

Bugs (Hemiptera) are fifth biggest insect order, right after so called Big Four: beetles (Coleoptera), flies (Diptera), butterflies (Lepidoptera) and hymenopterans (Hymenoptera). Diversity of these insects, both morphological and ecological, and their adaptations to various food sources, environments and habitats, and various lifestyles are incredible, but in many Hemiptera families still poorly known.

Achilidae, one of those families, is currently distributed worldwide; at present over 500 species in about 160 genera are known. Our knowledge of its biology is very limited, and modern taxonomical or molecular studies of this group were either not conducted in regular and composed way, nor taken due to quandaries in taxonomy and difficulties in obtaining research material, especially that for molecular techniques studies.

In fossil record Achilidae are known since Lower Cretaceous (about 115 million years ago) and its first members were described in second half of 19th century, when Germar and Berendt gave a formal descriptions of some specimens embedded in Baltic amber (known as inclusions). Since then there were only 13 fossil genera described with 16 species from the family as a whole.

The project is supposed to provide extra knowledge about the family and more information about taxonomic and morphological diversity of its fossil taxa. Moreover the data received will be analysed against its possible use for phylogenetic reconstructions and presented at time scale.

Preliminary results suggest that largest diversity of Achilidae taxa occurred during the Eocene (56-33.9 Mya), a period in which Baltic amber was formed and deposited (about 46-37 Mya). This period is also important because of major climate changes, reconstruction of many ecosystems and creation of modern floras and faunas.

During the investigations, a number of Achilidae inclusions from Baltic amber will be studied and described. The specimens under scrutiny will be loaned from Polish and abroad collections. Those inclusions will be compared with already known taxa and new, not yet known taxa identified (genera, species), enabling better recognition and understanding of fossil and modern forms diversity. Fossils will be presented in context of already recognized tribes and subtribes of Achilidae; it is also probable, that new taxa at these levels should be established to enclose fossil forms. The investigations will use traditional methods of light microscopy, enhanced with computer image processing and analysis methods; for some idiosyncratic preserved specimens the methods of scanning electron microscopy could be used; as part of research, the specimens will be documented and analysed with techniques of infrared spectra analysis.

Completion of this project will result in widening of the knowledge of the chosen group – family Achilidae, and based on that, the model of diversification of this group of insects, their specialization and extinction patterns could be presented.

Results of the project will be published in high-impact magazines and presented at both local and international conferences