley, rice and corn. Both nymphs and adults were found, especially in barley and rice. It is worth noting that the genus has been reported as a vector of plant pathogens, including *Xylella fastidiosa*. Due to its classification as a quarantine pest in the EU, it is crucial to closely monitor its further spread on the continent.

Overview on adventive eucalypt psyllids in the world [O]

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The genus *Eucalyptus* with over 730 species is native to Australia, Tasmania and nearby islands. Today, many eucalypt species adapted to different climatic conditions are planted on all continents. They are used for the production of paper, cellulose, wood, charcoal and many other purposes. The species richness of the Australian eucalypt flora is reflected in the associated insect fauna, such as the host specific jumping plant lice or lerp insects (Sternorrhyncha, Psylloidea). Of the around 400 known Australian psyllid species, 275 species develop on eucalypts. Several psyllid species have become serious pests in eucalypt plantations in Australia and, in particular, on other continents. Psyllids can harm their host by removing large quantities of plant sap, by damaging new flush or by the secretion of honeydew serving as a substrate for sooty mold. Currently, 15 eucalypt psyllids have been reported from outside Australia with the highest number in New Zealand followed by the USA. From Brazil, with the largest area of eucalypt plantations, four species are known. They are present in most of the eucalypt-growing regions of Brazil. These exotic psyllids attacking the eucalypt plantations were accidentally introduced into the country in the last three decades: *Blastopsylla occidentalis*, *Ctenarytaina eucalypti*, *C. spatulata* and *Glycaspis brimblecombei*. The pest status of the exotic eucalypt psyllids varies between species and regions. Many colonize a variety of eucalypt species rarely causing significant damage, while others can be very destructive. As an example, *Ctenarytaina eucalypti* caused a significant production loss (30%) in commercial plantations of *Eucalyptus pulverulenta* in the USA (California) and Europe. Here we analyze the current and potential threat of psyllids to eucalypt plantations around the world. There is some concern that additional Australian eucalypt psyllids will be inadvertently introduced into other continents and become pests.

The role of drainage canals in conservation of grassland true bugs (Heteroptera) in the Pannonian Region [O]

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In central Hungary, different habitats and soil types characteristic for the Pannonian Region can be found: wetlands, dry grasslands and forests on aeolian sands, loess or peaty loams. In the mid-20th century, a dense network of drainage canals was built in the region to free the land from water and support agriculture. Since then, many wetlands and species associated with them disappeared. Nowadays, drainage canals are being evaluated for their role in biodiversity conservation. Our study aimed to investigate how true bug communities respond to specific environments created by different landscape matrices and substrates. For sampling sites, we

selected seminatural reference grasslands (sandy steppes, saline steppes, fens) and drainage canals (grassland and agrarian) on different soil types (sandy, saline, peaty). Species and functional richness, taxonomic and functional diversity of true bug communities were analyzed together with community weighted mean values of several functional and life-history traits. Analysis of variance and Tukey's test were performed to validate the differences in trait values among communities from different habitats. Results showed that agrarian canals have the highest number of species and the greatest diversity of functional traits but do not contribute to the taxonomic diversity of the region. Communities of agrarian canals mostly consist of larger and polyphagous species which prefer partly-shaded habitats with shrubs and taller vegetation. These canals have the greatest infestation by invasive plants and are mostly occupied by habitat generalists among true bugs. In the case of sandy habitats and fens, communities of grassland canals are intermediate between those of reference grasslands and agrarian canals. However, in all three saline habitats, there is a clear separation of communities. Despite having the lowest taxonomic and functional diversity, saline grassland canals preserve unique communities of highly endangered saline marshlands.

