AMBERIF 2018

International Fair of Amber,
Jewellery and Gemstones

INTERNATIONAL SYMPOSIUM

AMBER. SCIENCE AND ART

Abstracts

GDAŃSK, POLAND

22-23 MARCH 2018

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Abstracts

Editors: Ewa Wagner-Wysiecka · Jacek Szwedo · Elżbieta Sontag
Anna Sobecka · Janusz Czebreszuk · Mateusz Cwaliński

This International Symposium was organised
to celebrate the 25th Anniversary
of the AMBERIF International Fair of Amber,
Jewellery and Gemstones
and the 20th Anniversary of the Museum of Amber
Inclusions at the University of Gdańsk

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Foreword

For 25 years, AMBERIF has been gathering people of common passion: Baltic amber (=succinite). Since its first edition, AMBERIF has been accompanied by scientific seminars, which were initiated by Prof. Barbara Kosmowska-Ceranowicz and Wiesław Gierłowski. In its silver jubilee year 2018, the seminar is an International Symposium, organized under the supervision of AMBERIF Project Director Ewa Rachoń.

Science and art have been coming together from times immemorial. They are like a good marriage, supporting and complementing each other, providing creativity and inspiration, opening new perspectives and opportunities every day. Baltic amber, but also other fossil resins of the world, is a perfect example of a link between science and art. It is because succinite in a magical way simply attracts—not only those who just love the secret beauty of amber, but also scientists and artists.

During the two days of the Symposium (22-23 March 2018), we would like to present, in light of the latest scientific reports, the dynamic development and progress of the research areas related to amber in the field of natural sciences, exact sciences and humanities. Four thematic sessions, which will be chaired by members of the Scientific Committee of the Symposium, with the honorary Chair of the Symposium, Professor Barbara Kosmowska-Ceranowicz (Museum of the Earth in Warsaw, Polish Academy of Sciences), include lectures and poster sessions. Our invitation as keynote lecturers was accepted by: Prof. Faya Causey (Getty Research Institute, USA), Prof. Sarjit Kaur (Laboratory of Amber Research, Faculty of Chemistry, M. Vassar College, USA), Prof. Joseph B. Lambert (Faculty of Chemistry, University of Trinity, USA), Prof. Vincent Perrichot (Faculty of Earth Sciences, University of Rennes 1, France).

Session "*Life traces in amber"* chaired by Prof. Jacek Szwedo and Dr Elżbieta Sontag (Faculty of Biology, Laboratory of Evolutionary Entomology and Museum of Amber Inclusions, University of Gdańsk) is dedicated to the traces of ancient organisms and their activities, preserved in fossil resins. Its main topic is the inclusion of insects and other arthropods, plants, fungi and other organisms. This session is also a celebration of the 20th Anniversary of the Museum of Amber Inclusions at the University of Gdańsk.

Local and supra-regional traditions in the manufacture of amber objects among European societies of the Bronze and Iron Age is the leading topic of the session "*Stylistics and processing technology of amber products in 3rd-1st millennium BC: local and interregional perspective"* conducted by Prof. Janusz Czebreszuk and Mateusz Cwaliński (Institute of Archaeology, Adam Mickiewicz University in Poznań). The twelve oral communications presented in this session will be summarized in a special final discussion.

The latest achievements in research on amber properties with the use of modern research techniques and applications of these achievements form the main topic of the session "*Highlights of amber properties investigations and current aspects of amber mining."* This part of the Symposium is also dedicated to very important current problems—also environmental ones—related to the geology and extraction of amber. This session is under the supervision of Dr Ewa Wagner-Wysiecka and Dr Natalia Łukasik (Faculty of Chemistry, Gdańsk University of Technology).

The amazing and captivating world of myths, toposes and their representations in amber artefacts is the subject of the session on "*Myths, collections and conservation of amber,"* led by Dr Anna Sobecka (Faculty of History, University of Gdańsk).

