

Institute: Institute of Systematics and Evolution of Animals, Polish Academy of Sciences

Title: The evolutionary changes occurring in a selected group of Diptera Nematocera during the Eocene.

Name of potential supervisor: prof. dr hab. Wiesław Krzemiński ORCID 0000-0001-5685-891X

Financial conditions:

Scholarship of PLN 3000 gross (approx. PLN 2600 net) per month for a period of one year and scholarship of PLN 4100 gross (approx. PLN 3600 net) per month for a period of next two years financed by the National Science Centre under the project entitled The influence of environmental and climate conditions in Eocene Europe on contemporary fauna of nematoceran Diptera.

Background information:

The Eocene is an extremely important period for the formation of the contemporary fauna of flies (Diptera). It is considered as a part of the Cenozoic period which lasted from 56 to 34 million years ago. Its onset was characterized by the highest temperatures recorded during the Cenozoic. Even though they decreased with time, the hot climate had a long-term effect on the development of the European fauna, so it is no coincidence that this period is informally referred to as "the dawn of a new age". Therefore, modern organisms evolved under tropical or subtropical climate conditions, and their direct descendants form the modern fauna of our continent.

The main aim of this project is to explain how environmental, climatic and biogeographical conditions have affected the further evolutionary stages of selected groups of flies up to the present day. Research will mainly focus on the oldest evolutionary lineages of flies (Diptera, Nematocera) which appear very frequently in the fossil record.

An additional, but no less important goal of the project is to conclude the age of the Baltic amber. The commonly accepted time of existence of amber forests in the territory of Europe is the middle Eocene. These forests covered nearly the entire continent over several million years. However, some theories assume an extension of the time of amber formation to the Lower as well as the Upper Eocene. These hypotheses can be verified in the current project by precise determination of species preserved in amber and its comparative analysis with contemporary living species and with those preserved in ambers presently considered to be older than the Baltic amber.

The main question to be addressed in the project:

1. What are the correlations of the amber fauna with the contemporary fauna at the family and genus level?
2. Is the Diptera fauna preserved in the Baltic amber from Ukraine and Saxony similar at the species level?
3. Do inclusions in Baltic amber show similarity at the species level with inclusions in amber from Oise Amber (France)?

Information on the methods/description of work:

1. Work in the collections will be the most significant part of the project. It will be necessary to sort entomological specimens and then mark them to species.
2. Preparation of photographic and drawing documentation of representatives of selected groups of flies.
3. Data analysis will require statistical (R software) and phylogenetic analyses (at least TNT knowledge).

Additional information (e.g., special requirements from the student):

1. Experience in working in fossil collections (amber and imprints in sedimentary);
2. Identification of Nematocera flies at least to families and genera level;
3. Proficiency in English language;

4. Experience in statistical and phylogenetic data analysis;
5. Driving license cat. B is welcome;
6. Availability to work non-standard hours (e.g. weekends).

Literatura:

- Krzemińska, E., Krzemiński, W., Haenni, J.P., Dufour Ch. 1993. W bursztynowej pułapce. Muzeum Przyrodnicze Instytutu Systematyki i Ewolucji Zwierząt PAN w Krakowie.
- Krzemiński, W., Krzemińska, E. 2003. Triassic Diptera: descriptions, revisions and phylogenetic relations. *Acta Zoologica Cracoviensia* 46 (Suppl. 1 e Fossil Insects), 153-184.
- McAlpine, J. F. 1981. *Manual of Nearctic Diptera*. Ottawa: Research Branch, Agriculture Canada.