

Review paper

MINING ACTIVITIES THROUGH HISTORY AT AVALA LOCALITY

RUDARSKE AKTIVNOSTI NA LOKALITETU AVALE KROZ ISTORIJU

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Abstract: This paper offers a review of some historical evidence and facts about the existence of mining activities in the area of the mountain Avala. Mining activities at Avala can be traced back to the pre-Antiquity times and, depending on the era and political circumstances, they affected more or less the destiny of the Belgrade neighbourhood and even of Serbia itself.

Key words: history, mining, mines, metals

Apstrakt: U ovom radu dat je pregled istorijskih dokaza i činjenica o postojanju rudarstva na prostoru planine Avale. Na Avali je, sve od preantičkog doba, rudarstvo bilo prisutno i znalo je, u zavisnosti od vremena i političkih prilika, da manje ili više utiče na krojenje sudbine okoline Beograda pa i same Srbije.

Ključne reči: istorija, rudarstvo, rudnici, metali

1. INTRODUCTION

Mountain Avala (511 m), a protected natural area situated at about 20 km south of downtown Belgrade, certainly represents an ideal destination for the weekend tourists from the capital city coming to enjoy the natural beauties of this mountain. Other than natural beauties, mount Avala is also the site of the landmarks and symbols of the city of Belgrade - the Avala Tower, a 202 m tall telecommunication tower, and the Monument to the Unknown Hero. Hence, no wonder why the citizens of Belgrade as well as tourists love to visit this mountain.

It sounds strange, particularly to those who are not very familiar with mining and the very history of mining activities in this area, that ores were excavated and refined for centuries backwards at the slopes of this same, tame mount Avala. The mountain itself belongs and represents the northern border of the Šumadija ore-bearing area whose opposite end is mountain Rudnik in the south. In this relatively small area, the ores of mercury, lead, silver and copper were exploited through history, whereas the main mining sites of this area were: Rudnik, Kosmaj, Ripanj and Avala (Simić,

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1951). Figure 1 shows situation map of Šumadija mining area. The mining activities of Avala are more diverse than any other in the region of Šumadija because once upon a time it was the place where mercury, silver-bearing lead and, most probably, copper were exploited (Simić, 1951).



Figure 1 - Situation map of Šumadija mining area (Simić, 1951)

The Avala area is dominated by flint stones, such as: sandstones, marl rocks, clay stones, alveolar, marl limestone and limestone. Sedimentation of the Avala flint took place in the Late Cretaceous, whereas flint stones were pierced by magmatic and/or eruptive dike rocks: lamprophyres, andesites, dacites, quartz latites and microgranites. Avala with the surrounding area represents an anticlinal structure that was most probably created by penetration of granite magma to the surface, while the very structure is rather deformed by faults.

In addition to flint sediments containing ore deposits with lead, zinc and silver, in the area of the mine "Crveni Breg" on the eastern and south-eastern slopes of Avala, serpentine rocks can be found in the wide area of Šuplja Stena. In that area there are several locations with quartz-carbonate and carbonate rocks of hydro-thermal origin where mineral traces of cinnabar-mercury ore, were discovered.

In addition to material traces, the Roman mining activities at Avala are purported by two inscriptions whose connection with the Avala *res metallica* (mines) has not been explained yet. They evidence that the Avala mines were under the auspices of Procurator and the city dignitaries of Singidunum (Jovanović, 2007).

Contemporary geological and archaeological explorations recorded several locations of ore presence where the remains of old mining works could be noticed, but, unfortunately, they have not been explored in further detail from the archaeological perspective. Figure 2 shows vestiges of old mining and smelting works between Avala and Ripanj village.

