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The Miocene small mammals of Serbia, a review

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Preliminary fauna lists of the small mammals from the major Miocene localities of Serbia are presented and the correlation of these assemblages to the MN scale is discussed. The composition of the assemblages of Sibnica suggests that the climate in the area was humid during the Badenian and Sarmatian.

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INTRODUCTION

The fossil content of the continental Miocene deposits of Serbia has been intensively studied during the twentieth century. However, the small mammals remained a neglected group because Z. Petronijevic and M. Pavlovic were the only palaeontologists who systematically searched and studied fossil mammals. Isolated finds of large mammals have been occasionally reported by B. Ciric, V. Laskarev, P. Stevanovic and others who concentrated on the study of the malacofauna.

Many shallow lakes formed in the area of Serbia when the Paratethys receded during the Miocene, so continental sediments are widespread and the potential to find fossil mammals in these deposits is good. Some rich sites, such as Prebreza, Popovac, Mala Miliva and Sibnica, have been known for a long time, but isolated finds of large mammals found during building activities have become known form some seventy other places in Serbia. A team of the Natural History Museum of Belgrade started a few years ago to systematically screen-wash test samples of sediment that might contain remains of small mammals. In spite of difficult working conditions this campaign resulted in the discovery of several new localities and the extension of the collections from known sites. The preliminary results of this joint effort will be presented below.

METHODS

The sediment samples were either dried under the sun or in a stove in the laboratory at a temperature of 80°C before soaking in water and subsequent sieving. The set of sieves used in the laboratory (mesh ∅ 2 mm and 0.6 mm) is mounted on a vertical axis that is rotated by an electromotor. In order to increase the efficiency of the sieving process the tank with the sieves has been connected to a vibrator.

LOCALITIES AND MATERIAL

Lestane

A section of brackish and lacustrine deposits allocated to the Badenian are exposed in a road cut near Lestane (Fig. 1). The middle part of this section contains remains of

