

## Miocene rhinoceroses from Romania: an overview

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Abstract. In Romania, Miocene rhinoceroses have the following stratigraphic distribution. From the Early Miocene there are only a few data that document the existence of this group. In the Middle Miocene, *Brachypotherium brachypus* and *Lartetotherium sansaniensis*? have been recorded from MN 5 and *Gaındatherium*? from MN 6. *Alicornops simorreense* characterizes the Late Astaracian and Early Vallesian faunas (MN ?7 or 8 - MN 9). *Aceratherium incisivum* was present in both the Vallesian and the Turolian, i. e., MN 9 - MN 11. *Dicerorhinus orientalis* has a single occurrence in MN 9, while "*Dicerorhinus*" *schleiermacheri* is known from the Late Vallesian and Turolian, i. e., MN 10 - MN 13.

Key words: Vertebrata, Perissodactyla, Ceratomorpha.

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### I. INTRODUCTION

During the Miocene, Romania was subjected to a series of transgressions and regressions that resulted in a permanent redistribution of the emerged and submerged areas. In favourable conditions, immigrant species could arrive from all directions. The present study reviews materials of the Miocene rhinoceroses from Romania.

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### II. COLLECTIONS AND MATERIAL

The material examined for this overview is preserved in the following collections:

1. Collection of the Geological Institute of Romania:
  - a. ?*Brachypotherium*; Rohia: inv. P-9415, P4/ or M1/; heavy worn; unpublished.
2. Collection of the Institute of Speology "E. Racovitza" Bucharest:
  - a. *Gaındatherium*?; Tasad: nasals, P2/-M3/ dext., P2/-M/2 sin., damaged; unpublished; unnumbered.
  - b. *Dicerorhinus* cf. *orientalis*; Comanesti: P4/-M2/ dext., P4/-M/1 sin., damaged; unnumbered.
  - c. *Chilotherium* sp.; Reghiu: skull (complete), humerus, femur; unpublished; unnumbered.

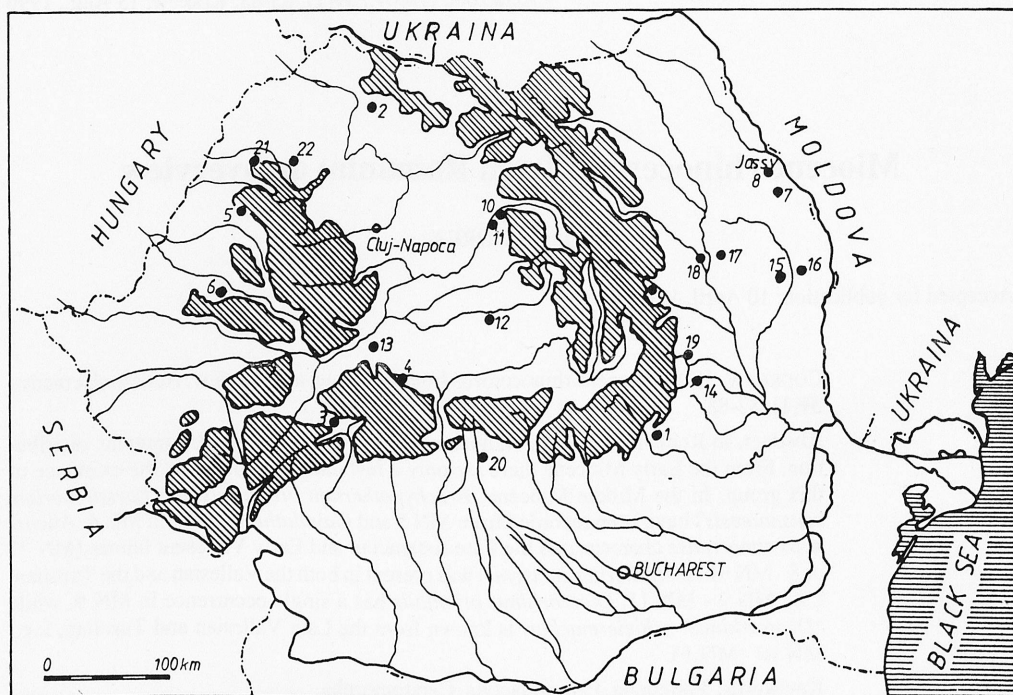


Fig. 1. Miocene rhinoceros localities in Romania: 1. Brebu 2. Rohia 3. Petros 4. Dobirca 5. Tasad 6. Minisu de Sus 7. Scheia 8. Jassy 9. Comanesti 10. Sanmihaiu de Padure 11. Petrilaca 12. Sighisoara 13. Ungurei 14. Reghiu-Scruntar 15. Giurcani 16. Zorleni 17. Fundu Vail Plopana 18. Bacau 19. Valea Sariei 20. Golesti 21. Derna-Tatarus 22. Dersida.