Instead of a summary—

"Man is unique not because he does science, and he is unique not because he does art, but because science and art equally are expressions of his marvellous plasticity of mind" (Jacob Bronowski)

Ewa Wagner-Wysiecka

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ORAL PRESENTATIONS

POSTERS

Koba-chan 2009. 'File:Eurasian mass.jpg', Wikimedia Commons, the free media repository. https://commons.wikimedia.org/w/index.php?title=File:Eurasian_mass.jpg&oldid=139404878 (accessed 23.01.2018)

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More than expected – disparity of the Hemiptera (Insecta) in the mid-Cretaceous Burmese amber

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The Hemiptera – this insect order which such different insect groups aphids, scale insects, whiteflies, psyllids, planthoppers, singing cicadas, froghoppers, leafhoppers, treehoppers, true bugs, moss bugs and numerous extinct lineages not possessing trivial names. The Hemiptera – the one of Big Five insect orders, the most speciose and the most diversified. The Hemiptera – the insect order covering over 300 extant and extinct families, which is the highest number among all insects (Szwedo 2018). There are 211 recognised families for the richest in species beetles, Coleoptera, with over 400,000 species described (Bouchard et al. 2011), and 160 extant and extinct families for about 125,000 species of flies already described (Thompson and Pape 2013, Michaelsen and Pape 2017). The Hemiptera appeared in the Carboniferous, and since then which is a major component of terrestrial and aquatic biota through geological periods. The Hemiptera – insects from 2 mm to 300 mm of wingspan, with wings sclerotised, membranous, reduced or transformed, the insects presenting the highest morphological disparity than any other insect order, making the major and minor groups distinguishable by particular sets of morphological characters and adaptations.

Fossil record, with all its limits, is the only source of information about taxonomic palaeodiversity and morphological palaeodisparity of extinct organisms. Inclusions in amber are invaluable source of information on organisms, which had to live millions years ago, their morphology, taxic diversity, palaeodistributions and palaeoecology. Regarding the Hemiptera, the oldest finding of these insects in amber, come from the early Cretaceous, from amber of Lebanon.

Burmese amber, mineralogically named as burmite by Gdańsk pharmacist Otto Helm (Helm 1892, 1893), till end of last century was regarded as rare and weakly known fossil resin. The interest in burmite and its inclusions exploded during the past two decades and resulted in hundreds of descriptions of taxa from this amber. The main amberiferous and fossiliferous deposit is an area near Noije Bum Hill, in Hukawng Valley,

Kachin State (Kania et al. 2015; Thu and Zaw 2017). These deposits were investigated and dated in detail by Cruickshank and Ko (2003) and Shi et al. (2012), which currently date the deposit of 98.8 ± 0.63 Ma. However, slightly older, late Aptian age of amber was recently postulated (Zheng et al. 2018), due to fact, that the amber shows evidence of redeposition (Grimaldi and Ross 2017; Smith and Ross 2018).

Burmite is bringing rich record of almost all hemipteran groups and lineages, presenting diversity and disparity far more expressed and sometimes odd, than in their recent descendants. The first descriptions come from Cockerell (1916, 1917a, b, 1919), covering planthoppers, whiteflies and true bugs. Then burmite inclusions of the Hemiptera were almost forgotten (Štys 1969, Rasnitsyn and Ross 2000, Ross and Yorke 2000).

Sternorrhyncha is one of this group which is treated in more details elsewhere (Szwedo et al. this volume). Heteroptera are quite rich, known since Cockerell's first descriptions, but insufficiently elaborated. One extinct family, Palaeoleptidae was already described (Poinar and Buckley 2009), but several others as Aradidae, Cimicidae, Coreidae, Cydnidae, Dipsocoridae, Enicocephalidae, Gelastocoridae, Hydrometridae, Leptopodidae, Miridae, Naucoridae, Ochteridae, Reduviidae, Schizopteridae, Tingidae and Velocipedidae were already mentioned and with new taxa described (Ross 2018). All these taxa represent not only rich taxonomic record, but also wide morphological disparity, with very unique examples of morphological features. Coleorrhyncha, moss bugs is another group of interest. For the moment only a sole species was reported from Lower Cretaceous Lebanese amber (Szwedo et al. 2011), but another representative of Progonocimicidae was identified among inclusions of Burmese amber.

