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# The fauna of Prebreza (southern Serbia) and its position within the Mammalian Neogene units

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**Abstract.** The paleontological site of Prebreza in southern Serbia is an important European mammalian site of Middle Miocene age. The presence of various species shows the migration routes of various taxa in intercontinental exchange that occured between Europe, Asia and Africa. In this paper, a short revision of published taxa is given. The correlation to other Neogene sites, such as Çandir, Inönü, Pasalar (Turkey) and Belometchetskaya (North Caucasus) shows the position within MN6 Mammalian Neogene unit. The large collections from, and the capacity of the Prebreza site, will be the subject of further research of paleontologists and other scientists, interested in the evolution of fauna, paleogeography and the climate.

**Keywords:** Mammalia, Neogene, MN unit, Prebreza, Balkans, Europe, Asia.

**Апстракт.** Палеонтолошки локалитет Пребреза (јужна Србија) представља један од најзначајнијих средње миоценских европских налазишта фосилних сисара. Присуство појединих врста, на овом локалитету, указује на миграционе путеве различитих таксона у међуконтиненталној размени која се одиграла између Европе, Азије и Африке. У овом раду дата је кратка ревизија до сада објављених података. Корелација са другим локалитетима, као што су Чандар, Инони, Пашалар (Турска) и Беломечетскаја (северни Кавказ), указује на припадност јединици MH6. Богате колекције из, као и капацитет самог локалитета Пребрезе, представљаће и у будућности предмет истраживања, како палеонтолога, тако и других стручњака заинтересованих за еволуцију, палеогеографију и климатске промене.

**Кључне речи:** сисари, неоген, MH јединица, Пребреза, Балкан, Европа, Азија.

## Introduction

Terrestrial vertebrates were dispersed several times in the Neogene, following orogeny, changes of the eustatic sea level and climate. Exchanges of taxa between different continents, such as Asia, Europe, Africa and the Americas, occured. Ecological barriers and land bridges resulted in different associations of terrestrial mammals, causing evolution, migration and extinction of wildlife in the past. Different regions of the world according to their faunal history, give variable amounts of information that may shed light on these global processes. Some regions are of particular interest, as they are the places where different faunas came into contact and allowed exchange of members from different ecological environments. The fossil record originating from such regions of intercontinental faunal exchange is of prime importance for the understanding of the evolution of ecosystems.

One of the regions of significant importance is the Balkan peninsula. Once the Balkan peninsula together with Anatolia formed a land mass surrounded with the Tethis and the Paratethis seas. Through its geological history, it changed several times from an island to a peninsula and it has been connected with different continents (Europe, Asia and Africa) thus allowing faunal exchange. Several fossil sites have been discovered some of which have received a lot of attention.

## The age

In present day research of European Neogene mammals, it is common practice to subdivide the zones according to the stage of the evolutionary development of mammalian fossil associations (MN or mammalian Neogene zones). In earlier publications, the use of marine stratigraphical ter-

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minology was used, but this sometimes caused unsolvable problems in correlation. The use of MN zones simplified the comparison of fossil terrestrial vertebrate faunas. Different parameters, based on the morphology of the organisms, are taken into consideration, allowing certain associations of mammals to be placed in succession. This methology enable a Neogene fossil record to be assigned to a MN unit, from MN1 to MN17, and, sometimes, to define its position within a MN zone as well. Fossil sites with a variety of species, and especially sites having species which are good indicators for certain MN zones, once placed within a zone, and within its geographical position (considering its palaeogeography), may give a lot of information on migrations and the ecology of the specified region. The presence of certain, and omission of other species is of major importance for the understanding of the evolution of species and their ecology.

In previously published papers by ĆIRIĆ, (1960) and PAVLOVIĆ (1969), the age assessments were from "Tortonian" (considered to be equal to Badenian or Langian–Serravalian age and not to Tortonian of the general subdivision of Miocene) to Sarmatian. The possible range within MN units was from MN5 to MN7+8.

The development of the European ecosystem would be hard to understand if there were no knowledge of migrations into, and out of the continent. The sites that can give significant information of intercontinental exchange in the region are those of southeastern Europe and Turkey. Correlation of fauna from Prebreza with faunas of Çandar, Inönü, Pasalar and Belometchetskaya is the key for the assessment of the correct position within MN units as there is great similarity in the faunal lists. All the mentioned sites are within MN5–6 stages (DE BRUIJN *et al*., 1992; VAN DER MADE 1996; VAN DER MADE 2003).