Spread of *Tautoneura polymitusa* in the Czech Republic (Hemiptera: Auchenorrhyncha: Cicadellidae) [P]

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The leafhopper *Tautoneura polymitusa* Oh & Jung, 2016, was described from South Korea. Reports of its occurrence from Central and Eastern Europe (Hungary, Slovenia, Serbia, Ukraine, Russia) and the USA (Missouri) soon followed. In 2018, the species was found for the first time in the Czech Republic on the territory of the capital city of Prague. The first known locality was a garden area in Prague-Smíchov (occurrence also confirmed in the following years 2019–2023). In 2019, *T. polymitusa* was found in two protected nature areas (Baba and Modřanská rokles Nature Monuments), in 2022 it was found in an elm plantation in Prague-Michle and in the Rokytka Brook valley in Prague-Kyje. In all these localities, *T. polymitusa* was collected in sunny habitats on the autochthonous elm *Ulmus minor* or in plantations of the alien *Ulmus pumila*. *Tautoneura polymitusa* often co-occurred there with other leafhopper species, most commonly *Arboridia pusilla*, *Empoasca decipiens*, *Kyboasca bipunctata*, and *Zyginella pulchra*. It appears that *T. polymitusa* may spread with elm saplings planted as hedges.

Seasonal wild dance of dual-obligate symbionts in the pear psyllid *Cacopsylla pyricola* (Hemiptera: Psylloidea): Titer of symbionts tell different stories [O]

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Cacopsylla pyricola (Hemiptera: Psylloidea) is a multivoltine pear psyllid that spends its entire life cycle on pear trees, producing several summer generations and one morphologically

different overwintering generation. This species is also a vector of ‘*Candidatus Phytoplasma pyri*’, the causative agent of Pear Decline disease. As most sap-feeding insects, *C. pyricola* maintains obligate relationships with two endosymbiotic bacteria, *Ca. Carsonella ruddii* and *Ca. Psyllophila symbiotica*, that provide the host with essential nutrients. Using quantitative PCR, we explored the seasonal dynamics of these symbionts in a natural population of *C. pyricola*, collected across an entire year, encompassing all generations of this species. Among all tested individuals, immatures harboured the highest titer of both symbionts, while the lowest symbiont density was observed in males. The density of *Carsonella* remained high and relatively stable throughout the vegetation period, whereas its density significantly dropped during the winter, overlapping with *C. pyricola*’s reproductive diapause. In contrast, *Psyllophila* titer was significantly higher than *Carsonella* titer and exhibited fluctuations throughout the sampling year related to host age. Despite a tightly integrated metabolic complementarity between *Carsonella* and *Psyllophila*, our findings suggest that their density dynamics are regulated by different forces that could be linked to differences in their metabolic roles at different life stages of the host. Taken together, this study provides insights into host-symbiont interactions and could thus contribute to the development of novel strategies to control plant disease vectors.

Long-term changes in Auchenorrhyncha assemblages in a floodplain forest in southern Moravia (Czech Republic) [P]

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Long-term studies are still quite rare in insect ecology, although they are crucial for monitoring the responses of insect communities to antropogenic changes. We describe the assemblages of true hoppers (Hemiptera: Auchenorrhyncha), a model group of phytophagous insects, in the floodplain forest “Horní les“ near Lednice (South Moravia, Czech Republic), which is part of the LTER network (long-term ecological research). Auchenorrhyncha were collected there with standardised sweep-netting in the herb and shrub layers in 1971, 1972, 1981 and 1991, i.e. before and after the regulation of the nearby Dyje River in the 1970s which changed the water regime of the forest by stopping the regular spring floods. A total of 7483 specimens of 104 species of Auchenorrhyncha were included in the data set. After the end of natural flooding in the second half of the 1970s, the abundance, species richness and equitability of the Auchenorrhyncha assemblages declined. The impact on Auchenorrhyncha was more pronounced in the herb layer than in the shrub layer, where abundance and species richness were similar before and after the water regulations. After the end of the floods, the species composition of the Auchenorrhyncha assemblages also changed significantly in both the herb and shrub layers. Auchenorrhyncha species associated with hygrophilous vegetation types (originally dominated by *Carex acutiformis*, *Deschampsia cespitosa* and *Glechoma hederacea*) disappeared from the site and the species composition of Auchenorrhyncha in the herb layer in 1981 and 1991 was most similar to the assemblages that occurred in the 1970s in the mesophilous vegetation type dominated by nettle (*Urtica dioica*). In the shrub layer, the dominance of polyphagous *Empoasca* spp. increased significantly in 1981 and 1991 compared to the 1970s. Preliminary results from a re-sampling of the site in 2020–2021 indicate that these trends will continue. In addition to several other mesophilic and xerophilic Auchenorrhyncha species, three alien species have newly established at the site (*Japananus hyalinus*, *Orientalis ishidae* and *Phlogotettix cyclops*).

