

Tourist attractiveness of mineralogical-petrographical and paleontological collections in the museums of Vojvodina (North Serbia)

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ABSTRACT

On the territory of the Autonomous Province of Vojvodina, there are five museums that possess mineralogical-petrographical, and nine museums that possess paleontological collections. Also, the Provincial Institute for Nature Conservation, within its Natural History collection, possesses these collections. The main aim of this paper is to present the mineralogical-petrographical and paleontological collections in the museums of Vojvodina, as well as to evaluate their tourist attractiveness. Aims are also to explore the extent of visits and to identify main problems related to the inclusion of these collections in current tourist offer. Research results indicate the need for better planning, promotion and upgrading of collections in order to attract more visitors.

Key words: mineralogical-petrographical collections, paleontological collections, museums, tourism, Vojvodina, Serbia

INTRODUCTION

According to a definition of the International Council of Museums (ICOM): “Museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment” (ICOM Statute, 2007).

The rich cultural and historical past of Vojvodina lead to the emergence of a large number of museums in this area. The first museum on the territory of Vojvodina was founded in 1877 in Bela Crkva (Kumović, 2001). The first geological collection is even older. It was formed by Andreas Wolny (1759-1827), director of the Gymnasium in Sremski Karlovci. Of the

initial 800 specimens, in the first half of the 19th century, it has grown to 2000 specimens, but after that it was neglected, and slowly disappeared (Jović, 2008).

In addition to their cultural importance, museums in Vojvodina have a certain educational and touristic function. Among other things, these institutions store movable geological heritage that represents not only the geodiversity of Vojvodina, but the geodiversity of the entire country. At the moment, on the territory of the Autonomous Province of Vojvodina, there are nine museums that own mineralogical-petrographical and/or paleontological collections. In addition, it is necessary to mention the Provincial Institute for Nature Conservation which is included in the survey because within its Natural History collection, the Institute owns rich mineralogical-petrographical, as well as a paleontological collection.

The main aim of this paper is to present mineralogical-petrographical and paleontological collections in the museums of Vojvodina, as well as to evaluate their tourist attractiveness. For this purpose, it is necessary to explore the extent of visits and to identify main problems related to the inclusion of these collections in current tourist offer.

METHODOLOGY

In order to assess the attractiveness of a tourist product (in this case, mineralogical-petrographical and paleontological collections in the museums of Vojvodina) it is not enough just to perceive its value (attractiveness, cultural, educational, historical value etc). A very important issue in assessing the attractiveness of a tourist product is examining the attitudes of tourists. It is necessary to investigate what it is that people are most drawn to, what they expect from certain tourist product, what is that satisfy them, or not.

This research consisted of two parts. The first part is field research, which was conducted during September of 2015. Residents from all parts of the Republic of Serbia were included in the survey. The second part of a research is an analysis of the completed questionnaires.

Sample

The sample included a total of 100 respondents whose place of residence is the Republic of Serbia. More than half of the respondents (57%) belong to urban, while the rest (43%) belong to rural population. Sample characteristics are further described in Table 1.

Instruments

The questionnaire consisted of two parts. The first part involved questions related to the socio-demographic profile of respondents (age, gender, occupation, education level, place of residence). The second part of the questionnaire consisted

of different questions related to the attendance of museums and their mineralogical-petrographical and paleontological collections, as well as respondents' opinions about their tourist importance and the problems they face.

Procedure

The research was carried out between the 1st and 25th of September 2015. Partly, it was conducted in the field where each of the respondents filled out the questionnaire with the assistance of the authors, and partly by using a program software called E-surveyspro. The respondents were informed of the general purpose of the study and that participation is voluntary and anonymous.