## Geographic position, litology and other neighboring localities

The position of Prebreza is on the territory of southeastern Serbia, west of Niš and Blace. To the west, the Kopaonik mountain closes the Toplica valley in which Prebreza is situated. This region has produced several fossil sites belonging to two fossilbearing strata.

The lowermost strata are represented by claystone, sandstone marls and series of tuff with coal. There are two fossil sites in these strata:

The oldest is that of Čučale within the "Jankova klisura" coalmine. It is considered to be of Burdigalian ("Burdigalian–Helvetian") age (PAVLOVIĆ, 1969). Significant fauna of *Anchitherium aurelianense* H. v. MEYER, *Crocodilus* sp., *Gomphotherium angustidens* (CUVIER), *Mionictis* sp., and indeterminable remains of fish, insects and ostracodes (PAVLOVIĆ & ĆURKOVIĆ, 1962; PAVLOVIĆ, 1969) hawe been found in the stratum.

Jugovac is another site within and on the eastern side of the basin, near the city of Prokuplje. The age (by PAVLOVIĆ 1969) should be of Badenian ("Tortonian"). The remains of *Palaeomeryx eminens* H. v. MEYER and *Dorcatherium vindobonense* H. v. MEYER, were found on this site (PAVLOVIĆ & OBRADINOVIĆ, 1961; PAVLOVIĆ, 1969).

The second series is that of sandstones and clay–sandstones with liscune which overlie pelite and tuff with coals. There are the sites of Medjuhana and Prebeza. PAVLOVIĆ (1969) assigned Prebreza to Badenian–Sarmatian ("Tortonian–Sarmatian"), and Medjuhana to lower Sarmatian.

The stratigraphicaly younger, Medjuhana has remains of *Deinotherium* aff. *gigantheum* KAUP, *Gomphotherium angustidens* CUVIER, and of unidentified rhinoceros.

## Fossils of Prebreza

Research of the site and its fossils has been carried out several times. The published papers are those of ĆIRIĆ & THENIUS (1959), PAVLOVIĆ & THENIUS (1959), ĆIRIĆ (1960), MATEJIĆ & PAVLOVIĆ (1962), PAVLOVIĆ & THENIUS (1965) and PAVLOVIĆ (1969). There are large collections in the Museum of Natural History, and in the Museum of The Faculty of Mining and Geology in Belgrade. Not all of the gathered material in these collections has been studied. Hence there is a lot of work for vertebrate paleontoliogists in the future. Furthermore, the faunal list of the described species needs a revision (Table 1). Among the published species, there are several that may be of special importance. Some of these species are unique in Europe and, therefore, of significant interest in paleontology. In this paper the names of the species are cited with revised names, and the history of the nomenclature is given in short terms. The study of some ruminants from Prebreza is incomplete, and the work carried out by ĆIRIĆ (1960) can not be revalued, as the present whereabouts of the collection are unknown.

The remains of small mammals are regrettably missing, as none were found in the numerous excavations. Of other microfauna, some ostrascodes were found.

In this paper the synonymy is restricted only to references which changed the identifications of specific material from Prebreza, and to closely involved papers.

## Taxonomy of Mammalia

Order Carnivora BOWDICH, 1821
Family Mustelidae SWAINSON, 1835

Mustelidae indet.

1960 Mustelidae indet. – ĆIRIĆ: 110.

The parts of a single tooth are mentioned by ĆIRIĆ (1960), without any further details.

Family Canidae GRAY, 1821
Subfamily Borophaginae SIMPSON, 1945.

### Genus ***Gobicyon*** COLBERT, 1939

#### ***Gobicyon macrognathus*** COLBERT, 1939

1959 *Pseudocyon sansaniensis* LART. – MATEJIĆ & PAVLOVIĆ: 187.
1959 *Gobicyon macrognathus* COLBERT – PAVLOVIĆ & THENIUS: 214–222, pl. 1.