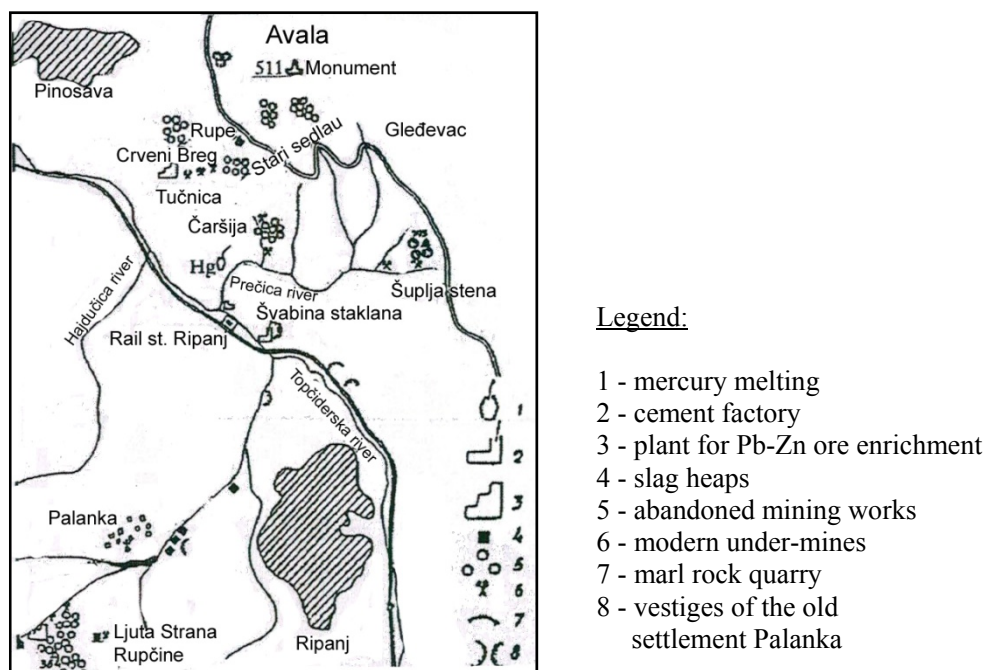


Figure 2 - Vestiges of old mining works and smelting works between Avala and village Ripanj (V. Simić, Situation from 1975)

2. ŠUPLJA STENA

The pre-Antiquity mining at the territory of today's Serbia can be said without any doubt to have been significant; yet, it is still poorly explored. On the other hand, indisputable evidence confirms the fact that mining activity had been developed before Romans arrived to our territories. Furthermore, there is a high probability that *a part of silver used at Troy and in the Aegean region at the time of transition from middle Minoan period to late Minoan period* (Vasić, 1932) originated from our neighbourhood.

Avala is the only mining site in Serbia where connection between cinnabar deposit at Šuplja Stena and prehistoric settlement in Vinča near the Danube was undeniably established. Namely, pieces of cinnabar and galenite found at this locality certainly derive from Avala, whereas mortars and pestles for ore crushing, grinding and milling were made of Avala sandstone. In the old mining works at Šuplja Stena, parts of pottery originating from Vinča were found. Also, *there was a small, poor, miners' settlement at Avala* (Vasić, 1932).

The ancient miners at Avala used to reach the depth of 30 meters from the surface. Mercury ore was excavated and carried to Vinča, where it was concentrated and refined. The age of this mining activity was accurately determined. Vinča was founded between the 7th and 6th century BC by the colonists *who came from the eastern Greek regions, conquered this locality as warriors - hoplites and founded their colony - 'polis' - there* (Vasić, 1932). Upon Roman arrival to these regions, mining activities at Avala were interrupted *because the Romans had rich mercury mines near Almaden in Spain, whose ores were much richer than those of Avala* (Vasić, 1932).

There exist no data about Roman mining activities at Avala although it is rather difficult to imagine that the Romans, who exploited gold in huge quantities at our territories, did not at the same time exploit mercury which was necessary for gold manufacturing, particularly from root mining sites and particularly when taking into consideration that Avala, with mercury content of 10% and more, was the only mercury mining site at the Balkan Peninsula apart to the mercury mining sites in the mid-Bosnian schistose mountains.

Furthermore, Plinius recorded in his writings that the place where the Sava and the Danube met had very active trade in metals, primarily in silver, copper and iron. Also, the very name of Ripanj as well as Ripa, according to some earlier explorers of Avala, could derive from mercury mines Ripa, near Servezze in Upper Italy, the name which the Roman miners gave to these places, thus marking the analogous mining sites.

Likewise, there are no data about the medieval mining activities at the mercury mining site at Avala. It is understandable to some extent, because the data about mercury processing in the middle Ages do not exist even in the regions well known for mercury exploitation (Simić, 1951).

