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THE STUDY OF AMBER PIECES WITH SEVERAL INCLUSIONS INSIDE

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The fauna, flora and ecological conditions of the ancient Baltic amber forest have been the object of study for more than a century from quite different scientific points of view. A good summary of nearly one hundred and fifty years of scientific research on Baltic amber flora and fauna has been published by Larsson S.G. (Larsson S.G. 1978). In this monograph he tried to overview all groups of flora and fauna from Baltic amber and attempted to group them according to their living environments and biology. Later, a short summary of amber trees biotopes was done by Katinas V. (Katinas V. 1983). More detailed overview of inclusions from amber was published by Poinar G.O. (Poinar Jr.G.O. 1992). A controversial picture of amber forest has been presented by Lourenco W.R. and Weitschat W. (Lourenco W.R., Weitschat W. 1996). There they explained why a fossil scorpion *Palaeochylas balticus* (which has closest recent living relatives in the tropical forests of South – East Asia, North Australia, Indo – Malayan region and some parts of Africa) might live in usually judged as subtropical or even Palaearctic or Nearctic (Ander K., 1942) climate of today amber forests. Baltic amber forest was immense, covering large areas of what is now Scandinavia and northern Europe almost to the Urals (Poinar G.O., 1992, p.265).

In my work I will classify amber pieces with groups of inclusions inside (with more than seven inclusions) into three groups, using a modified system of Larsson S.G., in order to find out which part of the amber tree particular piece of amber with inclusions has come from.

Materials and methods

About 3000 pieces with inclusions from Palanga amber museum were investigated, from which only 100 pieces of amber with inclusions had more than seven inclusions inside. Those were examined more detailed by binocular microscope. Systematic position was determinate till the level of families. Generally, in Baltic amber from Palanga amber museum amber contains 1.3 inclusions per piece. The biggest one examined by me has 95 specimens of different inclusions inside.

Description of zones

A vertical layering can be observed in an amber forest. Conditions of light and humidity in this forest must have varied from the base of a tree to the treetops. There can be separated three zones in the amber forest: "Sciara" zone, the tree-trunk zone and the crown of a tree zone.

"Sciara" zone

Among the amber fossils, there is large number of one biological type from that animal life which has been widely distributed in the forest floor. This is the type of animal, which lives larval live in rotting vegetation and adult's existence free in the vegetation of the forest undergrowth. The most characteristic representatives are Diptera Sciaridae – fungus gnats. Others, belonging to this wet, filled with mold-forming plant material were

Diptera Mycetophilidae, part of Diptera Chironomidae, etc. Moss, liverwort, lichen, fungi were abundant in this zone. (Katinas V. 1983, p.20-21).

The fauna of moss and bark with a great variety of groups also could be found there.

Diptera from families Sciaridae, Mycetophilidae preferred wet, shadowed undergrowth. Part of representatives from families Empididae, Dolichopodidae hunted on them. Collembola, Acarina, Pseudoscorpiones, Coleoptera Carabidae, Silphidae, Embioptera, Dermatoptera belong to this zone. Blatoides, Myriopoda, Formicidae were found here.

The tree trunk zone

The fauna has been of a different type of this shadowed, partly sunny, less humid region. Mostly of Diptera were found there. Part of them was caught while resting, part of them while feeding. This is the zone, which has contained many spiders, Diptera Ceratopogonidae, Diptera Empididae, Diptera Rhagionidae (Larsson S.G. 1978, p. 182). The hidden fauna of tree trunks (Coleoptera Buprestidae, Anobiidae, Mycetophagidae) belonged to this level.

The fauna of the crown of the amber trees (tree crown zone)

Fossils, which with certainty must have originated from the crown of the amber trees, are unknown. Only some good fliers seed and leave eaters, or nectar seekers may have belonged to it. They were Apoides (bees), Diptera Tabanidae, Syrphidae, part of Curculionidae (weevils).

Results

Several examples are presented here.

Amber piece No. ED 159 containing 20 inclusions and a piece of a lizard skin. In this piece 55% of the fauna are from the "Sciara" zone, 35% - from the tree trunk zone and 10% - from an undetermined location (undetermined larva, Diptera Brachycera). The formation of such piece might take place on the "Sciara" zone. The part of a lizard skin also pointed to this.