3. Collection of the Geological Institute of Hungary, Budapest:

- a. *Alicornops simorreense* (= *Aceratherium incisivum* var. *transsylvanicum*); Sinmihaiu de Padure: inv. Ob 3969, right hemimandible fragment with P/3-M/2.
- b. *Aceratherium incisivum*; Derna-Tatarus: inv. Ob 1201, Ob 2149, mandible with right P/1-M/3 and left P/4-M/2.
- c. "*Dicerorhinus*" *schleiermacheri*; Derna-Tatarus: inv. V 14130, right mandible fragment with P/4-M/2.

4. Museum of the Transylvanian Basin, University of Cluj:

- a. *Brachypotherium brachypus*; Petros: inv. 1492, right P4/-M1/.
- b. *Lartetotherium sansaniensis*?; Dobirca: inv. 15797, fragmentary skull with D4/, unpublished.
- c. *Alicornops simorreense*; Minisu de Sus: P4/, V 1.

5. Museum of the Department of Geology, University of Jassy:

- a. *Aceratherium incisivum*; Jassy, Repedea Hill: P2/, inv. 1881; Jassy, Paun Hill: P2/, inv. P 119; M2/, inv. P1 21; Comanesti: P4/, inv. MB4; P2/, inv. MB2; P/3 or P/4 and P/3, inv. MB3.
- b. *Alicornops simorreense*; Jassy, Paun Hill: humerus, inv. MP2.

6. Museum of Natural History "Gr. Antipa", Bucharest:

- a. *Aceratherium incisivum*; Comanesti: left P2/-M2/, unnumbered.

## 7. Museum of Sebes, Alba:

- a. *Aceratherium incisivum*; Ungurei: right mandible fragment with P/3-M/3, inv. MOS 301, unpublished.

## 8. Brukental Museum, Sibiu:

- a. *Lartetotherium sansaniensis*?; Dobirca: cast of mandible with D/2-D/4, inv. 55033, unpublished.

## 9. Museum of Tirgu Mures:

- a. *Aceratherium* sp.; Petrila de Mures: right femur, distal fragment, inv. 364, unpublished.

## 10. "Tarii Crisurilor" Museum, Oradea:

- a. "*Dicerorhinus*" *schleiermacheri*; Derna-Tatarus: P3/, inv. 9613; right lower incisor, inv. 5317/1; M/1, inv. 5318; left Mt III, inv. 5897/2; ?humerus fragment, inv. 5321; all unpublished.

## 11. Private collections:

- a. *Aceratherium incisivum*; Scheia: P4/.
- b. "*Dicerorhinus*" cf. *schleiermacheri*; Dersida: incisor, unpublished.

## III. THE OCCURRENCES OF MIOCENE RHINOCEROSES IN ROMANIA

The oldest specimen indicating the presence of Miocene rhinoceroses in Romania is a footprint from the Lower Miocene Brebu deposits (Buzau county) in the southeastern part of the country. This tridactyl footprint is an isolated find and not part of a trackway. It was described as *Rhinoceropeda problematica* (PANIN & STEFANESCU 1968, Pl. I, figs. 3-4) and estimated on the basis of its dimensions to be that of a medium to small-sized specimen. The Miocene Brebu deposits belong to the molass zone of the eastern Carpathians (SANDULESCU 1984). The age of the deposit is Ottnangian, which may be correlated with MN 4. Besides the footprint that is of special interest to us, a number of other mammal, as well as bird, footprints are also known from this site.

Of the same age is a tooth from Rohia (Salaj county), in the intracarpethian area. This comes from a predominantly conglomerate-gritty molass characterizing a regressive episode in the sedimentary basin, which deposited the Hida Formation (NN 4, MN 4; MÉSZÁROS 1991). This specimen may belong to the genus *Brachypotherium*.