Planthopper and leafhopper communities (Hemiptera: Fulgoromorpha et Cicadomorpha) of the post-mining coal slagheaps in the Upper Silesia region (southern Poland) [P]

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Slagheaps and other post-mining dumping grounds are interesting sites for ecological research on many groups of insects. Such areas, as a result of spontaneous natural succession or intentional reclamation, undergo partial or complete overgrowth with grass-dominated vegetation. Within the groups of insects inhabiting grassland communities of postindustrial areas, apart from orthopterans and butterfly larvae, hemipterans are the largest consumer group of grass biomass. As they are phytophagous, their piercing-sucking mouthparts provide them with access to internal plant tissues, which are free from macrocontaminations. The study was carried out in 2014 on planthopper and leafhopper communities inhabiting selected post-mining coal slagheaps on the boundaries of the cities of Rybnik and Rydułtowy (Upper Silesia, southern Poland). The plots represented vegetation at different stages of development: from very simplified, composed exclusively of perennials to well-stratified. On 5 research plots, a total of 50 Auchenorrhyncha species were collected (10 species of planthoppers and 40 species of leafhoppers) represented by 907 specimens. The results of the zoocenological analysis revealed that the community dynamics was mostly influenced by eurytopic species such as *Psammotettix confinis*, *Macrostelus laevis*, *Balclutha calamagrostis* and *Errastunus ocellaris*. Chorological analysis indicated that wide-ranging elements form the major groups: Trans-Palaeartic, Euro-Siberian and European. Regarding hostplant specificity, polyphagous and oligophagous shared the highest percentage ratio. Considering the number of annual generations, bivoltine species prevailed over the monovoltine ones. Taking into account the overwintering stage, forms hibernating as eggs dominated over nymphs and adults. The results obtained indicate a significant instability of the studied environments, which is typical for urban ecosystems, particularly when they are shaped differently from more pristine ones. At the same time, urban centers support some degree of biodiversity that is indigenous to the region, including rare and endangered species. Concluding, further studies are needed across multiple urban and post-industrial sites so that we can better understand these environments.

The bugs in a-gadda-da-vida – evolutionary paths, models and conundrums of the Hemiptera [O]

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The Hemiptera is one of the Big Five insect orders, with fossil history reaching the Carboniferous. Its concept, content, classification varied through centuries, with still numerous unanswered questions. The geological history of the order and its lineages is complex, with periods of fruitful development and dramatic changes, originations, and radiations, and extinctions. These changes, sometimes rapid and turbulent, sometimes mild and prolonged, are preserved in the fossil record, but also in the features of contemporary taxa. The evolutionary

history of the Hemiptera has been tumultuous, and its scenario is still full of ambiguities and gaps. This is due not only to the characteristics of the fossil record but also to its interpretation. The evolution of the hemipterans must be understood in the context of time and environmental changes, sometimes slow, sometimes rapid. Equally important in understanding of the evolutionary pathways of these insects are interactions with other organisms. Adaptations to new habitats and environments, new food sources and ways of their exploitation, resource sharing and avoidance of competition, and escape from predators, parasites and parasitoids – these phenomena have left a lasting mark on their evolutionary scenario. However, the bugs are also a playground for microorganisms, sometimes being neutral, sometimes harmful, often entering into close symbiotic relationships with hosts. Endosymbiosis could be an opportunity, but also an evolutionary rabbit hole. Interactions with other animals, e.g. in various forms of trophobiosis appeared. Specific reproductive strategies, sexual dimorphism and sexual conflicts, parthenogenesis, complex sexual and reproductive behaviors, including traumatic insemination and parental care – these could be beneficial at a particular time and place, risky at others. Major global changes of abiotic and biotic nature have shaped the evolutionary pathways of the Hemiptera during 300 million years. These insects survived many troubling events, adapted fast, in hardship and toil to new challenges, new environments, associated organisms and partners, particular lineages flourished, the others went extinct, interacted with changing environments and other organisms at various levels and scales.