PAVLOVIĆ & THENIUS (1959) published the species as *G. macrognathus* COLBERT, otherwise known from the Mongolian Tung–Gur formation. There are no other remains known from Europe that have been identified as members of this species. In the first publication of the remains (MATEJIĆ & PAVLOVIĆ 1959), the species was published as *Pseudocyon sansaniensis* LARTET, and remains of this species are known from Belometchetskaya in Georgia (MORALES *in* PICKFORD *et al*., 2000). GABUNIA (1973) at first identified the remains from Belometchetskaya as *Amphicyon caucasicus* GABUNIA, and it may concluded that there is some resemblance of fossils from Prebreza and Belometchetskaya. This genus is otherwise of uncertain taxonomical position, and is usually cited as a member of the Family Amphicionidae. The uncertain taxonomical position, and some differences between the Mongolian and Serbian remains (considering the first lower molar) are the reasons that the systematic of PAVLOVIĆ (1969) is retained in this paper. This species, may be related to *Amphicyon* species, otherwise known from Asia, and later *Pseudocyon* species from Europe (Sansan). The presence of these remains is of some importance as it may show the pattern of development and the evolution of the species, which may have entered Europe from the East.

## Family Viverridae GRAY, 1821
## Subfamily Viverrinae GILL, 1872

### Genus ***Tunguractis*** COLBERT, 1939

#### ***Tunguractis*** sp.

1969 *Tunguractis* sp. (= cfr. *spocki*) – PAVLOVIĆ: 307–310, pl. 7, figs. 1–3.

PAVLOVIĆ (1969) gives a description of a cranium found in Prebreza. The species, according to Pavlović is within the range of the genus *Tungurictus* known from Mongolia, and China. The members of this genus may have been ecological equivalents of hyenas in Asia. The presence of this genus is not known from Europe, but there is a great of resemblance to the small viverrid *Semigenetta sansaniensis* (LARTET), known from other Serbian localities under the name *Semigenetta mutata* FILHOL, and from other European localities, such as La Grive St. Albain and Vieux Collognes (WERDELIN, 1996). The difference lies in the dimensions of the representatives of the two genera, and the absence of the upper second molar in species of *Semigenetta*. According to PAVLOVIĆ (1969), this leads to the conclusion, that the fossil from Prebreza shows more Asian morphology, and should remain within the Asian genus.

## Family Percrocutidae WERDELIN & SOLOUNIAS, 1991

### Genus ***Percrocuta*** KRETZOI, 1938

#### ***Percrocuta miocenica*** PAVLOVIĆ & THENIUS, 1965

1965 *Crocuta (Percrocuta) miocenica* n. sp. – PAVLOVIĆ & THENIUS: 177–185, Fig. 1.
1969 *Crocuta miocenica* PAVLOVIĆ & THENIUS – PAVLOVIĆ: 311–319, pl. 3, figs. 1, 2; pl. 4, figs. 1, 2; pl. 5, figs. 1, 2; pl. 6, figs. 1–3.
1996 *Percrocuta miocenica* PAVLOVIĆ & THENIUS – WERDELIN: 272–273.
2000 *Percrocuta abessalomi* GABUNIA 1958 – PICKFORD *et al*.: 261.

Several finds of this species are recorded in Prebreza. The percrocutide species had been considered as members of crocutides, and relatives of hyenas. Several authors published the remains from Prebreza. A new species *Crocuta miocenica* PAVLOVIĆ (PAVLOVIĆ & THENIUS, 1965; PAVLOVIĆ, 1969) has been established. In further research of the genus, important differences in the deciduous dentition and in the characters of the skull were noticed (ZHAN–XIANG *et al*., 1988; GUANFANG & SCHMIDT–KITTLER, 1983; SCHMIDT–KITTLER, 1983), and the name *Percrocuta miocenica* was accepted. This species was also found in Pasalar in Turkey, but there is just a mandible fragment and an isolated tooth representing the material from Turkey (WERDELIN, 1996). The remains from Prebreza are numerous and include a juvenile skull with mandible and complete deciduous dentition. The skull is of prime importance because it is the only complete skull of this species known. MORALES (*in* PICKFORD *et al*., 2000) proposed that the name of the species *Percrocuta miocenica* (PAVLOVIĆ) might prove to be a junior synonym of *Crocuta* (*Percrocuta) abessalomi* GABUNIA, an older name of the Percrocutidae material from Belometchetskaya (GABUNIA, 1958, 1973). The mentioned localities are all of the MN6 unit (if Belometchetskaya is not older than MN5 unit) and percrocutids from Prebreza are the oldest known representatives of the group in Europe. There are some specimens of this genus indicated as *Percrocuta* sp. in La Grive St. Alban (HOWELL & PETTER, 1985) in MN7 unit, and the related genus of dinocrocutids is present in even later sites of Europe.