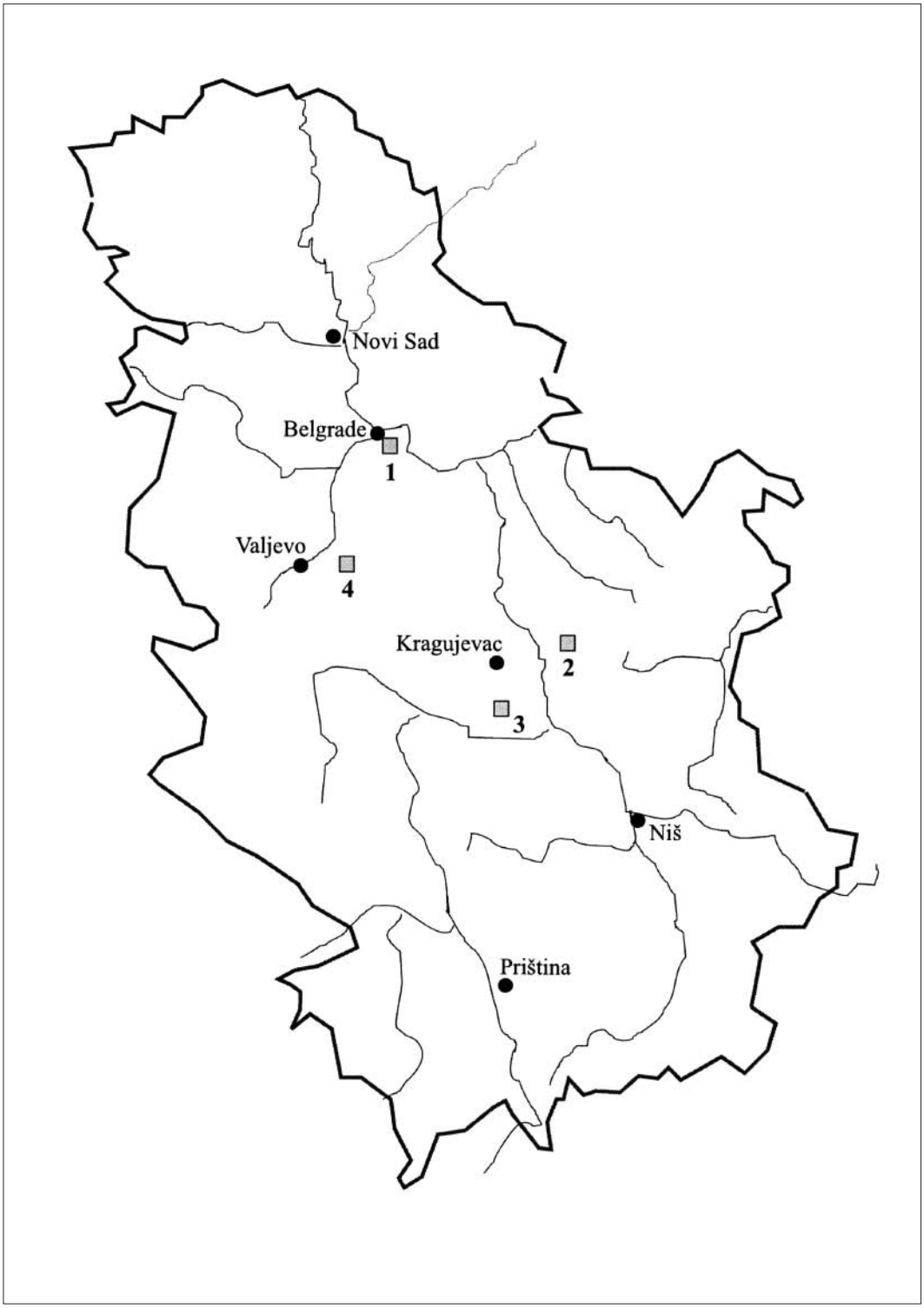

Figure 1 Map of Serbia with geographical positions of the localities. **1** Lestane, **2** Mala Miliva, **3** Sibnica, **4** Vracevici.

Testudo sp. and *Trionyx* sp. A mandible of *Galerix exilis* with two teeth was found in this bed. The overlying conglomerates contain silificied three trunks. The occurrence of *G. exilis* does not allow the correlation to the MN zonation.

Mala Miliva

This locality (Fig. 1), known since 1953, was situated in the now deserted coal mines near the village of Mala Miliva (Despotovac basin). Two cricetid species have become known from this locality: *Cricetodon meini* FREUDENTHAL, 1963 and *Democricetodon affinis* (SCHAUB, 1925) (see Petronijevic 1967). Some cricetid incisors and fragments of cheek teeth of Soricidae were collected from the dumps of the mine above the village during a recent visit to the area.
The Malva Miliva "fauna" is tentatively correlated with MN 5.

Sibnica

This locality in the Levac basin is situated on the southern slope of the Gledic Mountains in the vicinity of the village of Gornja Sibnica (Fig. 1). The original site that was easy to reach at the time of Petronijevic (1967) was later covered by landslides. However, brownish-grey clays containing mollusc remains and bone fragments are now exposed in a new quarry on the right bank of the Poljanski potok river. A sample of about 200 kg of this bed yielded specimens of *Democricetodon mutilus*, *Eumyarion bifidu*s, *Anomalomys minor*, *Ligerimys antiquus* and *Heramys* sp., species that are not represented in the original collections, so it cannot be excluded that the two faunas come from different levels. The original fauna from Sibnica has been correlated to MN 6 by Pavlovic (2000) and MN5 by de Bruijn *et al.* (1992), however, the presence of *Ligerimys antiquus*, *Anomalomys minor* and *Heramys* sp. in the new quarry where is almost ahalf of specimens belong to the families Cricetidae and Eomydae (data on 95 teeth), allow the unequivocal correlation of that assemblage to MN 4.

Fauna lists Sibnica (old collection, Fig. 2)

Insectivora
- Erinaceidae
  - Echinosoricinae
    - *Galerix exilis* (BLAINVILLE, 1840)
- Talpidae
  - Urotrichini
    - "*Scaptonyx*" *fowardsi* GAILLARD, 1899
- Soricidae
  - Heterosoricinae
    - *Deinosorex sansaniensis* LARTRET, 1851
  - Crocidosoricinae
    - *Lartetium dehmi* (VIRET & ZAPFE, 1952)

Rodentia
- Sciuroidea
- Sciuridae
  - *Spermophilinus bredai* (VON MEYER, 1848)
- Cricetidae
  - *Democricetodon brevis* (SCHAUB, 1925)
  - *Eumyarion weinfurteri* (SCHAUB & ZAPFE, 1953)

Fauna list Sibnica (new collection, Fig. 2)

Insectivora
- Erinaceidae
  - Echinosoricidae
    - *Galerix symeonidisi* DOUKAS, 1986
- Talpidae indet.
- Soricidae indet.

Chiroptera indet.

