25<sup>™</sup> ANNIVERSARY OF MUSEUM OF AMBER INCLUSIONS UNIVERSITY OF GDAŃSK

# Fossil Record in Resins and Sediments

## **BOOK OF ABSTRACTS**

UNIVERSITY OF GDAŃSK 23-26 MAY, 2023



### **FossilRRS Conference**



## Fossil Record in Resins and Sediments

25<sup>th</sup> Anniversary of Museum of Amber Inclusions University of Gdańsk

### **BOOK OF ABSTRACTS**

University of Gdańsk, Faculty of Biology Gdańsk, POLAND May 23 - 26 2023







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#### WELCOME

The Museum of Amber Inclusions University of Gdańsk is pleased to invite you to celebrate its 25<sup>th</sup> anniversary and attend the conference *Fossil Record in Resins and Sediments*, which will be held in Gdańsk, Poland, from 23<sup>rd</sup>-26<sup>th</sup> May 2023.

Twenty-five years ago, the natural history collection of amber and inclusions, started from modest beginnings – scientific collection of the Diptera inclusions of Professor Ryszard Szadziewski. What revolutionised the collection was the donation of 50 kg of raw Baltic amber, which completely changed the view on amber, its inclusions and its amber taphocoenosis. The uniqueness of the scientific collection of the Museum of Amber Inclusions is in its positioning within the structures of the University. We are not a collection of specimens, musealia that cannot be touched, but a collection where amber is the basis of scientific discovery and research. Twenty-five years ago, we were at the point when interest in inclusions was developing, and the amber market was growing, and we were present at the Amberif Fair, among the amber workers and collectors, at the centre of the amber (and inclusions) fever. The scientific backbone of the Museum is its collectors and friends among scientists. The flesh is a collaboration with amber workers, and opinions.

New technologies allow us to look more and more closely into worlds hidden millions of years ago in the solidifying drops of resins. It is the 21<sup>st</sup> century and we are discovering new pages written in the books of amber, its inclusions and its deposits, but also in the stone books of palaeontology. We will not be able to answer more and more questions on our own – cooperation, exchange of information and experience of geologists, palaeontologists and biologists is needed.

The Conference, which is being held at the University of Gdańsk and supported by the Ministry of Education and Science, will offer an outstanding scientific programme thanks to the participants. It is an opportunity to share the current state of knowledge, new working hypotheses, to debate new findings and new tools, to discuss and find new interpretations of existing data and opinions.

It is with great pleasure that we invite all of you in the spring of 2023 to this Conference, we encourage scientific openness, warm discussions, collaboration, and a shared reading of palaeobiology in fossil resins and sediments. We trust that your stay in Gdańsk – the World Capital of Amber and Museum of Amber Inclusions will be a memorable opportunity for both professional and personal satisfaction.