The percrocutid material from Prebreza is the earliest known in Europe west of Belometchetskaya. The specimens are the most numerous and show some otherwise un-

known, specific features. Even though some of these specimens are unpublished and that there is still some research to be carried out, the presence of this species, which in its diet may resemble present day hyaena, leads to the conclusion that this species migrated from Asia into Europe.

Order Perissodactyla OWEN, 1848
Family Rhinocerotidae OWEN, 1845

Rhinocerotidae indet.

1960 *Rhinoceros* sp. – ĆIRIĆ: 117, pl. 1, fig. 1, 2.

Remains of rhinoceros found in Prebreza were first published by ĆIRIĆ (1960) and are represented by a part of a mandible with deciduous teeth. There have been no further identifications, and the Rhinoceratidae seem to be rare in Prebreza.

Family Equidae GREY, 1921

Genus ***Anchitherium*** H. v. MEYER, 1844

***Anchitherium aurelianense*** CUVIER, 1812

1960 *Anchitherium aurelianense* CUV. – ĆIRIĆ: 115–117, pl. 1, fig 1.
1969 *Anchitherium aurelianense* CUV. – PAVLOVIĆ: 320–326, pl. 7, figs. 1–5; pl. 8, figs. 1–7.

The remains of this species from Prebreza are cited several times. The presence of the species is recorded from many localities, both in Asia and Europe. The remains of the species are versatile and present over a wide range of time.

Order Artiodactyla OWEN, 1948
Superfamily Suoidea GRAY, 1821
Family Palaeochoeridae MATTHEW, 1924
Subfamily Schizochoerinae GOLPE–POSSE, 1972
Tribus Taucanamini VAN DER MADE, 1997

Genus ***Taucanamo*** SIMPSON, 1945

***Taucanamo sansaniense*** (LARTET, 1851)

1959 *Taucanamo (Choerotherium) sansaniense* (LARTET) – PAVLOVIĆ & THENIUS: 2.
1969 *Taucanamo sansaniense* (LARTET) – PAVLOVIĆ: 333–338, pl. 12, figs. 1–3; pl. 13, figs. 1–5.

*Taucanamo* is well known from Serbia, and Europe in general. There is a small difference between *T. sansaniense* (LARTET) and *T. inonuensis* PICKFORD & ERTÜRK from Turkey, and it is suggested (VAN DER MADE 1997) that *T. sansaniense* represents the ancestral evolutionary stage of *T. inonuensis*. It can be concluded that the species from Prebreza and Turkish localities are closely related, and that they both indicate MN6 stage.

The classification by VAN DER MADE (1997) is used.

Family Suidae GRAY, 1821
Subfamily Listriodontinae GERVAIS, 1859
Tribus Listriodontini GERVAIS, 1859

Genus ***Bunolistriodon*** ARAMBOURG, 1963

***Bunolistriodon meidamon*** FORTELIUS, VAN DER MADE & BERNOR, 1996

1959 *Listriodon lockharti* (POMEL) – MATEJIĆ & PAVLOVIĆ: 187.
1959 *Listriodon splendens michali* (PARASK) – ĆIRIĆ & THENIUS: 153.
1959 *Listriodon michali* (PARASK) – PAVLOVIĆ & THENIUS: 214.
1969 *Listriodon michali* (PARASK) – PAVLOVIĆ: 326–333, pl. 9, figs. 1–5; pl. 19, figs. 1–2; pl. 11, figs. 1–4.
1996 *Bunolistriodon meidamon* sp. nov. – FORTELIUS, VAN DER MADE & BERNOR: 353 & 374, fig. 28.4.
1996 *Bunolistridon meidamon* FORTELIUS, VAN DER MADE & BERNOR – VAN DER MADE: 78–80, fig. 37.