Remaining euhemipterans, i.e. planthoppers and leafhoppers are very unevenly recorded and unevenly reported. Fulgoromorpha, planthoppers are very abundant, but their placement in already recognised families is quite challenging. The oldest report on planthoppers from burmite comes from Cockerell (1917b), and now this species is placed in the family Achilidae. The other species also described by Cockerell (1917b) is to be placed in Cixiidae or rather within complex of taxa related to family Cixiidae. Numerous other fossils, representing higher units of classification (families) recognisable due to their morphological characteristics are to be described. Already known extinct families of planthoppers represented among inclusions in Burmese amber are Perforissidae (Shcherbakov 2007; Zhang et al. 2017), and recently found Mimarachnidae (Shcherbakov 2017, Jiang et al. in press), Neazoniidae and just described Dorytocidae (Emeljanov and Shcherbakov 2018). It will not be exaggeration to say that more than dozen family level groups not yet formally described, and presenting wider and more diverse morphological characters than recent planthoppers await formal description. Observing the planthoppers inclusions in burmite, their morphological disparity and resulting taxonomical diversity one can say the Burmese amber inclusions witnessed rapid radiation of Fulgoromorpha, and that recent fauna, with all its high diversity in 20 families is depauperate and that it could result of bottleneck effect due to environmental changes, competition and co-evolution with host plants.

Representatives of Cicadomorpha from burmite are known extremely poor, but their diversity and morphological disparity seems to be high. Not yet formally described taxa representing Hylicellidae – family believed to be ancestral to modern Clypeata (Szwedo 2018) were found and these are under elaboration at the moment. This family was known exclusively from the compression and impression fossils in sedimentary deposits. Then, the first more three-dimensionally preserved fossils give new possibilities for recognition the new morphological characters and their evolution. Inclusions in burmite of another family known so far only from the Jurassic deposits of Daohugou – Sinoalidae, were found (Chen et al. in press), and quite variable and numerous taxa are identified (work in progress). Burmese amber brought also representatives of modern families. Poinar and Kritsky (2012) reported nymph of Cicadidae, however the placement of this fossil must be re-analysed. The most diverse and rich in species leafhoppers, Cicadellidae inclusion was very recently found among inclusions in Burmese amber (Poinar and Brown 2018). This fossil was subsequently discussed by Dietrich and Thomas (2018), and based on their analysis it could represent subfamily Signoretiinae and tribe Phlogisiini. Then it is the oldest record of this subfamily and tribe, giving new insight to phylogeny and relationships of this enormously rich and diversified group. Also representatives of other subfamilies, namely Ledrinae were found and await formal elaboration. Not surprisingly and similarly to inclusions in Baltic amber,

the nymphs of Cicadellidae are more numerous than imagines. Inclusions of Cicadellidae in burmite should be of special interest as these could bear answers to many questions concerning the early evolution and radiation of this lineage, its monophyly, subdivisions and morphological differentiation.

Burmese amber, beautiful, versatile and rich in inclusions, has the unique capacity to preserve traces of ancient life, ancient organisms and traces of their activities. Burmite comes from the times of great biotic re-organization, from times of last glimpse of Mesozoic hemipterans and dawn of the Cenozoic groups, recent winners of evolutionary race. Studies of the Hemiptera inclusions caught in this resin give the unique contribution to understanding range of morphological disparity, taxonomic diversity, ecological relationships and evolutionary processes.

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The planthopper family Mimarachnidae (Hemiptera: Fulgoromorpha) in Burmese amber

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The Hemiptera is one of the "Big Five" insect orders presenting the highest taxonomic diversity and morpho-ecological disparity. Planthoppers (Fulgoromorpha) is one of the hemipteran suborders displaying enormous diversity, with 30 extant and extinct families currently recognized and with fossil record reaching the Permian (Szwedo 2018). The extinct family Mimarachnidae Shcherbakov, 2007 is characteristed by its simplified venation, setigerous metatibial pecten, and the spider-like dark silhouette and black eyespots of tegmina (Shcherbakov 2007). For the moment Mimarachnidae were known exclusively from the compression/impression fossils in sedimentary deposits of Buryatia (Russia), Japan and Spain (some not formally described taxa come from Mongolia and probably also from Brazil), which restrict the family distribution to the middle to high latitudes probably with the seasonal alteration (Szwedo and Ansorge 2015). Recently, Shcherbakov (2017) reported the first representative of this group from Burmese amber.

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