STUDY AREA

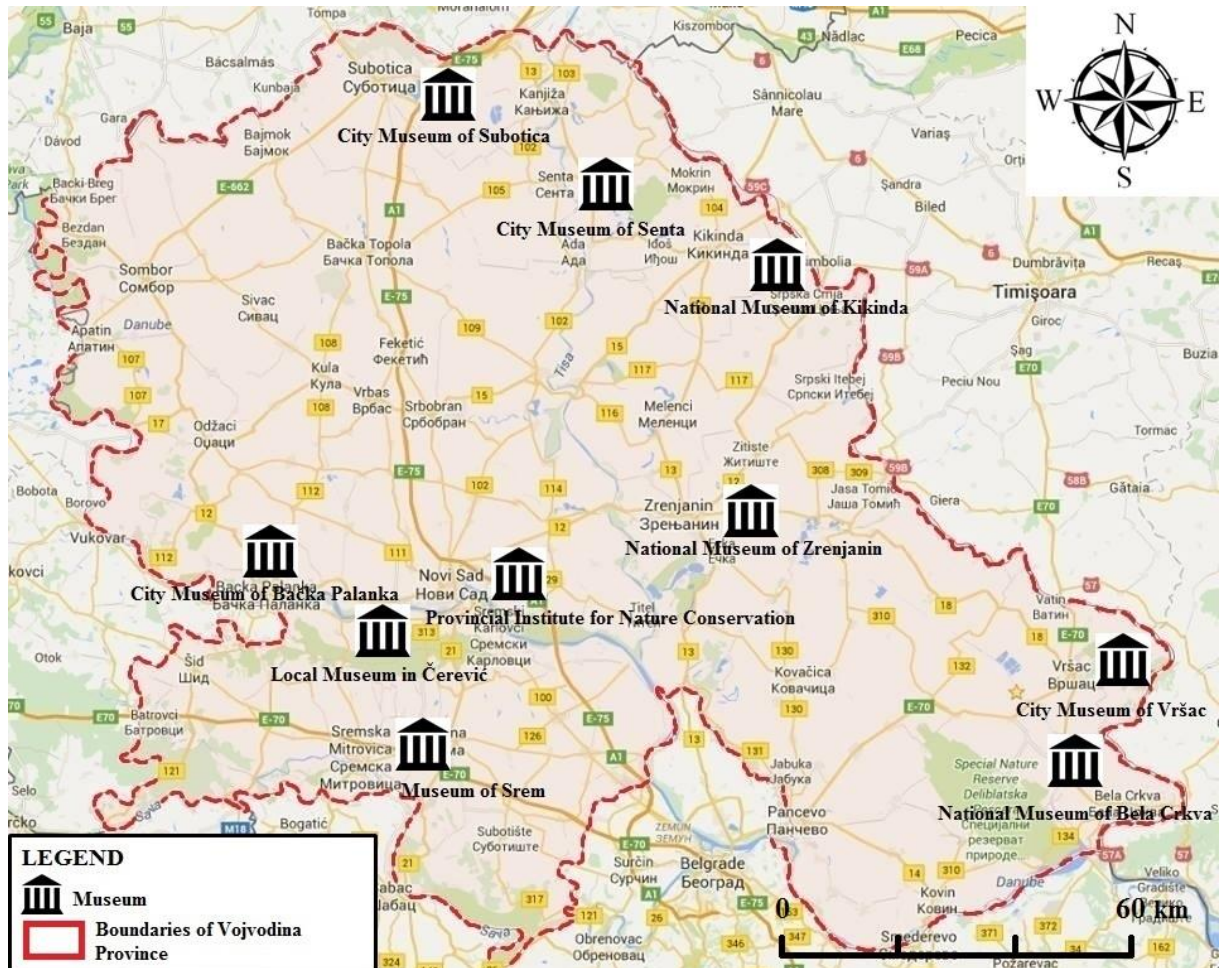
Vojvodina is a region in northern Serbia, located in the south-eastern part of the Carpathian (Pannonian) Basin. It covers the total area of 21,500 km² and has a population of about 2 million (about 27% of Serbia's total). The region is divided by the Danube, Tisza and Sava rivers into: Bačka in the northwest, Banat in the east and Srem in the southwest (a small part of the Mačva region is also located in the Srem District) (Dodić et al., 2010).

Vojvodina has a significant traffic importance (international roads E-75 and E-70, european main railway lines E-85, E-70 and E-66). When it comes to domestic and international traffic, the Danube River has the biggest importance with the length of its flows through Vojvodina of about 360 km. The Sava, Tisza and Tamiš rivers are also navigable, as well as the main channel Danube-Tisza-Danube (Bugarčić, 2007; www.pkv.rs/node/105).

Museums included in the survey are mainly located in major urban centers, but there are also those that are located in smaller communities (e.g. museums in Senta and Čerević).

Tab. 1 Socio-demographic characteristics of respondents

Gender		Age		Level of education		Place of residence	
	%		%		%		%
Male	59	< 21	4	primary	0	town	57
		21-35	46	secondary	62		
female	41	36-55	34	higher	7	village	43
		over 55	16	high	31		

**Fig. 1** Geographical position of museums covered by the survey (Source: Google maps, modified)

MINERALOGICAL- PETROGRAPHICAL AND PALEONTOLOGICAL COLLECTIONS IN MUSEUMS OF VOJVODINA

In this part of the paper all the mineralogical-petrographical and paleontological collections in museums of Vojvodina are presented. Except those that are exposed, collections that are not part of the permanent museum settings are also

presented.

Mineralogical-petrographical and paleontological collections of the National Museum of Zrenjanin together constitute a unique geo-paleontological collection. Formation of this collection started in 1978. The material for the paleontological collection was created mostly by drilling the ground for oil exploration (Deak, 2011). At the moment, the total number of samples of the geo-paleontological collection is 449. It

contains zoo and phyto paleontological material, as well as various types of loess, sandstone and volcanic rocks with fossil remains (Archives of the Zrenjanin National Museum). Within the permanent exhibition of the Museum currently there are only 25 exposed specimens, among them: fossil remains of the woolly mammoth, steppe bison, wild (European) cattle and giant deer (Boškov, 2015). The most valuable, and in the same time the most interesting showpiece for visitors are the fossil remains of the woolly mammoth (*Mammuthus primigenius*) that were found in 1952 during the excavation of the Danube-Tisza-Danube channel, near Novi Bečej. The woolly mammoth (*Mammuthus primigenius*) is an extinct genus of the proboscidean family, whose occurrence is linked to the Pleistocene, about 135 000 years ago (Spinar, 1985).

Mineralogical-petrographical and paleontological collections of the National Museum of Kikinda are within the Department of Natural History. These collections were obtained from the Gymnasium of Kikinda in 1993, and were created since the establishment of the Gymnasium in 1858, until 1941. The number of samples is approximately 300, but within the permanent exhibition only 15 of them are exposed. The most important showpiece in the Museum are the mammoth fossil remains. These fossil remains were found in 1996, during the extraction of clay, and are kept in the Museum since 2006. About 90% of bone mass is preserved. This animal (named Kika) lived 500 000 years ago, and belongs to a species *Mammuthus trogontherii*, also known as steppe mammoth (www.kikinda.co.yu). Within the permanent exhibition a multimedia presentation is available for all visitors who want to find out more about Kika and her life.

