



THE MIDDLE MIOCENE FOSSIL SITE PREBREZA IN SOUTHERN SERBIA

Ivan STEFANOVIĆ¹, Dragan MIJOVIĆ²

Abstract. The palaeontological site of Prebreza in southern Serbia is one of the most important European sites of Middle Miocene age. Its numerous vertebrate faunal fossils differ from fossils known from other European sites of the same age. The rich and unique mammalian fauna indicates a peculiar climate and environment present on Balkan peninsula during the Neogene. Large collections from Prebreza site, and the capacity of this site, are to be the matter of further research of palaeontologists and other scientists interested in the evolution of fauna, palaeogeography and climate, as well as geology conservation specialists.

Key words: Mammalia, Neogene, MN unit, geo-heritage site, Prebreza, Serbia.

Abstrakt. Paleontologiczne stanowisko Prebreza w południowej Serbii jest jednym z najważniejszych stanowisk europejskich wieku środkowo mioceńskiego. Jego liczna skamieniała fauna kręgowców różni się od skamieniałości znanych z innych europejskich stanowisk tego samego wieku. Bogata i unikatowa fauna ssaków wskazuje na szczególnie klimat i środowisko obecne podczas Neogenu na półwyspie bałkańskim. Duże kolekcje ze stanowiska Prebreza i rozmiar tego stanowiska wzbudzają wielkie zainteresowanie badawcze paleontologów i innych naukowców zainteresowanych ewolucją fauny, paleogeografią i klimatem, a także specjalistów zajmujących się konserwacją stanowisk geologicznych.

Słowa kluczowe: ssaki, neogen, stanowisko dziedzictwa geologicznego, Prebreza, Serbia.

INTRODUCTION

The fossil site of Prebreza has been studied several times during the last century. The published papers are those of Cirić and Thenius (1959), Pavlović and Thenius (1959), Matejić and Pavlović (1959), Cirić (1960), Pavlović and Thenius (1965) and Pavlović (1969). They have been often cited in international literature as a unique site of Middle Miocene mammalian associations because it differs from one of other European localities. Contents of the discovered fauna are of enormous importance for they show migration pathways of various taxa in the intercontinental exchange between Europe, Asia and Af-

rica. Correlation of fossil material places Prebreza in MN6 stage and in close relationship with several Turkish localities (such as Paşalar, Çandır and İnönü) and Belometchetskaya from Georgia. The association of Prebreza reveals also different climate, thus describing the ecological history of Europe and Asia in the Middle Miocene.

The site has been under protection of the Nature Conservation Institute of Serbia, and large collections of recovered fossils are kept in several museums of Serbia.

¹ Museum of Faculty of Mining and Geology, 6 Kamenicka str., Beograd, Serbia

² Nature Conservation Institute of Serbia, III bulevar 106, New Belgrade, Serbia

GEOGRAPHICAL POSITION, LITHOLOGY AND NEIGHBOURING LOCALITIES

Prebreza is situated west of Niš (Naisus), and the city of Blace, south-eastern Serbia. To the west, rises the Kopaonik mountain that closes the Toplica valley in which Prebreza is situated. This region has several fossil sites of two fossil-bearing strata.

One sequence of strata consists of claystone, sandstone marls and tuff with coal. Two fossil sites in these strata have been found. The older is **Čučale** within Jankova klisura coal mine. It is considered to be of Burdigalian (Burdigalian–Helvetian) age (Pavlović, 1969). Significant fossils of *Anchitherium aurelianense* Cuvier, *Crocodylus* indet, *Gomphotherium angustidens*, *Mionictis* sp., indeterminate fish, insects and ostracodes (Pavlović, Curković, 1962; Pavlović, 1969) have been found there.

Jugovac is another site on the eastern side of the basin, near the city of Prokuplje. Its age (by Pavlović, 1969) should be Badenian (Tortonian). Remains of *Palaeomerix eminens* and *Dorcatherium vindobonense* have been found in this site (Pavlović, Obradinović, 1961; Pavlović, 1969).

The other sequence consists of sandstones and clayey-sandstone with mica over pelite and tuff with coal. There are the sites of **Medjuhana** and **Prebreza**. Pavlović (1969) dated Prebreza as Badenian–Sarmatian (Tortonian–Sarmatian), and Medjuhana as the Lower Sarmatian.

Stratigraphically younger Medjuhana contains remains of *Dinotherium* aff *gigantem* Kaup, *Gomphotherium angustidens* Cuvier and unidentified rhinoceros.