Mercury mining site at Šuplja Stena was completely forgotten over the centuries. It was only on the occasion of construction of the railway track Belgrade – Niš in 1882 that cinnabar grains were found in the drifts of the Ripanj River. It was Professor of the Belgrade High School Ljubomir Klerić who, following cinnabar traces in the river vale in 1883, rediscovered the Avala mining sites in the places: Šuplja Stena, Cerov kamen and Rupine, while F. Hofmann discovered the mining site Ripa.

Soon after discovery of these mining sites, the exploration works started and Đorđe Waifert received mining concession for 42 ore fields and the mine was opened under the name "Mercury Mine Avala, Serbian-English Joint Stock Company". The exploration works were also carried out at Dženver Kamen, Rupine, Dragušićki Potok as well as at Šuplja Stena where they were mostly focused.

The Mine of Šuplja Stena was opened with two sub-shafts, "Jerina" and "Osnovni" (Erbstollen). Between "Jerina", as the highest one, and "Osnovni", as the lowest one, there existed three horizons more which were inter-connected with three blind mining pits (whose total length was 110 m). A report from 1891 purported that the mine employed *70 workers, one superintendent, two deputy superintendents and a workshop director* (Simić, 1951). Some 3 250 m far from the mining site, in Ripanj, a smeltery was built. In the first trial year, the smeltery produced 3 000 kg of mercury from the ore that had an average content of 1.83% Hg. In the following year, 15 000 kg of mercury was produced, while plans for the third year reached 50 000 kg of mercury; however, there are no data if they were accomplished. The smeltery worked

occasionally, and in 1891 its work was discontinued; soon afterwards the works in the very mine were stopped.

The works at Šuplja Stena were resumed in 1908 in all old shafts and galleries. The same year, the official letter reported that *the pillars with fine mercury ores were discovered, which remained from earlier excavations. Besides, traces of mercury ores were visible in older diggings.* The following year, the basic sub-shaft was reconstructed in the length of 600 m and the connection with sub-shaft "Jerina" was made. The works were stopped in 1912, probably because of the Balkan Wars in 1912. Afterwards, the mine was reopened only after the Second World War and definitely closed in 1972.

3. CRVENI BREG

There is a high probability that lead was manufactured at this locality in the Ancient Ages, during the Roman rule, because the Avala ore-bearing veins protruded on the surface and it must have been incredible that they had been unnoticed by the miners of the Roman Age who at that time intensively used the Kosmaj mining site, only about 20 km far from Avala. On the basis of the already mentioned Plinius notes and information found therein about Belgrade as a very active metal market of the time, it can be assumed that the mining activity at Avala still existed. Nevertheless, neither Roman nor any Middle Age history sources ever mentioned a single word about mining and smelting activities at Avala (Simić, 1951).

The depth of the old mining works at Avala ranged from 30 to 40 meters (Necić, 1997).

Currently, only one document purports the fact that ore excavation existed somewhere around Belgrade, in the mid 15th century. According to the Hungarian king Vladislav's Charter of 12 May 1456, Sibirjanin Janko received a concession to "Rudišta" (Rudyshta, Rwdischa) which was located somewhere around Belgrade and which belonged to a monastery. As written in the Charter, this mining site had gold and silver smeltery (*fodinae auri et argenti*). The place mentioned in the Charter could be at Avala, in Ripanj or Kosmaj, as that area belonged to the Hungarian king at the time (Simić, 1951).

The data on mining at Avala from the period of Austrian occupation (1718-1739) were found at the Vienna court. These data proved the existence of a company for exploitation of lead ores at Avala in 1735. This mining activity of Avala was short-lived due to the war with the Turks (Necić, 1997).

During the First Serbian Uprising, lead was manufactured at Avala, which is evident from the reports of the Russian Consul Rodofinikin in 1808. They said that the Serbs near Belgrade had started with excavation of lead ore (Simić, 1951). During the Crimean war, a small mining and smelting works existed at Avala, but its work was suspended before long.

The contemporary mining history at Avala began in 1871 when, according to the report of the then head of the mining department Jefrem Gudović, *a person from Belgrade, who was known to the Ministry, was entitled with the right to exploration* (Simić, 1951). Only the old sub-shafts were opened. Serious exploration works began in 1886 and they lasted, with shorter or longer interruptions, until the beginning of the

20th century. These works established that the mining site Crveni Breg had industrial ore reserves. Already in 1901, the works in the mine Crveni Breg started.

