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ABSTRACT

-Doctoral thesis-

Study of fossil microvertebrates from the Upper Miocene deposits of the Eastern Carpathian Foreland

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Abstract

I began my paleontological research on fossil microvertebrates from the Upper Miocene deposits of the Carpathian Foreland on the Moldavian Platform during my first years as a student, studying outcrops in the vicinity of Iași, at the suggestion and under the guidance of my supervisor, Dr. Bogdan-Gabriel Rățoi. The results I obtained from my first research in this area were recorded in my diploma thesis, then further developed in my dissertation and in a series of papers presented at national and international symposia, with specific sessions on paleontology. After six years of studies in the bachelor's and master's cycles, I continued my research on fossil microvertebrates in my doctoral program, expanding my area of interest to at least ten outcrops in the northeastern region of Romania, under the guidance of Prof. Dr. Mihai Brânzilă. It is worth noting that the research presented in the current paper marks a first study of this kind in the Miocene of the Eastern Carpathian Foreland.

The main purpose of this doctoral thesis is to highlight the fossiliferous potential of the sedimentary deposits belonging to the Upper Miocene, which outcrop south of Iași, in part of northeastern Romania, but also a biostratigraphic correlation of these deposits, based on the identified fossil microvertebrate fauna, with deposits of the same geological age, studied in other countries in Europe and western Asia. Such a study is of particular importance, in the sense that, by highlighting the continental fauna, an overall paleogeographic and environmental image of this region is created, in terms of the living creatures that evolved at that time, but also strengthening the arguments for the relative dating of the studied deposits and their positioning on the biostratigraphic scale at the level of the European continent.

The objectives of this doctoral thesis consist of:

1. Collection and processing of fossil material belonging to continental microvertebrates in the Upper Miocene sediments of northeastern Romania;

2. Taxonomic identification of fossil remains collected from the analyzed sediments, based on dental morphologies and by comparisons with fossil material from other areas of Europe and Western Asia;

3. Use of advanced analysis methods in the analysis of identified fossil remains, such as the use of electron microscope and microcomputer tomography.

4. Positioning on a biostratigraphic scale of the studied deposits, based on interpretations of the faunal associations identified in each analyzed outcrop.

The design of objectives such as those mentioned represent novel elements for the paleontological studies carried out to date and bring useful information in the understanding and interpretation of the geological past, more precisely of the Miocene that outcrops in the Eastern Carpathian Foreland.

The fossil material identified following the research carried out over time is numerous, consisting of dental elements of fossil microvertebrates (fish, reptiles and small mammals). Other fossil elements such as opercula, postcranial bones of microvertebrates, osteoderms, gastropods or fossil algae fruits were also identified in the studied deposits. All these fossil pieces will be able to be seen and accessed by specialists, in the Paleontology room of the Natural History Museum in Iași, the entire collection being donated to this museum and bearing the name of the author of this work.

Subsequently, as a working method and implicitly for identifying dental elements of fossil micromammals, dental morphologies were presented for each of the families of the orders Rodentia, Lagomorpha and Eulipotyphla, respectively the notations of the morphological characters characteristic of each fossil family, namely Muridae, Sciuridae, Eomyidae, Gliridae, Castoridae, Cricetidae, Dipodidae, Alactagidae, Ochotonidae, Leporidae, Talpidae, Soricidae and Erinaceidae.

Based on the descriptions of the dental elements made for each of the over two hundred and fifty molars and premolars, a total of fifty-two species were identified in the sixteen outcrops of interest. For each fossil family, tables were made in which the analyzed fossil material was presented, indicating the related dimensions, as well as the inventory number for each dental element. In order to accurately identify the species of fossil micromammals, diagrams were made for the diagnostic molars and premolars for the different fossil species identified in other areas of the same age in Europe or West Asia. Tables were also made with the comparative material used in making the diagrams referred to previously, as well as tables of distribution of the different rodent species, including the related bibliographical references.

The last chapter deals with biostratigraphic aspects and paleomedial discussions. Based on all the paleontological findings from the analyzed outcrops, a positioning on a bio-chronostratigraphic scale of the deposits from the sites of interest is proposed. Three of the analyzed outcrop deposits were assigned to MN 9, a single sedimentary deposit is assigned to MN 10, a number of nine analyzed deposits were assigned to MN 11, and the remaining three outcrops, after the analysis of the related sediments, were assigned to MN 12.

The outcrop sediments that are assigned to MN 9 are: Dracseni 1, Bârnova 1 and Țibana 1. Only the deposits from the Bohotin-Moșna 1 outcrop are assigned to MN 10. Most of the analyzed sedimentary deposits are assigned to MN 11: Dolhești 1, Arsura 1, Rusca-Pădureni 1, Muntenii de Sus 1, Duda-Epureni 1, Rediu 1, Deleni 1, Crețești 1, Văleni 1. The deposits of the outcrops Unțești 1, Pogana 1 and Zorleni 1 were assigned to MN 12.

Complex analyses consisting of scanning microscope investigations were the basis for the realization of this work and in this sense I would like to express my special gratitude to Mr. CS II Dr. Sorin Tașcu, director of the RAMTECH center at Alexandru Ioan Cuza University in Iași, for the support and help provided in order to take high-quality photographs obtained within the center he directs, by using the scanning electron microscope provided. In the analysis of the

fossil elements, the microcomputer tomograph was also used, thus, I express my gratitude to Mr. Prof. Dr. Gerard JITĂREANU, rector of the "Ion Ionescu de la Brad" University of Life Sciences in Iași, for accessing this device, but also to Mrs. Head of Department Dr. Anca-Elena CALISTRU, for the help provided in terms of preparing and processing the samples in the micro-CT analysis.

Collaborations with international specialists in the field of vertebrate paleontology were of great help to me in perfecting a specialized scientific language, but also in being able to highlight the most important information regarding the associations of small mammals studied, and in this regard I am particularly grateful to the specialists at the Palevoprim Paleontology Laboratory, in Poitiers, France, but also to Dr. Vicente D. Crespo, a specialist in small mammals from Spain, University of Valencia.