FOSSILS OF PREBREZA

Fossil remains from Prebreza are numerous, exhibited in the Museum of Natural History and in the Museum of Faculty of Mining and Geology, Belgrade. Not all of the gathered material in these collections has been investigated; is much for vertebrate palaeontologists to study in the future. Several of the published species are particularly important. Some of these species are unique in Europe, therefore of interest to palaeontology. The names of species in this paper are revised names, and history of the nomenclature is given in [Table 1](#).

Remains of small mammals are regrettably missing, as none were found in the numerous excavations. The sediment itself is unfriendly to small bone remains as the granulation is not adequate for their preservation.

Of other microfauna, some ostracodes are found.

It should be noted that some of the species cited, are of specific interest:

- *Gobicyon macrognatus* is the unique European occurrence of the otherwise little known species that shows some affinities with the specimens from Mongolia and Georgia.
- *Tingurictus* sp. is determined species of the Asian genus *Tingurictus* but it also resembles the small viverrid *Semigenetta* known from other localities in Serbia and Europe.
- *Percrocuta miocenica* is a representative of a little known Asian genus. It was named by Pavlović and Thenius (1965) but there may be a synonym for the species *Percrocuta abessalomi*. Fossil remains of the genus are known from Europe only from much younger localities, which suggests that the genus migrated from Asia and left its evidence at Prebreza.
- The presence of *Bunolistriodon meidamon* in the locality of Prebreza is particularly important for determination of the locality age. Also, these remains indicate a connection

Table 1

Mammals from Prebreza

Ćirić (1960), Pavlović (1969)	Revised identifications
Mustelidae indet. '?'	Mistelidae indet. '?'
<i>Gobicyon macrognatus</i> Colbert	<i>Gobicyon macrognatus</i> Colbert
<i>Tingurictus</i> sp. (= cfr. <i>spocki</i> Colbert)	<i>Tingurictus</i> sp.
<i>Percrocuta miocenica</i> Pavlovic and Thenius	<i>Percrocuta miocenica</i> Pavlovic and Thenius
<i>Rhinoceros</i> sp. '	Rhinocerotidae indet. '
<i>Anchitherium aurelianense</i> Cuvier	<i>Anchitherium aurelianense</i> Cuvier
<i>Taucanamo sansaniense</i> (Lartet)	<i>Taucanamo sansaniense</i> (Lartet)
<i>Listriodon michali</i> (Paraskevaidis)	<i>Bunolistriodon meidamon</i> Fortelius, Van der Made and Bernor
<i>Giraffokerix punjabiensis</i> Pilgrim	<i>Gyraffokeerix punjabiensis</i> Pilgrim
<i>Dicroceros elegans</i> Lartet ?	<i>Dicroceros elegans</i> Lartet?
<i>Hypsodontus serbicus</i> Pavlovic	<i>Hypsodontus serbicus</i> Pavlovic
<i>Eotragus sansaniensis</i> (Lartet) '	<i>Eotragus sansaniensis</i> (Lartet)'
<i>Lagomerix</i> sp. '	<i>Lagomerix</i> sp. '
Bovidae indet.	Bovidae indet.
<i>Gomphotherium angustidens</i> (Cuvier)	<i>Gomphotherium angustidens</i> (Cuvier)

' — identifications based only on descriptions by Ćirić (1960); ? — species cited but not described

between Anatolia in Turkey and Balkan peninsula during the Neogene. This bunodont form may indicate a peculiar ecological environment in this region while already it was extinct in the rest of Europe.

- *Girafokerix punjabiensis* is known from the Middle Miocene of Punjab in India. Besides the remains from Turkey

(Paşalar), this is the only known find of the species in the region, which supports the inference on the species migration from Asia.

- *Hypsodontus serbicus* is the only known representative of the genus west of Belomechetskaia of Georgia. Pavlović and Thenius (1959) introduced this new species.

A SITE OF EUROPEAN IMPORTANCE

The mammalian fossil site of Prebreza is a very important Middle Miocene locality of southeastern Europe. Its assemblage of fossils is larger than in any similar locality of the region. Excluding small mammals, almost the entire mammalian fauna is represented in this locality. Several species indicate their Asian provenance, suggesting the only or the first occurrence in Europe. The list of fauna found at Prebreza indicates a migration pathway of different taxa during the Middle Miocene. The orogeny and the climate of Balkan peninsula during

the Neogene controlled the migration. Some of the species found at Prebreza can be used in dating the locality. A correlation of fossil contents in different localities of the region clearly indicates that the fauna of Prebreza belongs to the early Middle Miocene, MN6.

The fossils are well preserved, deposited in large numbers. Some of the specimens well show the morphology, better than from any other locality.