The first damsel bug (Heteroptera, Nabidae) from Eocene Lublin amber [O]

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The true bug family Nabidae – damsel bugs, contains about 30 genera and 400 species, divided into two subfamilies, Prostemmatinae and Nabinae, and up to eight tribes. The internal classification has been unclear and controversial, confusing researchers from different fields. Fossil Nabidae are uncommon in the fossil record. The oldest representative of the family – *Cretanazgul camillei* Garrouste et al., 2020 – comes from Cenomanian, Kachinian amber. Two species are known from Baltic amber – ‘*Nabis*’ *lucidus* Germar & Berendt, 1856 and *Metatropiphorus succini* (Jordan, 1952). We present the first fossil Nabidae from a new source of fossil resins – Eocene amber from the Lublin area. Amber occurs in fine clastic sediments accumulated in the middle and late Eocene of the Górka Lubartowska area (north Lublin region, SE Poland). The amber-bearing sediments are formations of the littoral zone or shallow siliceous shelf. Accumulations of amber occur in marine sediments associated with regressive facies, deposited in fairly low energy environments. The amber piece from Górka Lubartowska contained a fossil of a true bug presenting features of the Nabidae, but also features not found in modern damsel bugs. The most conspicuous features of this fossil are a short head, with stalky eyes, rostrum base strongly shifted ventrad, short, two-segmented tarsi and the presence of fossula spongiosa on all legs. Some morphological details of this inclusion are shared with representatives of modern Prostemmatini (Prostemmatinae), others with Carthasini and Arachnocorini (Nabinae), placing it in an intermediate position. Analyses of the morphological features of the fossil and comparisons with modern representatives of the family have allowed hypotheses to be put forward regarding its palaeoecology, behavior and habitat. It can be assumed that this fossil was a riparian bug, hunting near banks or marginal growths near freshwater bodies, estuaries and sea coasts, similar to contemporary members of the families Leptopodidae, Saldidae or Gelastocoridae. Among the recent Cimiciformes, including the

Nabidae, fossula spongiosa is found on the pro- and mesotibiae or only on the protibiae. Its presence on all legs is usually associated with traumatic insemination behavior, as postulated in this fossil damsel bug.

Cylapinae (Heteroptera: Miridae) of Madagascar [P]

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Madagascar, the fourth largest island in the world, is one of the top biodiversity hotspots on the Earth. The species richness of the Madagascan fauna is exceptional and is characterized by a very high degree of endemism. Only ninety-four species of Miridae, the most species-rich family of true bugs, have hitherto been recorded from this region. This obviously does not represent the actual diversity of this group and indicates a significant taxonomic impediment in this region. For example, of over 100 new species of Heteroptera described from Madagascar since 2010, only seven were Miridae. Cylapinae is currently recognized as one of the least diverse plant bugs (Miridae) subfamilies. They have primarily tropical and subtropical distributions, with only a few members inhabiting temperate regions. Gorczyca (2000) provided a comprehensive treatment of the Afrotropical Cylapinae. Since then, the Cylapinae of this region have received little attention, with most papers being descriptions of single taxa. Gorczyca (2006), in his catalogue, listed eight Cylapinae species represented by only a few individuals from Madagascar. In a rich collection of Madagascan true bugs in the Moravian Museum in Brno (MMBC), we recently found an unusually high (given the rarity of this group) number of Cylapinae specimens. So far, we described two new genera, each represented by a single new species, *Cassiotropis aciformis* and *Infernotropis madagascariensis*. In addition, *Fulvius anthocoroides* was recorded for the first time from Madagascar. Our poster presents the results of further research on Madagascan cylapines, which will result in the description of additional taxa within the tribes Fulviini and Vanniini.