Piece of amber Ap. 14597, contains 95 inclusions in it. 61 of them are Acarina - mites. 73% of a fauna in this piece belong to "Sciara" zone.

Piece of amber Ap. 14580 contains 29 inclusions in it. 44% of fauna belong to "Sciara" zone, 38% of them belong to tree trunk zone, and 18% are remnants and inclusions without clear location.

From the study of 100 specimen of amber pieces

with several inclusions, 50% of them probably had been formed in the "Sciara" zone, 40% - in the tree - trunk zone, 2% - in the tree - crown zone and 8% belonging equally to "Sciara" and the tree trunk zones.



Amber with inclusion from V. and K. Mizgiris Amber Museum

Conclusions

Pieces of amber with several inclusions inside are quite rare.

Most of amber with inclusions was formed in the lower part of an amber tree, in so-called "Sciara" zone.

Some elements in amber pieces determined as from the "Sciara" zone, are from the tree trunk zone. It proves the flow of a resin downwards, catching on its way bits of fauna and flora from the different vertical levels. The biggest excretion of a resin took place in the tree trunk zone.

There were no strong boundaries between vertical levels.

In order to receive more information, systematic determination must be more detailed, to the level of genus or species.

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AMBER COLLECTING REGULATIONS IN COASTAL LITHUANIA UNTIL THE MIDDLE OF THE 19TH C.

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The history of regulations that governed amber production in modern-day Lithuania has not yet received a comprehensive analysis in. This has been determined by a number of causes. Some problems in the history of coastal area failed to be addressed at all. In the period between the 13 - 19th c. six historical entities were active on this narrow coastal strip. Some researchers did not consider the past of small coastal sections to be of importance. This study has no ambition to give a complete picture reflecting the change of regulations on amber collecting in coastal Lithuania. Rather, an attempt will be made to introduce some of emerging problems and to highlight important features of this process.

Historiography

Material on amber harvesting and realization characteristic of the coastal strip of modern-day Lithuania lacks consistency and comprehensiveness. Historical sources and research works devoted to the coastal portions ruled by Prussia, the Grand Duchy of Lithuania, Curland and Russia differ in distribution, number and quality.

Most and broadest scientific interest has received the history of amber collecting and trade in Prussia. It suffices to mention the monograph by A. Aurifaber [A. Aurifaber, 1551] published as early as 1551. In the late 17th c. the same problems were in the focus of the works by P.J. Hartmann [P.J. Hartmann, 1699],

M.CH. Hartknoch [M.CH. Hartknoch MDCLXXXIV], M.Praetorius [M.Praetorius, 2000]. The last two have served as reference and source for the present study too. Contribution by F.S. Bock [F.S. Bock, 1767], A. Kotzebue [A. Kotzebue, 1811], the 18th c., certainly deserves mentioning. The 19th c. was extremely rich in investigation in this field, of the works of the century stands out the study by K.G. Hagen [K.G. Hagen, 1823], which has also been used by the authors. The works by German historians of the 20th centuries served as reference for the Lithuanians J. Remeika [J. Remeika, 1939], J. Kaškelis [J. Kaškelis, 1933], J. Bubnys [J. Bubnys, 1957], V. Katinas [V. Katinas, 1980] and others have used the ideas by German authors too indiscriminately. Historical amber production and trade features of the coastal strip of Memel were addressed by the historians A. Bezenberger [A. Bezenberger, 1889], G. Willoweit [G. Willoweit, 1969a, 1969b], F. Ulrich [F. Ulrich, 1970] in the 19-20th c. Besides these, as additional sources for separate facts or additional material served works of regional ethnological and history character by C. Hinze, U. Diederichs [C. Hinze, U. Diederichs, 1986], P. Jakštas [P. Jakštas, 1992], V. Kulakov, S. Šimėnas [V. Kulakov, S. Šimėnas, 1999], G. Hermanowski [G. Hermanowski, 1996].

Changes in regulations applied to amber collection and trade on the coastal strip ruled by the Grand Duchy of Lithuania reflect only in the old inventories of Darbėnai estate, and the townships of Palanga and Šventoji. These inventories have been used as sources Z. Kiaupa [Z. Kiaupa,