The mining works established ore-bearing to the depth of 300 m, while the capacity of the ore vein cut by bore holes was 1.56 m. It was a predominantly sphalerite ore-bearing, whereas silver quantity was unchanged in relation to higher shafts. In 1907, the excavation began. Exploration was continued concurrently with excavation works until the beginning of the First World War (Simić, 1951). Immediately after occupation, the Austrians continued the works, and the data from 1915 mentioned 700 employed workers.

In the period between the two world wars, there were several attempts to resume the works in the mine; however, it was only in 1936 that more intense works began (Necić, 1997). At the end of 1940, the mining site was opened with six horizons (247 m, 195 m, 165 m, 135 m, 129 m and 83 m). Two highest horizons were opened with sub-shafts, while the connection with lower horizons was made by means of a blind shaft. During the German occupation, exploitation was suspended. After the war, in 1948, the mine was reopened and operated until 1953 when it stopped production and became a school mine of the Faculty of Mining and Geology, where lectures still take place (Jovanović, 2008).

4. RIPANJSKA KLISURA

This was the name of the famous concession for exploitation of lead and zinc ores in the village of Ripanj near Belgrade issued in the 19th century. Two other mining sites were comprised by this concession: Prečica and Ljuta Strana. Both mining sites we discovered on the basis of old mining works noticeable on the surface. In 1886, the concession was issued in the name of "Ripanj Mining Society, Limited in London", and in addition to Prečice and Ljute Strane, the concession also included the mercury mining site Ripa (Simić, 1951).

The **mining site Prečica** is situated on the right side of the stream Prečica. The exploration works probably began at the same time as those at Ljuta Strana, in 1883, to mark the production of 4000 tons of ore already in 1888 (Simić, 1951). Until 1891, 334 meters of sub-shafts and one 37 meters deep mining shaft were erected in Prečice. The sub-shafts intersected several ore veins of different capacities. A report from 1897 purported that a 70 meter long sub-shaft was constructed there to intersect four ore veins whose range was not explored (Simić, 1951). The ore was situated at the contact points of limestone and decites. This mining site operated until 1910. The last year marked a production of 20 tons of ore. Due to lack of financial resources and becous of small exploration works were suspended (Jovanović, 2008). When the works were abandoned, the sub-shaft under Prečica was 700 meters long and it was directed towards the eastern side of the mining site Crveni Breg with plans to be prolonged by additional 1 000 meters in order to have Crveni Breg opened (Simić, 1951).

A predominant ore metal of Prečice was sphalerite, then galenite, pyrite and arsenopyrite. Besides, mineral jamesonite was also detected.

Traces of the old mining activity were found at the mining site **Ljuta Strana** in the form of numerous mining works which were met in the upper parts of the mining site.

The contemporary mining history of Ljuta Strana began in the 1880's. The exploration works started in 1883 and were very intensive for the circumstances of the time. Until 1891, 832 meters of sub-shafts and three mining shafts of total length of 140 meters were developed. The exploration works lasted until 1900 (Simić, 1951). The report from 1904 purported that the works at the mining site Ljuta Strana had not been restored yet. The exploration works were restored about 1905, while in 1906 only 16 workers worked at the mining site. The works were resumed in 1907/1908, employing a small number of people. The results were unfavourable. Small-scale explorations, probably only for the purpose of maintaining the right to the concession, were conducted until the Balkan Wars (1912) when they completely stopped. On the eve of the Second World War, in 1937, several old sub-shafts were cleared away, but the works were suspended soon afterwards and were never resumed again (Simić, 1951).

5. CONCLUSION

On the basis of above said, primarily because of the significance of the mines under Avala, it can be concluded that serious and expansive geological explorations of the whole area have to be done, as we have very few data available. Reliable data could help in decision-making on the further destiny of the mines Crveni Breg and Šuplja Stena. Taking into account their location within the National Park Avala, reactivation of production is an unreal option; however, a more realistic option is to turn these mines into the museums of mining and geology, taking example from such similar museums throughout Europe and other parts of the developed world.

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