Faunistic study of Auchenorrhyncha species in olive orchards in Greece [O]

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Studies of species composition, abundance and seasonal appearance of Auchenorrhyncha in Greek olive orchards are of paramount importance, since there is the plausible/imminent threat of the bacterium *Xylella fastidiosa* to invade and expand in Greece. Until recently, most studies on Auchenorrhyncha species in Greece were in mountainous regions, in forests, forest openings and near lakes and rivers by the late Professor Sakis Drosopoulos, while recently some studies were conducted for agricultural areas. From 2016 to 2023, extensive biodiversity studies were undertaken in twelve olive orchards in three main geographic regions of Greece: Peloponnese (4 orchards), Sterea Ellada (4 orchards) and Northeast Aegean (4 orchards). Malaise traps were installed in each orchard, and examined on a monthly basis for one year. Moreover, sweep net sampling was undertaken from the herb layer in some of the orchards to find species which are not so mobile but might be important as vectors of *X. fastidiosa*, and to associate

Auchenorrhyncha taxa with host plants. The most dominant species in most orchards were two Typhlocybinae (*Empoasca decipiens* and *Zyginidia pullula*), while many genera of Deltocephalinae constantly appeared in small numbers. Aphrophorids in Malaise traps were collected in low numbers, compared with sweep net, in most cases. According to the results of sweeping, *Philaenus spumarius* and *Neophilaenus campestris* were considered dominant in the areas where they occurred. The main host plant from which aphrophorids were collected was *Avena sterilis*. This study provides an overview of Auchenorrhyncha species composition in Greek olive orchards that could be useful for an effective containment of *X. fastidiosa* invasion to Greece.

Villages located in agglomeration zones of cities can still harbour species-rich true bug assemblages [O]

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Agricultural intensification and urbanization are increasing phenomena and the most important forces by which humans can change the natural environment and, thus, the biodiversity and functioning of ecosystems. In addition, urbanization can extend from cities to the nearby countryside as well. For instance, traditional country gardens are often replaced by ornamental gardens in villages near to cities. However, we have little knowledge of how these processes affect the biodiversity in rural landscapes. To fill this knowledge gap, we sampled the fauna and flora in 72 villages around 18 middle-sized towns in Hungary and Romania in a full factorial design. Our design variables were the landscape composition around villages (agricultural vs. forested), agglomeration status of villages (near to city vs. far to city), and location of samples (in the centre vs. at the edge of villages). We used various methods for sampling the biodiversity of plants and animals, including D-vac suction sampling for true bugs. In the first sampling period (May 2022), we collected 5370 true bug individuals of 160 species. We collected several species with a high conservation value, such as *Acalypta carinata* (Panzer, 1806), *Alloeorhynchus flavipes* (Fieber, 1836), *Berytinus hirticornis* (Brulle, 1836), *Chartoscirta cocksii* (Curtis, 1835), *Macrotylus paykullii* (Fallen, 1807), *Lygaeosoma sardeum* Spinola, 1837, and *Sciocoris sulcatus* Fieber, 1851. The surrounding landscape and agglomeration status did not significantly affect the species richness and abundance of true bugs. However, we found higher species richness and abundance of true bugs on the edge of the villages compared to their centres, similar to the diversity pattern observed often in cities. Our results suggest that villages still harbour numerous species, but urbanization processes in villages may decrease their biodiversity in the future.