Rodentia
- Sciuroidea
- Sciuridae
  - *Spermophilinus bredai* (VON MEYER, l848)
- Petauristidae
  - *Blackia miocaenica* MEIN, 1970
- Eomydae
  - Pseudotheriodomys sp.
  - *Ligeromys antiquus* (FAHLBUSCH, 1970)
- Gliridae
  - *Eomuscardinus* sp.
  - *Glirulus lissiensis* HUGUENEY & MEIN, 1965
  - Microdyromys sp.
- Cricetidae
  - *Democricetodon mutilus* FAHLBUSCH, 1964

Eumyarion bifidus (FAHLBUSCH, 1964)
Spalacidae
*Heramy*s sp.
Anomalomidae
Anomalomys minor FEJFAR, 1972

Vracevici

The village of Vracevici is situated at about 80 km to the Southwest of Belgrade where the Kolubarski and Mionicki basin merge. The locality is situated in a 10m thick section of sandy clays containing molluscs exposed in the bank of the Grabovac River. These sediments have been allocated a Sarmatian age by Stevanovic (1953) on the basis of the malacofauna. The 0.5-1 m thick bed that yielded the mammal remains is situated in the middle part of the section. About 400 kg of the fossiliferous sediment that occasionally contains pebbles as well as remains of larger mammals, amphibians, reptiles and fish has been sieved and sorted in the Natural History Museum of Belgrade. The bones of large mammals are rolled and have obviously been transported prior to deposition. The assemblage of small mammals from Vracevici, containing *Keramidomys mohleri*, *Eomyops* cf. *catalaunicus* and *Anomalomys gaudryi*, is dominated by the cricetids *Democricetodon*, *Megacricetodon* and *Cricetodon* (data on 528 specimens). This association can be correlated to MN 7 + 8.

Fauna list Vracevici (Fig. 3)

Insectivora
Erinaceidae
Echinosoricinae
Lanthanotherium sansaniense (LARTET, 1851)
Galerix socialis (VON MEYER, 1865)
Ereniceinae
Mioechinus sp.
Plesiosoricidae
Plesiosorex schaffneri ENGESSER, 1972
Talpidae
Scalopine
Proscapinus sansaniensis (LARTET, 1851)
Dimylidae
Plesiodimylus chantrei GAILLARD, 1897
Soricidae

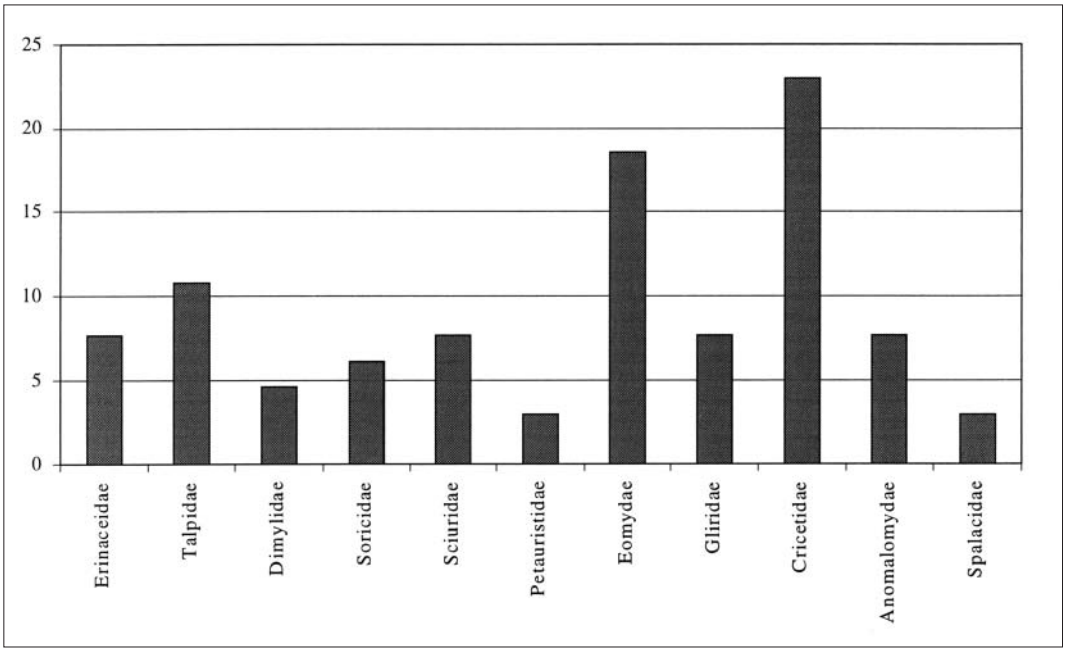

Figure 2 Relative abundance (%) of micromammal families from Sibnica site.