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#### TABLE OF CONTENTS

PLENARY LECTURES
Dzik J. – THE 'CAMBRIAN EXPLOSION'
Szwedo J. – FOSSIL RESINS OF THE WORLD, WORLDS OF FOSSIL RESINS
Szwedo J., Sontag E. – BALTIC AMBER – TRAP OR TREASURE TROVE FOR PALAEOBIOLOGY
ABSTRACTS
Álvarez-Parra S. et al. – PARASITOID WASP DIVERSITY (HYMENOPTERA) IN LOWER CRETACEOUS AMBER FROM EL SOPLAO (SPAIN)
Álvarez-Parra S. et al. – A GLIMPSE TO THE ANCIENT RESINIFEROUS FORESTS THROUGH AMBER TAPHONOMY 13
Arriaga-Varela E. et al. – HANDSOME FUNGUS BEETLES (COCCINELLOIDEA: ENDOMYCHIDAE, ANAMORPHIDAE) IN MYANMAR AMBER. REMARKABLE DIVERSITY, REMARKABLE CHALLENGES
Bartel C., Dunlop J.A. – A FORGOTTEN WORLD: AMBER HARVESTMEN AS A WINDOW INTO PAST DIVERSITY 17
Beurel S. et al. – FOSSIL FLOWERS FROM MIOCENE ZHANGPU AMBER (CHINA)
Bienias J. et al LITHOBIOMORPHA IN BALTIC AMBER - CURRENT KNOWLEDGE AND PERSPECTIVES 21
Bieszczad B. – NEW INSIGHTS INTO THE JURASSIC COLEORRHYNCHA MYERS ET CHINA, 1929 (HEMIPTERA) FROM EUROPEAN DEPOSITS
Bojarski B. et al EXPLORING THE FOSSIL RESINS TAPHONOMY - PIDDOCKS INCLUSIONS AND ICHNOFOSSILS 25
Bojarski B. et al THE NEMATODE FOSSIL RECORD - INSIGHTS FROM BALTIC AMBER INCLUSIONS
Bouju V. et al WHAT IS ETHIOPIAN AMBER TELLING US ABOUT MIOCENE AFRICAN FOREST ECOSYSTEM? 29
Celary W. et al BUZZERS FROM THE PAST - THE FIRST MELIKERTINI BEE FROM EOCENE LUBLIN AMBER 31
Cuber P., Hayes P.A. – AMBER COLLECTION AT THE NATURAL HISTORY MUSEUM, LONDON
<i>De Baets K. et al.</i> – THE BEARING OF THE FOSSIL RECORD TO CONSTRAIN THE EVOLUTION AND EXTINCTION OF PARASITE-HOST ASSOCIATIONS
Drohojowska J., Kurkina S. – JUMPING PLANT-LICE (HEMIPTERA: STERNORRHYNCHA: PSYLLOIDEA) FROM EOCENE BALTIC AMBER
Drohojowska J., Szwedo J. – CROUCHING DISPARITY, HIDDEN DIVERSITY – WHITEFLIES IN THE EOCENE RESINS OF EUROPE
Drohojowska J., Szwedo J. – DINGLOMORPHA - KEY TAXON OR BLIND BRANCH IN STERNORRHYNCHA EVOLUTION?
Heikkilä M. – SEARCHING FOR CALIBRATION POINTS IN THE WORLD FOSSIL RESINS TO DATE THE LEPIDOPTERAN TREE OF LIFE
Herbert M.C.M. et al. – THE IMPACT OF NEW SCUTTLE FLY FOSSILS IN FOSSIL RESINS FROM CRETACEOUS TO HOLOCENE
Hoffmannova J. et al. – LISSOMINAE (COLEOPTERA: ELATERIDAE) FROM BALTIC AND ROVNO AMBERS
Jenkins Shaw J., Solodovnikov A. – ROVE BEETLE PALAEOBIOLOGY AT THE NATURAL HISTORY HISTORY MUSEUM OF DENMARK
Jiang H. et al. – WIDESPREAD MINERALIZATION OF INSECTS IN MID-CRETACEOUS KACHIN AMBER
<i>Kaczmarek S., Soszyńska A.</i> – FIRST FEMALE OF FOSSIL <i>BURMOTHAUMA</i> (EOMEROPIDAE, MECOPTERA) FROM BURMESE AMBER SHEDS LIGHT ON ENVIRONMENTAL PREFERENCES OF FOSSIL EOMEROPID IN THE CRETACEOUS
Kaulfuss U. et al. – NEW ZEALAND AMBER: AGE, DEPOSITIONAL SETTING AND BIOINCLUSIONS
Kettunen E. et al. – DEMATIACEOUS MICROFUNGI FROM EUROPEAN PALAEOGENE AMBERS
<i>Kirichenko-Babko M.B. et al.</i> – A BRIEF REVIEW OF KNOWN AMBER PAUSSINAE (COLEOPTERA: CARABIDAE) AND THE IMPORTANCE OF THE FIRST ROVNO AMBER PAUSSINE FINDING
Klikowicz-Kosior A., Kosior M. – THE IMPORTANCE OF ACCURATE IDENTIFICATION OF FOSSIL RESINS
Krzemiński W. et al. – FIRST CHILELIMNOPHILA (DIPTERA: LIMONIIDAE) IN FOSSIL RECORD