Response of Hemiptera (Auchenorrhyncha and Heteroptera) to experimental restoration of grasslands invaded by the expansive grass *Calamagrostis epigejos* [O]

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Calamagrostis epigejos (wood small-reed or bushgrass, Poaceae) is a rhizomatous competitive plant species that is rapidly spreading into species-rich grasslands across Europe and threatening their diversity. Native hemiparasitic Yellow Rattle plants (*Rhinanthus* spp., Orobanchaceae) have been proposed as biocontrol agents to suppress *C. epigejos*, but experimental evidence is limited to a few local case studies. We investigated the effects of *Rhinanthus alectorolophus* and *R. major* on vegetation and arthropod communities in a field experiment in *Calamagrostis*-encroached grasslands at 15 sites in Czechia and Slovakia. We compared the effect of *Rhinanthus* with the effect of mowing, which is standard grassland management in the region. The experimental plots (2×2 m) were mown once or twice a year, in combination with or without *Rhinanthus* sowing, and the control plots remained fallow. In the third year of the experiment, arthropods were collected from each plot using standardised suction sampling. Both mowing and *Rhinanthus* sowing resulted in a significant suppression of *C. epigejos* and an increase in vegetation diversity, while the abundance of Auchenorrhyncha decreased compared to the fallow plots. *Rhinanthus* plots mown twice also had fewer Auchenorrhyncha species than plots that were mown only once. The trend was reversed for Heteroptera, although the differences between plots were not significant. Arthropod community composition changed: *Rhinanthus* promoted phytophagous Hemiptera species associated with various dicotyledonous plants and suppressed grass-feeding species, including specialists on *Calamagrostis*, and several predatory Heteroptera species. Sowing *Rhinanthus* into homogeneous grasslands covered with *C. epigejos* may thus support some arthropod taxa that would otherwise not find suitable conditions there. Negative impacts on Auchenorrhyncha can probably be mitigated by short-term (maximum two years) restoration management with *Rhinanthus* and mowing twice per season to suppress *C. epigejos*, followed by standard mowing management with one cut to support restoration of species diversity.

Succession of Auchenorrhyncha assemblages in abandoned military training areas [O]

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Military training areas are remarkable hotspots of biodiversity today because they have a heterogeneous mosaic of habitats that is lacking in today's agricultural landscape in Central Europe. This mosaic has evolved through regular disturbance by military activities of varying intensity since the 19th century. However, most military training areas in the Czech Republic have been abandoned in recent decades. As a result, ecological succession is taking place and early succession habitats with their specialised fauna and flora, which depend on regular disturbance, are threatened. Auchenorrhyncha, an important herbivorous insect group that is very common and species-rich in grasslands, can also be expected to be affected by this succession. We studied Auchenorrhyncha assemblages at two former military training sites in the Czech Republic (Načeratický kopec near Znojmo and Pánov near Hodonín). Both sites are

located in the relatively dry and warm region of southern Moravia on acid soils, but differ in their geology (disintegrated granodiorite rock and aeolian sands, respectively). We collected Auchenorrhyncha by standardised suction sampling from four important successional stages in the areas: i) sparse vegetation with much bare soil, ii) dense short dry grassland, iii) dense tall ruderal grassland and iv) woodland. A total of 9966 individuals belonging to 149 species were found. The species composition of the Auchenorrhyncha assemblages differed significantly between habitat types at both sites. The highest species richness and abundance of Auchenorrhyncha was found in tall ruderal grassland, although plant species richness was highest in sparse vegetation and dense short dry grassland. Most threatened species were associated with dense short dry and/or tall ruderal grassland. Each habitat type harboured up to 11 indicator species that significantly preferred only that one particular habitat type. For efficient conservation of Auchenorrhyncha biodiversity, it is therefore important to maintain habitats on former military training sites at different stages of vegetation succession. This can be achieved by disturbing the vegetation and upper soil layers through grazing and the use of military equipment, trucks and other vehicles.