Heterosoricinae
Dinosorex pachygnathus ENGESSER, 1972
Dinosorex sansaniensis (LARTET, 1851)
Chiroptera indet.
Lagomorpha
Ochotonidae
Prolagus sp.
Lagopsis cf. *verus* (HENSEL, 1856)
Amphilagus fontannesi (DEPÉRET, 1887)
Rodentia
Sciuroidea
Sciuridae
Spermophilinus bredai (VON MAYER, 1848)
Eomydae
Keramidomys mohleri ENGESSER, 1972
Eomyops aff. *catalaunicus* (HARTENBERGER, 1966)
Gliridae
Gliridinus sp.
Miodyromys sp.
Miodyromys hamadryas DE BRUIJN, 1966
Myoglis meini (DE BRUIJN, 1966)
Eomuscardinus aff. *sansaniensis* (LARTET, 1851)
Paraglirulus werenfelsi ENGESSER, 1972
Paraglirulus sp.
Microdyromys koenigswaldi DE BRUIJN, 1966
Microdyromys cf. *complicatus* DE BRUIJN, 1966
Microdyromys sp.
Cricetidae
Democricetodon affinus (SCHAUB, 1925)
Democricetodon brevis (SCHAUB, 1925)
Democricetodon freisigensis FAHLBUSCH, 1964
Megacricetodon minor (LARTET, 1891)
Megacricetodon similis (FAHLBUSCH, 1964)
Eumyarion latior (SCHAUB & ZAPFE, 1953)
Cricetodon sp.
Deperetomys hagni (FAHLBUSCH, 1964)
Anomalomydae
Anomalomys gaudryi GAILLARD, 1900
Neocometes sp.
Spalacidae
Pliospalax sp.

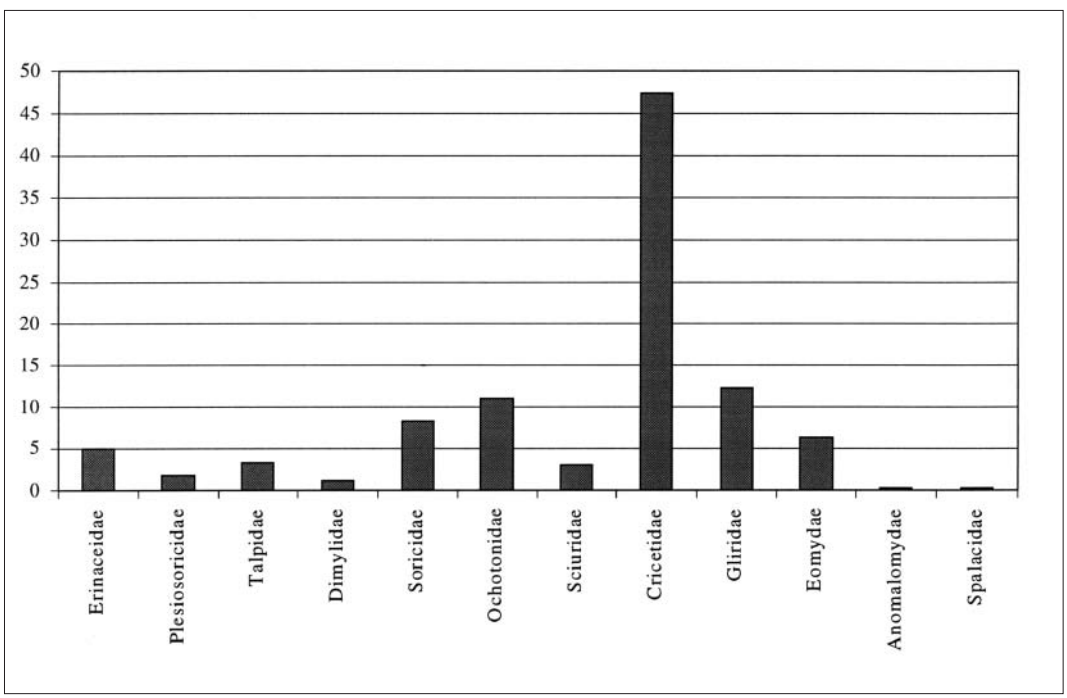

Figure 3 Relative abundance (%) of micromammal families from Vracevici site.

CONCLUSIONS

The assemblages from Sibnica (MN4) and Vracevici (MN 7+ 8) are both quite diverse and show strong similarity to those from Aliveri (Greece) and Anwil (Switzerland) respectively. This suggests that what is now Serbia was part of the same bioprovince as the southern part of the Balkan peninsula and the Alpine area during a larger part of the Miocene, a conclusion that is in agreement with the palaeogeographical maps presented by Popov (2001) and Rögl (2001). The composition of the two assemblages is, if corrected for age difference, quite similar, although the total absence of Ochotonidae in Sibnica is not understood. The presence of Talpidae, Dimylidae, Soricidae, Eomydae and the cricetid Democricetodon in both assemblages suggest that the climate in the area was humid during the Badenian as well as the Sarmatian.

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