Paleontological collection of the National Museum of Bela Crkva has not been exhibited since 2012. The forming of this collection started before the

establishment of the museum. In 1877, agriculturist and city representative Karl Spang donated mammoth bones to the city. These bones were found in 1875, near Dupljaja village. Spang donated them to the city for further storage in the City Hall. Soon, the representative body of Bela Crkva at its regular eighth session, on the initiative of the donor, designated a special room for the Museum (Kumović, 2001). During the Second World War a large part of the paleontological collection fund was destroyed. Today it is the humblest collection of its kind in Vojvodina and includes only 10 remnants: four mammoth bones, five mammoth teeth and part of a buffalo skull with a horn (Archives of the National Museum of Bela Crkva). As noted, paleontological collection of the National Museum of Bela Crkva is not exposed since 2012, but its presentation is planned in the following period, as part of thematic exhibitions.

Mineralogical-petrographical and paleontological collections of the City Museum of Vršac are parts of the Natural History Department, whose total collection contains more than 5 000 samples. The largest is the paleontological collection, but it has not been exhibited for a while, the same as the mineralogical-petrographic collection.

The formation of the collections began in the late 19th century. Geologist and volcanologist Rudolf Mileker brought first specimens of minerals to the Museum and was most deserving for the formation of these collections. The mineralogical-petrographical collection of the City museum of Vršac is in a very bad condition. All items are stored in the museum depot. There is no inventory of the collection and the documentation is incomplete. Similar situation is also with the paleontological collection. Samples originate mostly from the territory of southern Banat, and a part of them was found on the territory of Romanian Banat. The collection contains 84 bones of prehistoric animals (mainly mammoth) and 71 fossils that originate

from the period between Carboniferous and Holocene. The oldest sample in the Museum is 362 million years old (Rašajski, 2007/2008).

Mineralogical-petrographical and paleontological collections of the Museum of Srem arose from the private collection of an engineer Dušan Kostić from Kupinovo, and in 1947 were donated to the Museum. The collection was officially put into operation in 1996, when the workplace of curator of Natural History collection was opened. It contains significant paleontological, mineralogical-petrographical, archaeozoological and anthropological material. Mineralogical-petrographical part of the Natural History collection contains minerals, igneous, sedimentary and metamorphic rocks that comprise the geological base of the Fruška Gora mountain, as well as rare specimens originating from other parts of the country. The paleontological part of the Natural History collection contains vertebrates (Quaternary large mammals) and invertebrates (Miocene microfauna, fauna from archaeological sites). Fossil remains of large mammals include parts of skulls, teeth and other parts of mammoth, woolly rhinoceros, giant deer, elk and bison skeletons. The aforementioned species lived on the territory of Srem during the Pleistocene and became extinct more than 10 000 years ago. All remnants were found in the alluvial sediments of the Sava River. Of special importance is the skull of a giant deer (*Megaloceros giganteus*), which has been legally protected as a unique natural monument on the territory of Serbia, since 1973. The museum holds the original, but a replica is exhibited. Also, one replica is exhibited in the Provincial Institute for Nature Conservation in Novi Sad (Nedeljković, 2004). Numerous fossils of shells, snails, sea urchins and corals indicate a great diversity of fauna from the former Pannonian Sea.

Paleontological collection of the Local Museum in Čerević was formed in 1980, at a time when the Museum was founded. It

contains fossilized remains of flora and fauna of Fruška Gora, and the total number of samples is approximately 100. There is no inventory of the collection, so the origin, age, as well as the exact location where the objects were found are unknown. However, it is known that specimens of molluscs originate from the Čerević stream valley. Famous Hungarian geologist Antal Koh collected and determined these specimens in the second half of the 19th century (Koch, 1864, according to Petho, 1906). Most of these findings are exhibited in the Hungarian Natural History Museum in Budapest, and only a small part of them is still in Čerević.

In comparison with other museums in Vojvodina, the Local Museum of Čerević lags behind, due to its content, equipment, organization and presentation of paleontological collection. It is understandable, given the fact that this is a small museum, located in a smallish rural area.

Paleontological collection of the City Museum of Bačka Palanka contains approximately 50 specimens, 20 of them are exposed, while the rest are stored in the depot. The most numerous are bones and teeth of mammoths and bisons. These items were mostly found at the site Krstur and in the area of Mladenovo. Among the oldest and most interesting exhibits are the remains of shells, as well as teeth of sharks that lived in the former Pannonian Sea, which disappeared during the Pleistocene, ie. more than 600 000 years ago. These fossils provided numerous scientific discoveries and information about the former Pannonian Sea (Rodić and Pavlović, 1994).

Paleontological collection of the City Museum of Senta. Formation of the collection began in Senta Grammar School, at the end of the 19th century, and it was transferred to the Museum immediately after its opening. Today there are approximately 250 items within this collection, and only 15 of them are exhibited (fossil remains of the woolly

mammoth, bison and giant deer). In addition, in the Museum's depot there is a large number of items such as vertebrae, ribs, tusks, teeth and thigh bones of prehistoric animals.

Mineralogical-petrographical and paleontological collections of the City Museum of Subotica are parts of the Natural History Department, together with the zoological and botanical collections. Formation of these collections began simultaneously with the establishment of the Museum, however they were never exposed. The mineralogical-petrographical collection contains approximately 100

items of different origin. Paleontological collection contains between 150 and 200 specimens, mainly remains of animal bones. Also there is a small number of botanical fossil remains - approximately 15 fossils. This fossils were mainly found in the vicinity of Subotica. In 2014 the collection was complemented by the animal remains, sent from the Archaeological Department of Faculty of Philosophy in Belgrade. The Museum is currently working on the preparation of permanent exhibitions, and according to the staff, the paleontological collection is the first that will be prepared.