The interesting sublophodont Bunolistriodon has been described several times. The specimens from Prebreza were first published as *Listriodon michali* PARASKEVAIDIS (PAVLOVIĆ & THENIUS, 1959) and later, as *Listriodon splendens michali* PARASKEVAIDES (ĆIRIĆ, 1960) and *Listriodon michali* (PARASKEVAIDIS) (PAVLOVIĆ, 1969). PARASKEVAIDIS (1940) based the species "*michali*" on a single upper third molar found on the island Chios in Greece. Unfortunately, this fossil from Greece is now missing and it cannot be known which level of evolution is represented by '*michali*'. On the other hand, the bunodont forms are now placed in the genus *Bunolistriodon* and not in *Listriodon*. There are two separate branches of listriodont pigs that probably divided in the course of the MN4 unit. The branch that has become lophodont is placed in *Listriodon,* while the branch that remained sublophodont is placed in *Bunolistriodon*. Therefore FORTELIUS, VAN DER MADE & BERNOR (1996) identified the remains as *Bunolistriodon meidamon*. In the evolution of these bunodont species, which entered Europe in the MN4 unit from Asia, a trend of the increasing of several indices can be followed (VAN DER MADE, 1996). The specimens from Prebreza are close to the specimens from Turkey in age and morphology, and later in terms of MN units than the representatives of *Bunolistriodon* from the rest of Europe. This means that bunodont forms existed in the Balkans and Turkey at a time when they were extinct in the rest of Europe. This may be an interesting phenomenon caused by spe-

cific environmental conditions. The reason for such a conclusion comes from the fact that the sites from Turkey and Prebreza, in which *Bunolistriodon meidamon* was found, are of the MN6 evolutionary stage. In the rest of Europe it was the migration period of *Listriodon*, from Asia in MN5/MN6 unit transition, which excluded bunodont species in paleoecosystems. It may be that the result of climatic change was such that it caused the extinction of bunodont species elsewhere, as, *Listriodon* was found together with *Bunolistriodon* in some later Turkish localities (VAN DER MADE, 2003).

The presence of *Bunolistriodon*, in the locality of Prebreza is especially indicative for the exact definition of the age of this locality. The other significance of these remains is that they show a connection of Anatolia in Turkey and Balkan peninsula in Neogene.

## Suborder Ruminantia SCOPOLI, 1977
## Family Giraffidae GRAY, 1821
## Subfamily Palaeotraginae PILGRIM, 1911

### Genus ***Girafokeryx*** PILGRIM, 1910

#### ***Giraffokeryx punjabiensis*** PILGRIM, 1910

1959 *Palaeomeryx eminens* H. v. MEYER – MATEJIĆ & PAVLOVIĆ: 190.
1959 *Giraffokeryx punjabiensis* PILG – ĆIRIĆ & THENIUS: 153–162.
1960 *Giraffokeryx punjabiensis* PILG – ĆIRIĆ: 114, pl. 1, fig 4.
1969 *Giraffokeryx punjabiensis* PILG. – PAVLOVIĆ: 338–344, pl. 14, figs. 1–9; pl. 15, figs. 1–3; pl. 14, figs. 1–3.

Another interesting fossil record from Prebreza is that of *Giraffokeryx punjabiensis* PILGRIM. This species is known from Punjab in India (PILGRIM, 1910, 1911; COLBERT, 1933). The discoveries are of middle Siwaliks age, which are to be correlated to Middle Miocene (PILGRIM, 1934). The remains from Prebreza are of approximately same age, and probably represent the earliest find of the species in Europe. The specimens from Prebreza have been published by ĆIRIĆ & THENIUS (1959), ĆIRIĆ (1960) and PAVLOVIĆ (1969). Unfortunately, no skull was recovered at Prebreza and the position of the cranial appendages can not be indicated. The Prebreza remains are till now restricted to teeth, and more or less resemble the teeth of *Giraffokeryx punjabiensis*. There is some resemblance to the *Palaeomeryx eminens* H. v. MEYER also known from Serbia (PAVLOVIĆ, 1969). The *Giraffokeryx* remains from Prebreza, together with remains from Turkey (assigned to *Giraffokeryx* aff. *punjabiensis* by GENTRY (1990)) are the representatives of the species in the region.

These remains of *Giraffokeryx punjabiensis* represent the earliest and the only known specimens of the species in Europe and confirm the conclusions of the migratory directions from Asia. Their resemblance to the Pasalar samples also shows the connections of Anatolia and the Balkan peninsula.