<i>Krzemiński W. et al.</i> – UNIQUENESS OF PRESERVATION OF FOSSIL MATERIAL FROM FUR FORMATION ON THE EXAMPLE OF <i>ARCTOCONOPA</i> (DIPTERA, LIMONIIDAE)	НЕ 65
<i>Kundrata R. et al.</i> – FIRST CLICK-BEETLE LARVAE FROM THE MID-CRETACEOUS AMBER OF NORTHERN MYANMAR	67
<i>Mąkol J.</i> – TERRESTRIAL PARASITENGONA MITES (ARACHNIDA: ACARIFORMES) IN FOSSIL RESINS – STATE O ART	F THE 69
<i>Mulvey L. et al.</i> – WHERE TRADITIONAL EXTINCTION ESTIMATES FALL FLAT: USING NOVEL COPHYLOGENETI METHODS TO ESTIMATE EXTINCTION RISK IN PATHOGENS	C 71
Ogłaza B., Węgierek P. – THE COMPARISON OF APHIDS FROM CANADIAN AMBER TO FAUNAS FROM OTHER FOSSIL RESINS	R 73
Pełczyńska A. et al. – NEW INSIGHT INTO BIOGEOGRAPHICAL HISTORY OF THE GENUS ROBSONOMYIA (DIP KEROPLATIDAE) – FIRST EUROPEAN AND FOSSIL SPECIES	TERA: 75
<i>Pielińska A. et al.</i> – INCLUSIONS IN AMBER FROM COLLECTIONS OF THE POLISH ACADEMY OF SCIENCES MUSEUM OF THE EARTH IN WARSAW	77
<i>Ross A.J.</i> – THE REMARKABLE PALAEODIVERSITY IN BURMESE (MYANMAR) AMBER (MID-CRETACEOUS) – UPDATED	79
Santos D. – "OUR GRAVES HAVE MORE LIFE": FOSSIL TIPULOMORPHA FROM THE CRATO FORMATION OF N BRAZIL	E 81
Seyfullah L.J. et al. – A NEW GROUP OF AMBER SOURCE PLANTS FROM THE CRETACEOUS	83
Słomczyński K., Soszyńska A. – GLITTER IN AMBER – LONG-LEGGED FLIES (DOLICHOPODIDAE) IN BALTIC AM	1BER 85
Šmídová L. – COCKROACH FAUNA FROM MID-CRETACEOUS KACHIN AMBER: STATE OF THE KNOWLEDGE	87
Solórzano-Kraemer M.M. et al. – "NECROPHAGOUS TRAP" – A CASE STUDY ON CRETACEOUS AMBER WITH LIZARD HOLOTYPE OCULUDENTAVIS NAGA	89
Sontag E., Szwedo J. – MUSEUM OF AMBER INCLUSIONS UNIVERSITY OF GDAŃSK – DISCOVERIES AND POTENTIAL	91
Soszyńska A. et al. – EXTINCT PARASITE OF EXTINCT SCORPIONFLY - SYNCHROTRON MICROTOMOGRAPHY HELPED TO UNCOVER A HIDDEN STORY	93
Szawaryn K., Bukejs A. – X-RAY MICRO-COMPUTED TOMOGRAPHY REVEALS HIDDEN PALEODIVERSITY OF MINUTE HOODED BEETLES (COLEOPTERA: CORYLOPHIDAE) IN EOCENE BALTIC AMBER	95
Szawaryn K., Tomaszewska W. – MICRO-CT SCANNING REVEALED A NEW COCCINELLIDAE REPRESENTATIVE FROM BALTIC AMBER, A PUTATIVE COMMON ANCESTOR OF TWO EXTANT TRIBES	E 97
Szpila K. et al. – THE FIRST FOSSIL LARVA OF MECOPTERA (INSECTA) - DISCOVERED IN BALTIC AMBER	99
Szwedo J. – MIOCENE FOSSIL RESINS - WHAT THEY CAN SAY ON MODERN-DAY CLIMATIC CRISIS	101
Szwedo J., Bojarski B. – DAMSEL BUG FROM EOCENE LUBLIN AMBER, MAY BE NOT SUCH A DAMSEL	103
<i>Szwedo J. et al.</i> – FIRST SPILAPTERIDAE (PALAEODICTYOPTERA) FROM NAMURIAN B OF BIELSZOWICE COAL MINE, UPPER SILESIA	105
<i>Tischer M. et al.</i> – PALAEOGENE AMBERS AS SOURCE OF FOSSIL ASCOMYCETES: RECENT DISCOVERIES AND PERSPECTIVES.	) 107
Vilhelmsen L. et al. – ECHOES FROM THE CRETACEOUS: NEW FOSSILS SHED LIGHT ON THE EVOLUTION OF H DETECTION AND CONCEALED OVIPOSITOR APPARATUS IN THE PARASITOID WASP SUPERFAMILY	IOST
ORUSSOIDEA (HYMENOPTERA)	109
Zakrzewska M. et al. – THE LIMONIIDAE OF EOCENE LUBLIN AMBER	111
TYPES OF FOSSIL SPECIES IN MAI UG COLLECTION [MAIG]	113