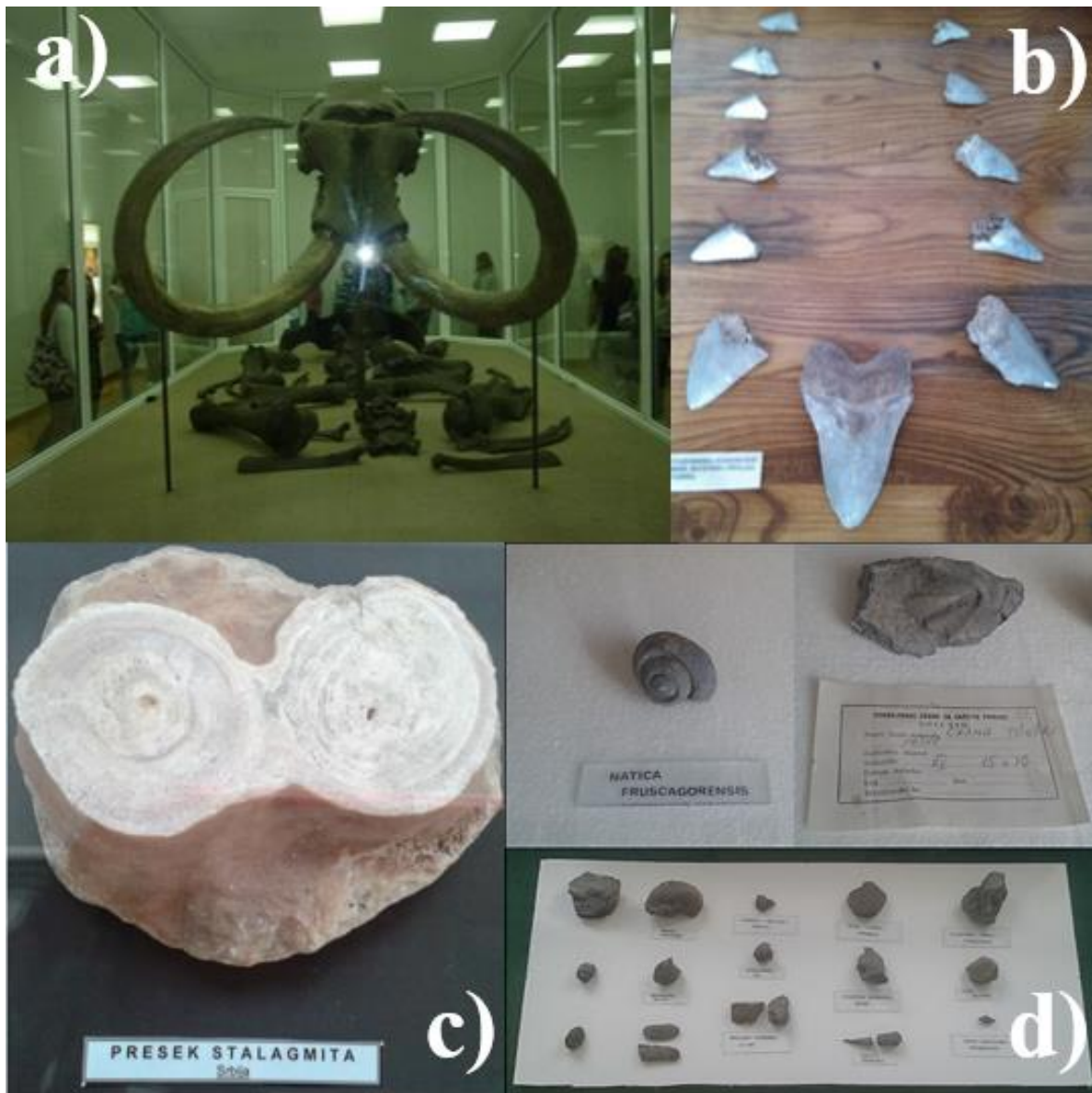


Fig. 2 a – Fossil remains of a mammoth in the National Museum of Kikinda, **b** – Teeth of Pannonian shark in the City Museum of Bačka Palanka, **c** – Stalagmite exposed in the Provincial Institute for Nature Conservation in Novi Sad, **d** – Fossils exposed in the Local Museum in Čerević (photo by: Jovana Boškov)

Mineralogical-petrographical and paleontological collections of the Provincial Institute for Nature Conservation are within the Natural History Department, consisting of over 25 000 specimens. The mineralogical-petrographical collection of the Provincial Institute represents the most complete collection of its kind in Vojvodina. Mineralogical part of the collection consists of samples of ores and minerals, found in famous mines of former Yugoslavia. Formation of this collection began simultaneously with the establishment of the Natural History Department at the Museum of Vojvodina, in 1947 (<http://pzzp.rs/sr/prirodnjacka-zbirka-i-izlozba/prirodnjacke-zbirke/geolosko-paleontoloska-zbirka.html>).

The petrographical part of the collection mainly contains specimens of rocks, originating from Fruška Gora and Vršac mountains, as well as from other parts of Serbia. Especially interesting are examples of sedimentary rocks - parts of stalactites and stalagmites. Exhibits of paleontological collection have been divided into six separate units (fauna of Tethys and Paratethys from the area of Fruška Gora; fossils of Mesozoic invertebrates from the area of Eastern Serbia; flora of Fruška Gora mountain; Deninger's bear; cave bear; remains of woolly mammoths, woolly rhinos and primitive proboscidean). The most precious exhibit is the skull of the woolly mammoth (*Mammuthus primigenius*), from Upper Pleistocene, found in the Tisza River near Novi Bečej, 1947. The skull is very massive, and on that base, considered as an unique sample not only in Serbia, but also in Europe.