## Family Bovidae GRAY, 1821
## Subfamily Hypsodontinae KÖHLER, 1987

### Genus ***Hypsodontus*** SOKOLOV, 1949

#### ***Hypsodontus serbicus*** PAVLOVIĆ, 1969

1959 *Gazela stehlini* THEN. – ĆIRIĆ & THENIUS: 155.
1959 *Hypsodontus miocenicus* SOKOLOV – PAVLOVIĆ & THENIUS: 215.
1960 *Gazela stehlini* THEN. – ĆIRIĆ: 113, pl. 2, fig. 1,3.
1969 *Hypsodontus serbicus* n. sp. – PAVLOVIĆ: 345–350, pl. 17, figs. 1, 2; pl. 18, figs. 1, 2; pl. 19, figs. 1–4.

PAVLOVIĆ (1969) introduced a new species on the basis of Prebreza material. This species is a representative of early bovids. He emphasized that there is a relationship between *H. serbicus* PAVLOVIĆ and other species, such as *H. miocenicus* SOKOLOV (which is the type species, based on the material from Belometchetskaya), and *Antilope* sp. from the island Chios in Geece (PARASKEVAIDIS, 1940). It is to note that the *H. serbicus* is the only known representative of this group west of Turkey (GENTRY & HEIZMANN, 1996), while this genus has an Asian origin, and may have been present in Arabia as well.

## Subfamily Bosealphinae KNOTTNERUS–MEYER, 1907

### Genus ***Eotragus*** PILGRIM, 1939

#### ***Eotragus sansaniensis*** (LARTET, 1851)

1960 *Eotragus sansaniensis* LART. – ĆIRIĆ: 113, pl. 2, fig. 2.

This European bovid is common in western and central Europe. In Serbia, the remains of this genus are known from other major localities, such as Mala Miliva and Sibnica (PETRONIJEVIĆ, 1967).

## Family Lagomericidae PILGRIM, 1941

### Genus ***Lagomeryx*** ROGER, 1904

#### ***Lagomeryx*** sp.

1960 *Lagomerix* sp. – ĆIRIĆ: 114, pl. 3, fig. 1.

ĆIRIĆ (1960) cited this genus. There is some doubt about the validity of the identification. Unfortunately the material published by ĆIRIĆ (1960) is missing, and the

Table 1. Mammal list from Prebreza. The identifications based on their description by ĆIRIĆ only (1960), are indicated with an asterisk. Question mark is restricted for species cited without any description.

| Species (acording to ĆIRIĆ 1960 and PAVLOVIĆ, 1969) | Revised identifications |
|---|---|
| Mustelidae indet. *?<br>*Gobicyon macrognatus* COLBERT<br>*Tungurictis* sp. (= cfr. *spocki* COLBERT)<br>*Crocuta miocenica* PAVLOVIĆ & THENIUS | Mustelidae indet. *?<br>*Gobicyon macrognatus* COLBERT<br>*Tungurictis* sp.<br>*Percrocuta miocenica* (PAVLOVIĆ & THENIUS) |
| *Anchitherium aurelianense* CUVIER<br>Rinocerotidae indet. | *Anchitherium aurelianense* CUVIER<br>Rinocerotidae indet.* |
| *Taucanamo sansaniense* (LARTET)<br>*Listriodon michali* (PARASKEVAIDIS) | *Taucanamo sansaniense* (LARTET)<br>*Bunolistriodon meidamon* FORTELIUS, VAN DER MADE & BERNOR |
| *Gomphotherium angustidens* (CUVIER) | *Gomphotherium angustidens* (CUVIER) |
| *Lagomeryx* sp.*<br>*Dicroceros elegans* LARTET?<br>*Giraffokeryx punjabiensis* PILGRIM<br>*Eotragus sansaniensis* (LARTET)*<br>*Hypsodontus serbicus* PAVLOVIĆ<br>Bovidae indet. | *Lagomeryx* sp.*<br>*Dicroceros elegans* LARTET?<br>*Giraffokeryx punjabiensis* PILGRIM<br>*Eotragus sansaniensis* (LARTET)*<br>*Hypsodontus serbicus* PAVLOVIĆ<br>Bovidae indet. |

data published are insufficient for any further evaluation of the fossils. PAVLOVIĆ (1969) mentions *Lagomerix* in his paper, but without description, and cites the genus only in the faunal list.

### Bovidae indet.

1969 *Bovidae* indet. – PAVLOVIĆ: 359.