Monophyly of Penthimiini and species delimitation of *Penthimia* (Hemiptera: Cicadellidae: Deltocephalinae) [P]

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The deltocephaline tribe Penthimiini contains approximately 224 species in 46 genera and occurs in all zoogeographical regions. The relationships among genera are not clear and some species of *Penthimia* are difficult to delineate owing to intraspecific variation and interspecific similarity. In this study, the monophyly of Penthimiini was detected with molecular characteristics and some closely related species of *Penthimia* were analyzed using DNA barcoding. The monophyly of Penthimiini was confirmed based on three nuclear genes (28S rDNA, H3 and H2a) and two mitochondrial genes (16S rDNA and COI) with Maximum likelihood and Bayesian inference methods using 22 species of 6 genera as ingroup and 5 related outgroups from the tribe Athysanini (*Eusama amanda*), Drabescini (*Drabescoides nuchalis*), Mukariini (*Mukaria maculate*, *M. albinotata*) and Neocoelidiini (*Neocoelidia tumidifrons*). Phylogenetic analysis indicated that Penthimiini and its genera *Haranga*, *Neodartus*, *Penthimia*, *Reticuluma* and an undescribed new genus are monophyletic but the genus *Chanohirata* is not. The species of *Penthimia* look similar in some important morphological characters and the overlap of interspecific and intraspecific variations were also observed, which made species identification confused. Here, a total of 115 samples representing 7 morphological species of *Penthimia* were analysed. Five approaches (ABGD, ASAP, jMOTU, GMYC and bPTP) were used to delimit species based on COI. The results of species delimitation confirmed the seven described species and revealed one new species.

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Morphometric analysis of forewing venation does not consistently differentiate the leafhopper tribes Typhlocybini and Zyginellini [P]

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Tribes of the leafhopper subfamily Typhlocybinae have traditionally been defined based on differences in hind wing venation, but the forewing venation also differs among some tribes. Here we used geometric morphometric analysis to determine whether previously recognized tribes can be distinguished based on the configuration of forewing veins. Focusing on the apical area of the male right forewing, 76 semi-landmarks in six curves corresponding to individual wing veins were measured for representatives of four previously recognized tribes and the data were analyzed using principal component analysis (PCA), canonical variates analysis (CVA), and UPGMA clustering analysis. The study showed that differences in the apical area of the forewing mainly occur in RP, MP', and MP'' + CuA'. PCA, CVA, and cluster analysis showed three distinct clusters representing tribes Empoascini, Erythroneurini, and Typhlocybini (*sensu lato*) but failed to distinguish Typhlocybini (*sensu stricto*) from Zyginellini, which has been considered as either separate tribe or a synonym of Typhlocybini by recent authors. The results show that the forewing venation differs among tribes of Typhlocybinae, but also agree with recent molecular phylogenetic analyses, indicating that Zyginellini is derived from within Typhlocybini.

Molecular phylogeny of the *Idiocerus* group (Hemiptera: Cicadellidae: Idiocerini) [O]

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The leafhopper tribe Idiocerini belongs to the family Cicadellidae of Hemiptera. It contains more than 400 species in 60 genera. Xue et al. (2020) recovered a well-supported monophyletic clade comprising the “*Idiocerus* group” in the phylogenetic analysis of this tribe based on both molecular and morphological characters. However, the taxonomic status of many genera in this group is still controversial. This is the first attempt for the phylogeny of the *Idiocerus* group based on mitochondrial genes and 28S rDNA sequences. The objectives of this study are: (i) to test the monophyly of the *Idiocerus* group, (ii) to explore the phylogenetic relationships within this group and (iii) to understand the character evolution in this group. The primary achievements are as follows: 1. The monophyly of the *Idiocerus* group is supported, including 8 genera (*Chinaocerus*, *Idiocerus*, *Koreocerus*, *Nabicerus*, *Parocerus*, *Populicerus*, *Rhytidodus* and *Tautocerus*) but *Balcanocerus*. 2. The sister relationships of *Rhytidodus* + (*Parocerus* + *Populicerus*) and *Chinaocerus* + *Koreocerus* are well supported. 3. A new genus with one new species is established based on the phylogenetic results. 4. Ancestral character state reconstructions revealed that most morphological characters previously used to define genera show little or no homoplasy.