RESULTS AND DISCUSSION

The main aim of this paper was to investigate the tourist attractiveness of mineralogical-petrographical and paleontological collections in museums of Vojvodina, as well as to identify problems

related to their larger tourist activating. This was done through a survey which included 100 respondents, from all parts of Serbia. Answers to the specific questions, related to tourist attractiveness and extent of visits of mineralogical-petrographical and paleontological collections in museums of Vojvodina are explained in more detail below.

Extent of visits of mineralogical-petrographical and paleontological collections in museums of Vojvodina.

To questions related to the extent of visits, respondents answered with *yes* or *no* (Table 2). Out of 100 respondents who took part in the survey, 51% visited some of the mineralogical-petrographical collections in museums of Vojvodina. A large percentage of respondents (49%) never visited any of the mineralogical-petrographical collections, which appears to be a result of the fact that many of these collections have not been exhibited for a long time. For example, in museums in Subotica and Vršac the collections have not been exhibited for more than 25 years, while in the Museum of Srem, the mineralogical-petrographical collection has never been exhibited. These examples highlight the lack of activity and engagement of museums in the field of protection and conservation of the geological history of our country. Most museums in Vojvodina give primacy to historical, artistic, and especially ethnographic collections.

Unlike mineralogical-petrographical, paleontological collections are characterized by a higher extent of visits. This is understandable considering that in Vojvodina there are ten paleontological collections, and only six mineralogical-petrographical collections.

Which mineralogical-petrographical collection have you visited?

In this question the respondents were able to choose between mineralogical-petrographical collections in following museums: National Museum of Kikinda,

Table 2. Extent of visits of mineralogical-petrographical and paleontological collections in museums of Vojvodina

Questions	Answers (%)	
	YES	NO
Have you ever visited any of mineralogical-petrographical collections in museums of Vojvodina?	51	49
Have you ever visited any of paleontological collections in museums of Vojvodina?	63	37

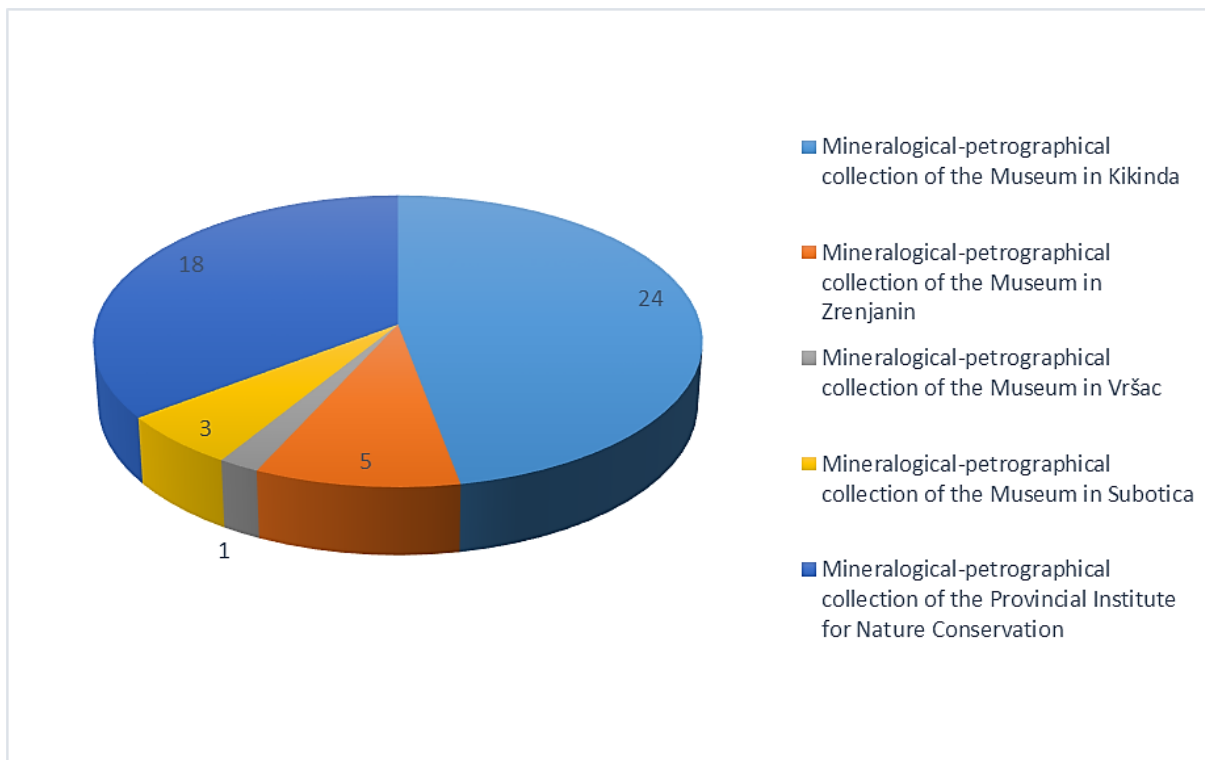


Fig. 3 Number of respondents who have visited mineralogical-petrographical collections

National Museum of Zrenjanin, City Museum of Vršac, City Museum of Subotica and Provincial Institute for Nature Conservation in Novi Sad. Mineralogical-petrographical collection of Museum of Srem is not listed, because it was never exhibited.