## Fossil Record in Resins and Sediments

### palaeobiological conference

23-26 May 2023 Gdańsk, Poland

### ABSTRACTS



#### BALTIC AMBER – TRAP OR TREASURE TROVE FOR PALAEOBIOLOGY

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Keywords: fossil resin, Eocene, environmental palaeoreconstructions, data interpetation

The Eocene, a geological epoch that lasted from about 56 to 33.9 million years ago, is the most biologically significant event of Cenozoic climate change, when the climate of Earth shifted from an equable greenhouse to a polarised icehouse. The snapshots of that times had been captured as inclusions in fossilised resins. The best known and the largest elaborated is a complex of fossilised resins known under umbrella term 'Baltic amber'. If the term is perfect for jewellery makers, for research it should be taken with some reservations.

The largest amount of these resins come from various secondary deposits, mostly found on the southern coasts of the Baltic Sea, from Estonia in the northeast to Denmark in the northwest. The most prolific source is the Gulf of Gdańsk deposit, spread from the Sambia Peninsula in the east to Chałpowo, at the base of the Hel Peninsula in the west. Here the resins are to be deposited in glauconitic marine sediments called the 'Blue Earth'. Sambian amber-bearing deposits are placed in the lower portion of the Prussian Formation, aged Late Eocene (Priabonian). The fossil resin collectively recognised as 'Baltic amber' is to be found very far to the north, in Spitsbergen, on Axel Heiberg Island in the Canadian Arctic, or on the east coast of the British Isles. Glaciers spread the amber to the south, to the foreland of the Carpathian mountains. Other deposits could result from glacier activity as well, as most of those in Lithuania and Belarus. It remains unclear whether 'Baltic amber' found in the different regions can be treated as being of the same origin<sup>1,2</sup>.

Other important deposits of fossil resins are those of the Bitterfeld area. The oldest fossil resin (succinite) was found under the Upper Eocene lignite seam Bruckdorf west of Bitterfeld; it is thus about the same age as the amber of the Blue Earth of Sambia. Other individual finds come from the seam level of the Lower Oligocene near Breitenfeld north of Leipzig and near Böhlen. In the entire Leipzig-Bitterfeld area, more than 500 amber deposits of Upper Oligocene age were found on an area of 20 square kilometers<sup>3</sup>.

Another important source is fossil resins from Ukraine, originating from Rovno-Zhitomir area. The fossilized resins are hosted in the Priabonian Mezhigorje Formation, with early reports of occurrences in the underlying Obukhov Formation as well<sup>4</sup>. The formations are found along the northwestern margin of the Ukrainian Crystalline Shield exposed in the Rivne region of the Ukraine and across the border near Rechitsa in the Gomel Region of Belarus.