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Reference: Xue Q.Q., Dietrich C.H., Zhang Y.L. 2020: Phylogeny and classification of the leafhopper subfamily Eurymelinae (Hemiptera: Cicadellidae) inferred from molecules and morphology. *Systematic Entomology* 45: 687–702.

Hidden life in the interstices: On biology and taxonomy of Dipsocoridae occurring in Central Europe [P]

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Dipsocoridae (Heteroptera: Dipsocoromorpha) is a small family of true bugs, inhabiting interstitial spaces in riverbanks (*Cryptostemma* spp.) or various bogs and fens (*Pachycoleus* spp.). So far, five species have been reported from Central Europe (*Cryptostemma alienum*, *C. carpathicum*, *Pachycoleus pusillimus*, *P. waltli*, *Alpagut* cf. *medius*), but due to their cryptic lifestyle, only few details about their biology are known. In this study, *Cryptostemma remanei* is reported for the first time from several countries in Central Europe. Observations on hunting behaviour, microhabitat preferences and ability to survive under water are provided for *P. pusillimus* and *C. remanei*. Furthermore, SEM pictures of ultrastructures located on rostrum and antennae of the two species are presented. In further course of this project, we aim to revise the distribution of *C. alienum* and *C. remanei* in Central Europe, assess their taxonomic validity using DNA barcoding and provide deeper insight in biology of selected species of Dipsocoridae, possibly including mating behaviour and differences in preferred microhabitats.

Wanted: Alive – Using citizen science to explore the diversity of trypanosomatids in invasive true bugs (Hemiptera: Heteroptera) [O]

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Trypanosomatids (Kinetoplastea: Trypanosomatida) are well-known parasites of vertebrates transmitted by insects, causing deadly diseases such as sleeping sickness, Chagas disease or leishmaniasis. However, most trypanosomatid genera are confined only to the insect host (usually a true bug), and, unlike parasites of vertebrates, their diversity remains largely unknown. In this ongoing project, we explore the possibility of utilizing citizen science to study the diversity of these monoxenous parasites in invasive true bugs (Hemiptera: Heteroptera) in the Czech Republic. Using the citizen science-based project "Najdi.je", we have collected specimens of *Leptoglossus occidentalis*, *Nezara viridula* and *Halyomorpha halys* from more than 25 localities and examined them for the presence of trypanosomatids. So far, *Phytomonas serpens* and an undescribed species of *Obscuromonas* have been found in the digestive tract of *L. occidentalis*. The surprisingly frequent occurrence of *P. serpens* in *L. occidentalis* is particularly puzzling, as this parasite is known to develop in tomato fruits – a plant on which *L. occidentalis* has not yet been recorded feeding. In the further course of this project, we aim to continue collecting data from citizen scientists, especially after the invasive bugs become established in natural or semi-natural habitats and might become infected with native species of trypanosomatids. Furthermore, we hope to elucidate the enigmatic life cycle of *P. serpens* in *L. occidentalis*.

Morphology of the stridulatory apparatus of Peiratinae [P]

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Peiratinae is a cosmopolitan subfamily within Reduviidae with approximately 350 known species (in 35 described genera). Representatives of this subfamily are characterized by enlarged forecoxae and anterior pronotal lobe longer than the posterior lobe. Peiratinae are distributed in almost all zoogeographical regions. They are usually nocturnal, ground-dwelling, non-specialized predators, preying on other insects at night on the ground and in very diverse, mostly cryptic microhabitats (e.g. rock crevices, decomposing tree trunks, fallen leaves). The stridulatory apparatus localization is typical for Reduviidae. It consists of a groove in the prosternum (stridulitrum) and the tip of the labium (plectrum). During our studies, we have analyzed 38 species belonging to 15 genera using a scanning electron microscope (SEM). Our analysis shows distinct intergeneric differences in the morphology of both structures forming the stridulatory apparatus. The next stage of our research will focus on the morphology and distribution of the sensilla associated with the mentioned structures.

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