As shown in Figure 2, the most visited is the mineralogical-petrographical collection of the National Museum of Kikinda (24). However, considering that the survey included 100 respondents, it is clear that this collection is also visited in small extent. On the other hand, a surprising result is that only 18 respondents visited the mineralogical-petrographical collection of the Provincial Institute for Nature Conservation in Novi Sad. As already

mentioned this collection is the most complete collection of its kind in Vojvodina, and it is also significant that is located in Novi Sad, the capital of the Autonomous Province of Vojvodina. For these reasons, it was expected that the number of visitors is bigger. Only five respondents visited the mineralogical-petrographical collection of the Museum in Zrenjanin, and only three visited the mineralogical-petrographical collection of the Museum in Subotica. The collection of the Museum in Vršac is the least visited - only one respondent visited it. Such a structure of answers is in accordance with the aforementioned condition of these collections in museums of Vojvodina. As mentioned, in some museums these

collections have not been exhibited for a long time. On the other side, respondents are between 21 and 35 years old, so the number of visitors is extremely small.

Which paleontological collection have you visited?

In this question the respondents were able to choose between the paleontological collections in museums in: Zrenjanin, Kikinda, Bela Crkva, Vršac, Sremska Mitrovica, Čerević, Bačka Palanka, Senta, Subotica and Novi Sad.

The largest number of respondents (69) visited the paleontological collection of the Provincial Institute for Nature Conservation. This is justified by the fact that the Institute organizes a large number of different events, which include a visit to the collection. Novi Sad is the University

center of Vojvodina, so every year a big number of students and pupils come to visit this collection. However, in the structure of answers a discrepancy is evident. This discrepancy is reflected in the following: mineralogical-petrographical and paleontological collections of the Provincial Institute are exhibited in the same room, next to each other and constituting a unique collection, so it is surprising that the mineralogical-petrographical collection was ranked in second, and the paleontological collection in the first place. Reasons for such mismatch could be a lack of information and respondent's inability to make the difference between these collections. The second most visited is the collection of the National Museum in Kikinda (54). This Museum gained great popularity thanks to the fossil remains of

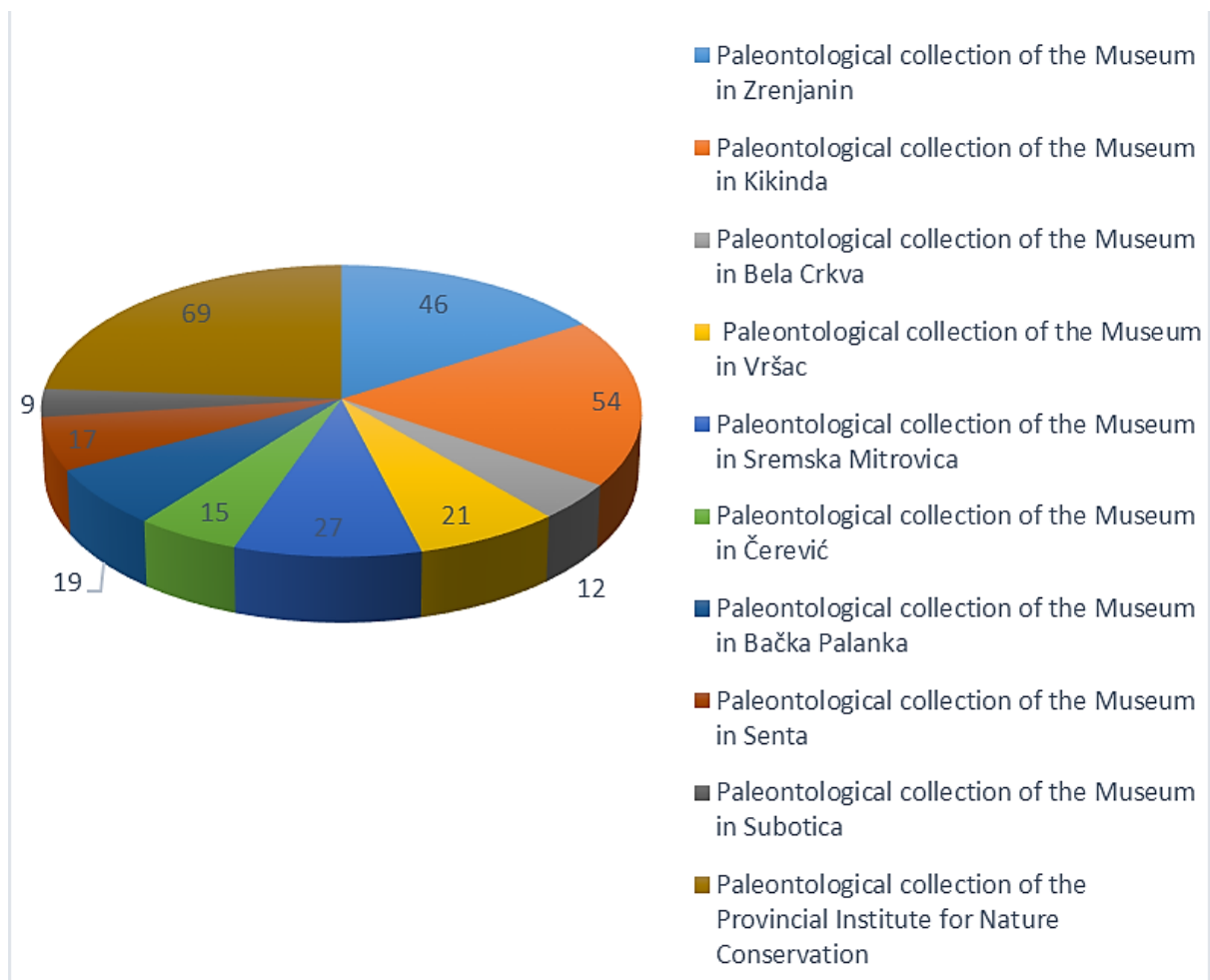


Fig. 4 Number of respondents who have visited paleontological collections

become a the mammoth Kika, which has kind of a brand not only of the Museum, but also of Kikinda in general. The lowest number of visitors of paleontological collections was observed in the Museums of Bela Crkva (12), and Subotica (only 9). This is understandable considering that in the Museum of Bela Crkva the paleontological collection has not been exhibited since 2012, and also in the Museum of Subotica it has not been exhibited for some time.