Numerous remains of Bovidae are found in Prebreza but remain unstudied. Most of these fossils are hypsodont (PAVLOVIĆ, 1969).

## Order Proboscidea ILLIGER, 1911
## Family Gomphotheriidae HAY, 1922

### Genus ***Gomphotherium*** BURMEISTER, 1837

### ***Gomphotherium angustidens*** (CUVIER, 1817)

1969 *Mastodon angustidens* CUV. (juv. form.) – PAVLOVIĆ: 350–356, pl. 20–25.

This species is common in localities of this age. A skull of a juvenile individual was found in Prebreza. (PAVLOVIĆ, 1969).

## Conclusion

The presence of some of the species discovered is of prime importance for the age assessment of Prebreza. In comparison with other faunal lists, it is clear that Prebreza shows the closest resemblance to the other localities of early MN6 unit of middle Miocene age. The faunal list is unique and may reveal the routes and patern of migrations that occurred during the middle Miocene.

The fossil site of Prebreza is one of the most important sites of southeastern Europe. Even though there are no small mammals found in the locality, some of the discovered fossils are representatives of the age and ecological environment. Some of the identified species show Asian affinities, and are either the earliest or the only appearance of the species or genus in Europe. Orogeny and climate influenced the dynamics of these processes.

The material is well preserved. Some of the fossils are unique as they show specific elements of morphology otherwise unknown from other collections. Only parts of the existing collections are published. The locality of Prebreza will draw the attention of many generations of paleontologists to come.

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## Резиме

### Фауна Пребрезе (јужна Србија) у оквиру МН јединица

Подручје Балканског полуострва имало је значајну улогу у еволуцији копнених кичмењака. Током неогена Балканско полуострво је заједно са територијом данашње Анадолије формирало копнену масу, окружену морима Тетиса и Паратетиса. Захваљујући променама нивоа мора, као и орогеним покретима, који су се догађали током геолошке историје, овај простор је копненим мостовима повремено био повезан са различитим континентима. Географски положај, између Европе, Азије и Африке, омогућавао је миграције и међуконтиненталну размену копнене фауне. Палеонтолошки локалитети Балканског полуострва, поред тога што представљају везу између различитих палеоекошких система, на изузетан начин приказују еволутивне промене и адаптацију различитих група копнених сисара на нове животне услове.

У савременој палеонтологији копнених кичмењака, а нарочито сисара, уобичајена је подела неогена на јединице које одговарају ступњу еволутивног развоја копнене фауне. У ранијим публикацијама коорелација различитих фауни копнених кичмењака је вршена помоћу терминологије која се примењује у маинској стратиграфији. Ово је веома отежвало коорелацију и процену старости фосилних асоцијација. Употребом МН јединица (Mammalian Neogene units) омогућена је подела неогена на основу ступња еволутивног развоја копнене фауне на јединице од МН1 до МН17.

Фоосили сакупљени у Пребрези проучавани су више пута. Најзначајнији радови су: Ćирић & THENIUS (1959), PAVLOVIĆ & THENIUS (1959), Ђириħ (1960), МАТЕЈИЋ и ПАВЉОВИЋ (1962), PAVLOVIĆ & THENIUS (1965) и PAVLOVIĆ (1969). Колекције сакупљене са овог локалитета налазе се у Природњачком музеју у Београду, као и у збирци Института за регионалну геологију и палеонтологију Рударско–геолошког факултета у Београду. Сакупљени материјал није у потпуности обрађен. Историјат проучавања и ревизија дати су у синонимици, као и у табели 1. Неке од врста које су објављене, су од посебног значаја јер представљају статиграфски најстарији, или једини налаз у Европи. Остаци ситних сисара још увек нису пронађени.

Присуство појединих таксона, као и еволутивни ступањ на којем се оне налазе, нам говоре о старости налазишта у Пребрези. Упоређивањем садржаја и карактристика Пребрешке фауне са фаунама других локалитета, можемо закључити да Пребреза показује највише сличмости са налазиштима средње миоценске старости, која припадају раном стадијуму МН6 јединице, односно одговарају маринским локалитетима баденске старости. Фаунистичка листа је специфична јер нам указује на путеве миграција, које су се одигравале током средњег миоцена. Орогени процеси и клима утицали су на динамику ових процеса.

Материјал је добро очуван. Локалитет у Пребрези ће и у будућности бити предмет истраживања.