From the Badenian (Middle Miocene) onward the data become more extensive. From the Lower Badenian of Transylvania (Moravian; NN 5, MN 5; MÉSZÁROS 1991) I have identified the species *Lartetotherium sansaniensis*? (LARTET, 1851) at Dobirca (Sibiu county) and *Brachypotherium brachypus* (LARTET, 1837) at Petros (Hunedoara county). Both of these species are characteristic of the Astaracian faunas of Europe.

The Petros material has been known since the end of the last century (KOCH 1900). Initially assigned to "*Aceratherium* cf. *Goldfussi*", it has recently been reassigned to *Brachypotherium brachypus* (CODREA 1991). Although found reworked in the alluvia of the Crivadia Valley it very probably originates from the Valea Rachitii Formation (Lower Badenian).

The genus *Brachypotherium* was also mentioned by KOCH (1900) as being known from the red deposits in the neighbourhood of Sebes-Alba. This record was controversial from the beginning, as NOPCSA (1905) questioned even the mammalian status of the skeletal fragments under discussion. Unfortunately, this material has been lost and therefore a renewed investigation is impossible.

A single find is known from the Upper Badenian (Kossovian; NN 6, MN 6 or MN ?7) of western Romania (ISTOYESCU & ISTOYESCU 1974). Within the Beius Basin, a sequence of deposits of deltaic origin are of this age. A specimen whose features make it very similar to the genus *Gaioadatherium*? has been found at Tasad (Bihor county) in deposits of this age.

From the base of the Sarmatian *sensu* SÜESS (Volhynian; NN 7-8, MN 7 or basal MN 8) comes the first known aceratherine occurrence in Romania. This is *Alicornops simorrense* (LARTET, 1851), found at Minisu de Sus (Arad county; CODREA 1992). This site helps us to reconstruct the Sarmatian paleoenvironment. The vertebrate fauna discovered up till now includes, besides the already mentioned aceratherine, some proboscideans (*Deinotherium*, *Gomphotherium*), a pig (*Listriodon*), a water chevrotain (*Dorcatherium*), a cetacean (Delphinoidea indet.), soft-shelled chelonians (*Tryonix*) and a great number of fish remains (mostly Clupeidae) (CODREA et al. 1991). The data on the macroflora are poor. Thus far only a single taxon, *Zanthoxylon europaeum*, has been described (GIVULESCU & RÜFFLE 1986), but by reference to what is known from neighbouring areas (BERNOR et al. 1988) and taking into account the faunistic elements, we can infer a warm climate for the Minis Volhynian. It was a forested area, probably interrupted by open lands, in a palustral and/or lacustrine area.

This small aceratherine also occurs in the eastern part of the Transylvanian Basin, at Sânmihailul de Padure (Mures county), where it was initially reported by MOTTI (1934) as "*Aceratherium incisivum* var. *Transylvanicum*". For a long time, this record was forgotten, but quite recently KRETZOÍ (1982) in one of his lists considered this aceratherine to be a distinct species, transcribing the name conferred on it by MOTTI as "*transylvaticum*". Upon examination of the fragment I believe that there is no evidence for a distinction from *A. simorrense*. It comes from deposits of Pannonian *sensu stricto* age (KRETZOÍ 1982). A distal fragment of a femur from deposits of similar age (KRETZOÍ 1982) outcropping in the neighbourhood of Petrila (Mures county) may also belong to the same species. Earlier records (MOTTI 1934) from Sighisoara (Mures county) and Cehal (Satu Mare county) could also belong to the same species. This species has as yet not been recorded within the extracarpathian area, but in my opinion we could assign the humerus found in the Kersonian deltaic facies deposits from the "La Catarg" quarry, Paun Hill, in the neighbourhood of Jassy, to the same species. From this site a flora containing a series of taxa indicating a temperate warm climate has been recovered (MACAROVICI 1958).

In the Vallesian and Turolian the most frequently recorded rhinoceros species in Romanian deposits is *Aceratherium incisivum* KAUP, 1832. The greatest number of finds comes from the eastern part of Romania (MACAROVICI 1978), of which a discovery at Scheia (Jassy county), in the Bessarabian deposits (TRELEA & SIMIONESCU 1985) was mistakenly identified as *Chilotherium zernowi* (BORISSIAK, 1915).