What are the biggest problems related to mineralogical-petrographical and paleontological collections in museums of Vojvodina?

In this question three statements relating to problems of presentation of aforementioned collections and their inclusion in the tourist offer were listed. Respodents could evaluate their agreement with each of these statements ranging from 1 to 5, with 5 indicating complete agreement with the statement.

Leading problems of tourism in Vojvodina in general, and also in case of these collections, are bad marketing and

promotion. At the statement that marketing of mineralogical-petrographical and paleontological collections is adequate, more than half of the respondents (54) gave the lowest grade (1), 29 of the respondents gave 2, 7 respondents gave 3 and 8 respondents gave 4. Only 2 out of 100 respondents are completely agreeing with this statement. Except for marketing, there is also a problem of poor inclusion of these collections in the tourist offer of Vojvodina. However, this problem should be observed from a wider perspective. Museums in Vojvodina are rarely present in the tourist offer. Their activities are insignificant and quite badly organized, starting from the organization of collections, supporting programs, marketing, registration of number of visitors which is often lacking etc. In a large number of museums no one takes care of museum objects and collections, there is no inventory of exhibits, nor basic museum documentation. Considering all abovementioned, it is evident that the tourist activation of museums in general should be done first, and then the mineralogical-petrographical and paleontological collections could be

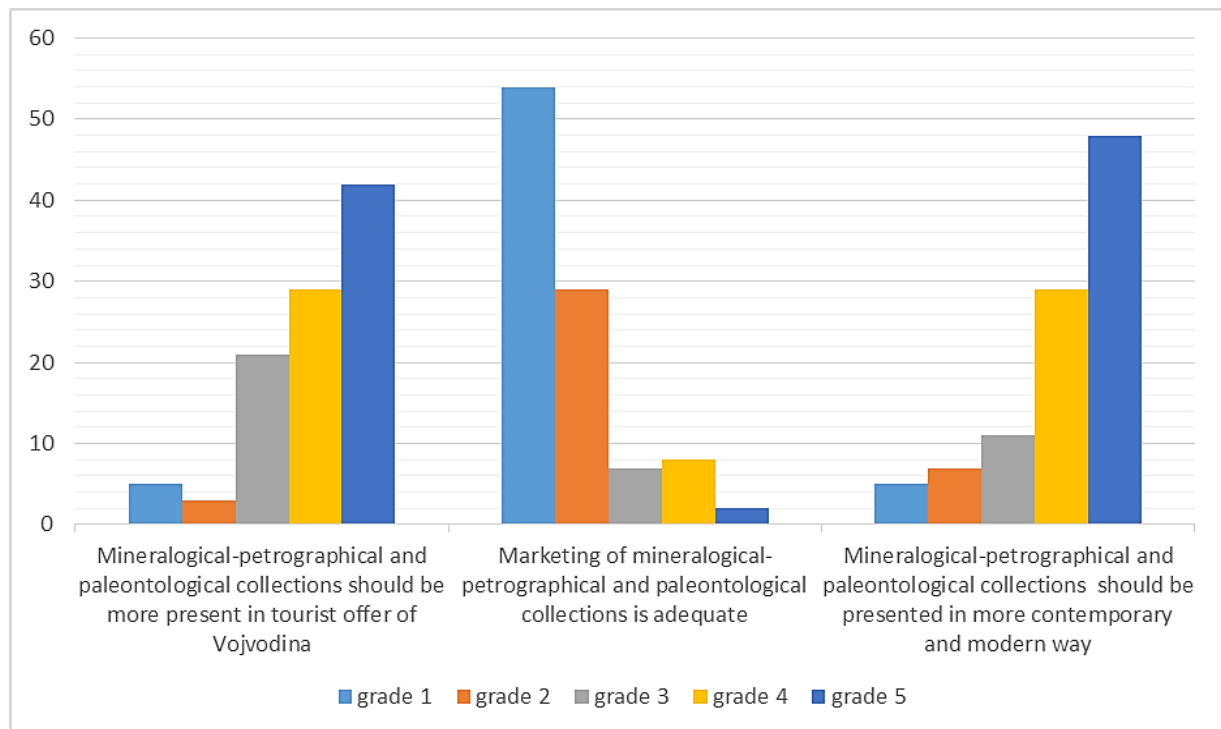


Fig. 5 Problems related to presentation of mineralogical-petrographical and paleontological collections in museums of Vojvodina

more included in the tourist offer of Vojvodina. This observation is corroborated by the insight into the number of visitors in museums of Vojvodina, that in larger, better-known and better-organized museums does not exceed 35 000 per year (Bošković, 2015). A large number of respondents (42) fully agree with the statement that collections should be more present in the tourist offer of Vojvodina. Regarding the same statement, 29 of the respondents gave the grade 4, 21 respondents gave a 3, and only 3 respondents gave a 2. Only 5 respondents completely disagree with this statement. The statement that mineralogical-petrographical and paleontological collections should be presented in a more contemporary and modern way was evaluated as following: grade 1 (5), grade 2 (7), grade 3 (11), grade 4 (29), while the highest grade (5) was given by 48 of the respondents. The necessity for modernizing the collections is clearly reflected in the attitudes of respondents. This is supported by the fact that only one of the mentioned

museums uses modern approaches in the presentation of the mineralogical-petrographical and paleontological collections.