DEVELOPMENT AND PRESENTATION OF THE SITE

The locality of Prebreza is a very complex area for protection and conservation of nature, because, although protected since 1960 by an act of Blace Municipality, the Nature Conservation Institute of Serbia has not succeeded in implementing the necessary measures for the following reasons:

- many owners of small land plots;
- absence of any interested promoter who would have the funds for investment into conservation, exploration and presentation of the site;
- inadequate exploration level and indeterminate extent of the fossiliferous layer;
- unreported exploration and deposition of fossil materials in various collections;
- unsystematic and unprepared collections, consequent unawareness of specialist and general public.

A revision of the Prebreza natural value was initiated in 1998 but the lack of funds discontinued its progress. Besides, all the above problems are still unattended.

The Prebreza locality has been exposed by erosion in the Gluvi Potok bank, in a subvertical profile. An intermittently active landslide on the right bank of the stream endangers the locality. No authority is responsible for stabilisation of the stream bank that would protect the locality. The situation is even more grave for the lack of interest or care of local population; informative boards of the site were repeatedly broken, removed, or thrown into the shrubs.

Similar localities (Sibnica and Mala Miliva), though equally important, are not entered into the list of the natural values or the Inventory of Geo-heritage Sites of Serbia, so that their alternative consideration for development and presentation is not possible.

In the above stated situation, the National Committee for Geological Heritage of Serbia and Montenegro have decided to inform the specialist public of the state of this locality which has long been classified in university text-books as a locus typicus.

REFERENCES

- CIRIĆ A., 1960 — O hioskoj fauni iz Prebreze. *Vesnik Zav. Geol. Geof. Istraz.*, **18/A**:1–82.
- CIRIĆ A., THENIUS E., 1959 — Über das Vorkommen von Giraffokeryx (Giraffidae) im europäischen Miozän. *Anzeiger der Mathematisch-naturwissenschaftliche Klasse der Österreichische Akademie der Wissenschaften*, **9**: 153–162.
- FORTELIUS M., MADE J. Van der, BERNOR R.L., 1996 — A new Listriodont suid, *Bunolistriodon meidamon* sp. nov., from the middle Miocene of Anatolia. *Journal Vertebrate Paleontology*, **16**, 1: 149–164.
- GABUNIA L., 1958 — On fossil carnivore remains from Belometchetskaya locality (northern Caucasus) [in Russian]. *Vertebrata Palasiatica*, **2**: 249–252.
- GABUNIA L.K., 1973 — The fossil vertebrate fauna from Belometchetskaya [in Russian]. Metsnierella, Tbilisi.
- GENTRY A.W., 1990 — Ruminant artiodactyls of Pasalar. *Journal of Human Evolution*, **19**: 529–550.
- HOWELL F.C., PETTER G., 1985 — Comparative observations on some middle and upper Miocene hyaenids. Genera *Percrocuta*

- Kretzoi, *Allohyaena Kretzoi*, *Adrocrocota Kretzoi* (Mammalia, Carnivora, Hyaenidae). *Géobios*, **18**: 419–476.
- MADE J. van der, 1996 — Listriodontinae (Suidae, Mammalia), their evolution systematics and distribution in the time and space. *Contributions to Tertiary and Quaternary Geology*, **33**: 3–254.
- MATEJIĆ B., PAVLOVIĆ M., 1959 — O nalasku “štajerske” sisarske faune u selu Prebrezi kod Blaca, *Zapiski SGD za 1959. god.*
- PAVLOVIĆ M., THENIUS E., 1959 — *Gobycion macrognatus* aus dem Miocän Jugoslaviens. *Anz. Öster. Akad. Wiss. Math-naturw. Kl.*: 214–222.
- PAVLOVIĆ M., THENIUS E., 1965 — Eine neue Hyäne (Carnivora, Mammalia) aus dem Miozän Jugoslaviens und ihre phylogenetische Stellung. *Anz. Öster. Akad. Wiss. Math-naturw. Kl.*, **102**, 1–14: 185.
- PAVLOVIĆ M.B., OBRADINOVIC Z., 1961 — Miozäne Säugtiere von Toplica (Serbien). *Ann. Geol. Peninsule Balkanique*, **28**: 265–177.
- PAVLOVIĆ M.B., DJURKOVIC R., 1962 — Miocäne Säugetiere aus dem Bergwerk “Jankova Klisura” in Toplica-Becken (Serbien). *Ann. Geol. Peninsule Balkanique*, **29**: 77–78.
- PAVLOVIĆ M.B., 1969 — Miozän-Säugetiere des Toplica-Beckens palaeontologisch-stratigraphische Studie. *Ann. Geol. Peninsule Balkanique*, **44**: 269–394, 27 pls.
- SOKOLOV I.I., 1952 — On finds of Carnicornia (Bovidae, Mammalia) of Lower Miocene sediments of Western Goby [in Russian]. *Trudi paleont. Instituta Akad. Nauk SSSR*, **41**.