I will not here consider a series of finds of which the determinations are questionable (Aroneanu Jassy, Fundu Vail Plopana-Ruseni, Rafaila) or specimens that have been lost. However, one could assert as far as Moldavia is concerned that in the Bessarabian deposits, as was the case in the Comanesti (Bacau county) coal deposits (MN 9), *A. incisivum* is accompanied by *Dicerorhinus cf. orientalis* RINGSTRÖM, 1924 (APOSTOL 1966; ALEXANDRESCU & RADULESCU 1994). SARAI-MAN (1990) mistakenly referred some remains from same deposits belonging to *D. orientalis* to *A. incisivum*. In the later deposits such as those from Reghiu-Scruntar (Vrancea county; STAN 1963) or Bacau (RADULESCU & SOVA 1987; in both cases MN 10), *A. incisivum* occurs in association with *Chilotherium* RINGSTRÖM, 1924. For the moment there are too few discoveries to enable us to establish a rule, but future discoveries in Romania could confirm the sequence of these associations in the second half of the Sarmatian *sensu* ANDRUSSOV: a similar pattern is known from Moldova (LUNGU 1984). In this context, the genus *Chilotherium* could become important for the stratigraphy of the eastern part of Romania.

According to the present data, *Chilotherium* never crossed the Carpathians. It is highly probable that the mountainous areas were an impenetrable barrier to this genus. As a consequence of this only *A. incisivum* has been found in Transylvania. Here however, discoveries are less numerous. We can mention a find in the Pannonian *sensu lato* deposits (according to the geological map of



Romania, 1:200000 probably MN 9 or perhaps MN 10) from Ungurei, near Sebes (Alba county) and a richer set of finds from the coals and tar sands of the Derna-Tatarus (Bihor county) deposits of early Pontian age (MN 11) (KRETZOÍ 1982). At Derna, *A. incisivum* occurs in association with "*Dicerorhinus*" *schleiermacheri* (KAUP, 1832) and other mammals (KRETZOÍ 1982). A series of other localities (Vinga, Ormenis) where the species has been recorded (KOCH 1900) represent rather more questionable occurrences, although we cannot completely exclude them.

"*D.*" *schleiermacheri* is recorded from the Vrancea Meotian in the Valea Sării (BARBU 1959) and in Arges county at Golesti (MIHAILA 1971) from formations of the same age. In the first case it is a simple literature mention, while the second is an uncertain referral. Therefore, it is useless to discuss whether these finds represent "*D.*" *schleiermacheri* or the vicariant species *D. orientalis*. Finally, an incisor seems to document the existence of "*D.*" *schleiermacheri* in the Late Pontian *sensu stricto* from Dersida (Salaj county; MUTIAC & IONESI 1974) (Fig. 2)

As in western Europe (GUERIN 1980), there is a renewal of the rhinocerotid fauna at the Miocene/Pliocene boundary. It becomes poorer with the extinction of the aceratheres and the large "*D.*" *schleiermacheri*. The only rhinoceros known from the Romanian Pliocene (RADULESCU & SAMSON 1985; CODREA 1993) is *Dicerorhinus megarhinus* (CHRISTOL, 1834).

Epochs	Mammal-Ages	Mein's zones	Vertebrate Localities Romania	Rhinoceroses problematica	Brachypotherium ?	Brachypotherium brachypus	?Lartetotherium sansanensis	Gondatherium ?	Alcornops simorreise	Aceratherium incisivum	Aceratherium sp.	Chilotherium sp.	Dicerorhinus orientalis	"Dicerorhinus" schleiermacheri	"Dicerorhinus" schleiermacheri
UPPER MIOCENE	TUROLIAN	upper	13	Dersida											•
		m	12												
		lower	11	Derna - Tătarus						•				•	
	VALLESIAN	upper	10	Golesti Valea - Sării Bacău Fundu-Văii, Plopana Giurcani, Zorleni Reghiu - Scruntar Ungurei Sighişoara Petrilăca						•		•			•
		lower	9	Şimnişul de Pădure Comăneşti Jassy (Repedea, D. Păun) Scheia					•	•	•		•		
MIDDLE MIOCENE	ARAGONIAN	upper	7/8	Minişu de Sus					•						
			6	Tăşad				•							
		middle	5	Dobârcă Petros		•	•								
LM			4	Rohia Brebu	•	•									

Fig. 2. Stratigraphic distribution of Romanian Miocene rhinoceroses.

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