In your opinion, to what extent are mineralogical-petrographical and paleontological collections in museums of Vojvodina attractive for tourist visits?

The respondents could answer this question in the same way as the previous ones by giving grades from 1 to 5, where 1 reflects the lowest, and 5 the highest value.

As it can be seen in Figure 5 the biggest number of respondents (45) evaluated the tourist attractiveness of mineralogical-petrographical and paleontological collections in museums of Vojvodina with the highest grade (5), 33 of the respondents gave a 4 and 6 respondents gave a 3. Only 5 respondents evaluated this statement with a 2, while the lowest grade (1) was given by 11 respondents. The research points to favorable attitudes of respondents in relation to the tourism importance of mineralogical-petrographical and paleonto-

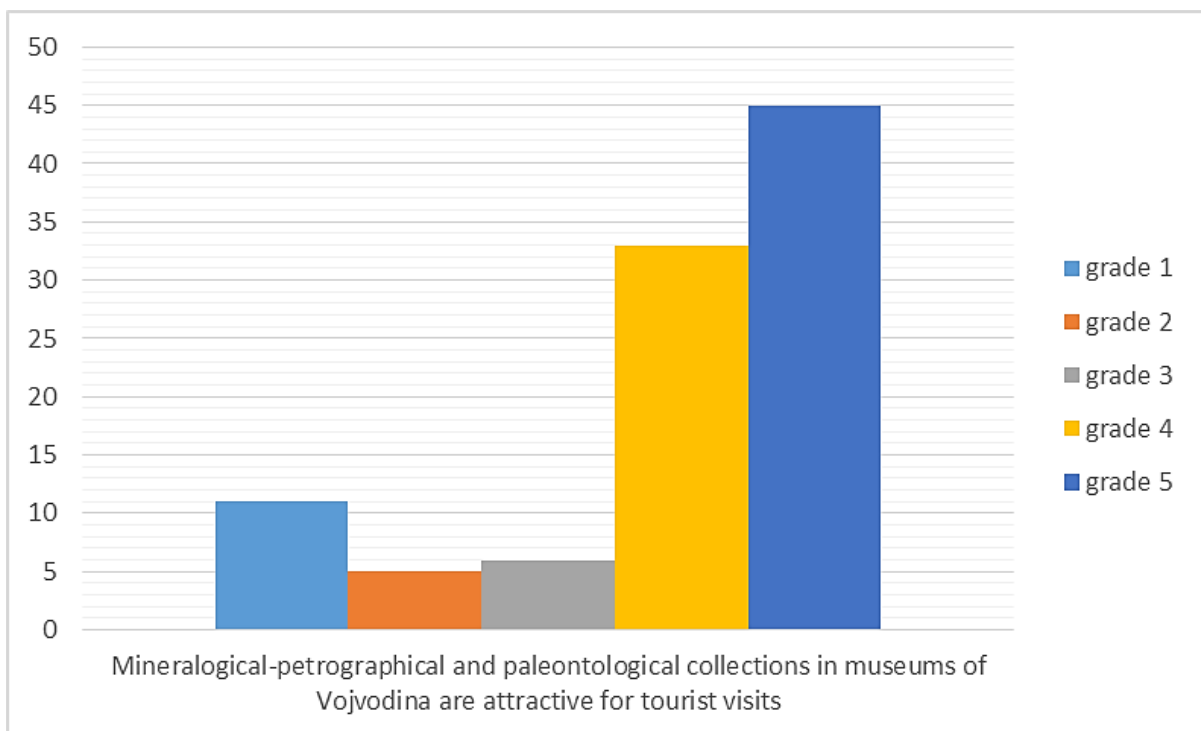


Fig. 6 Tourist attractiveness of mineralogical-petrographical and paleontological collections in museums of Vojvodina

logical collections in museums of Vojvodina. Answers of respondents come down to the opinion that these collections have a certain tourist value, however due to the fact that museums in Vojvodina have no significant role in the tourist activity, these values can not be highlighted enough. Nevertheless, there is the necessity of applying more modern approaches and concepts in the work of museums (such as adequate positioning and branding, application of experiences of more successful museums, multimedia presentation, participation in various projects and linking with other museums and related institutions, strategic planning and controlled implementation of cultural policies, with the active participation of public, private and civil sector), as well as increased promotion and marketing.

CONCLUSION

On the territory of the Autonomous Province of Vojvodina, there are five museums that possess mineralogical-petrographical, and nine museums that possess paleontological collections. Also, the Provincial Institute for Nature Conservation, within its natural history collection, owns these collections. The condition of these collections can be characterized as extremely poor, due to the fact that in many museums there is no documentation, inventory, adequate presentation, as well as appropriate employees. On the other hand, in some of the mentioned museums collections are not exhibited. Based on the conducted survey it was found that the population has a positive attitude towards the tourist value of mineralogical-petrographical and paleontological collections in museums of Vojvodina. Major obstacles in their activation are poor organization, lack of interest of museums to present these collections, as well as poor promotion and marketing. However, it is certain that with careful planning and investing,

mineralogical-petrographical and paleontological collections could be included in the tourist offer of Vojvodina.

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