But what is behind the collective 'Baltic amber' resins? The vast majority of fossilised resin from these three major deposits and numerous other localities is identifiable as succinite, with a characteristic shape of FT-IR spectrum called 'Baltic amber shoulder'. This kind of resin is the most variable in coloration and transparency, and this one is the one usually containing inclusions. In all deposits, there are also other accessory resins, occurring together with succinite, e.g. gedanite, glessite, beckerite and stantienite, present in various amounts; the most diverse (at least the best elaborated) are those from the Bitterfeld area. These resins are important source of information, however, as they can have different botanical origin. Botanical origin of succinite and some other accessory resins is still subject of discussions<sup>5</sup>. Geochemical data clearly indicate

#### Fossil Record in Resins and Sediments

#### 25<sup>th</sup> Anniversary of Museum of Amber Inclusions University

#### Gdańsk 23<sup>rd</sup>-26<sup>th</sup> May 2023

that Bitterfeld and Baltic amber are not identical<sup>6</sup>. Geochemical evidence for the distinct origin of Rivne and Baltic amber deposits was also recently presented<sup>7</sup>. The age of the deposit is not age of fossil resins contained – this reservation is often overlooked in analyses and interpretations of 'Baltic amber'. Most important deposits are secondary, amber could be (much) older than deposit. Further hurdles are linked to the physical properties of these fossilized resins. Once reworked from the original sediment, they may float or drift in sea water, even specimens forming large deposits may have been repeatedly reworked and transported by ancient rivers and sea currents, originally belonging to older and possibly geographically distinct sediments<sup>8</sup>. The probable broad range of the ancient amber producing forests and their presumed existence for several million years adding controversies to the image. These reservations are well known, but there are several other traps for researchers<sup>1</sup>.

Eocene 'Baltic amber' is unequalled as Konservat-Lagerstätte, as a place of exceptionally rich and wellpreserved fossil organisms. Its importance for scientific study is not to be overestimated. Hundreds of thousands of inclusions were found in Baltic amber, with >3800 species described from Baltic amber<sup>2</sup> and nearly 800 species reported from Bitterfeld amber<sup>3</sup>. The results of Baltic amber investigations are used in the taxonomy and phylogenetics of plants and animals, palaeobotany, palaeobiogeography, palaeoecology, palaeoclimatology,... Fossil resins are prime examples of chemical fossils that are relatively resistant to diagenesis and can retain their original chemical and isotopic compositions, which may support the detection of the resin-producing plants and the reconstruction of the palaeoenvironment and palaeoclimate<sup>9</sup>. Inclusions comprise many groups of organisms, from bacteria to vertebrates, which typically derive from forest ecosystems where they became embedded in resin outpourings in their habitats<sup>10</sup>. Being conscious of all problematic issues, 'Baltic amber' is still an important source of fossils for science and research. With new analytical techniques applied to the resins and their deposits, with new techniques for observation and documentation of fossil resins inclusions, with more taxonomic data enabling more detailed statistical comparisons of inclusions from various deposits, with a better understanding of taphonomic and diagenetic processes, the volumes of Baltic amber books are to be deciphered and translated into modern science language.

#### References

- 1. Szwedo J., Sontag E. 2009: Denisia, 26, 155–169.
- 2. Szadziewski R. et al. 2018: Baltic amber treasure of the Bay of Gdańsk. Związek Miast i Gmin Morskich
- 3. Rappslilber I. 2022: Bitterfeld Bernstein. Ampyx.
- 4. Perkovsky E.E. et al. 2010: Rovno amber, in Penney D. (Ed) Biodiversity of fossils in amber from the major World deposits. Siri Scientific Press.
- 5. Sadowski E.-M. et al. 2017: Stapfia, 106, 1–73.
- 6. Wolfe A.P. et al. 2016: Rev. Palaeobot. Palynol., 225, 21–32; doi:10.1016/j.revpalbo.2015.11.002
- 7. Mänd K. et al. 2018: Palaeogeogr. Palaeoclomatol. Palaeoecol, 505, 265–273; doi: 10.1016/j.palaeo. 2018.06.004
- 8. Weitschat W., Wichard W. 2010: Baltic amber, in Penney D (Ed) Biodiversity of fossils in amber from the major World deposits. Siri Scientific Press.
- 9. Dal Corso J. et al. 2017: Geochim. Cosmochim. Acta 199, 351–369; doi:10.1016/j.gca.2016.11.025
- 10. Seyfullah L., Schmidt A.R. 2015: Palaeontology Online, 5, 12, 1–11.



