

## THE TRACES OF ROMAN METALLURGY IN EASTERN SERBIA

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### Abstract

The archaeological traces of the Roman mining and metallurgy in eastern Serbia are rather frequent but insufficiently studied and published. Three mining-metallurgical regions abounding in gold, silver, copper, iron and lead could be distinguished there: 1. the upper course of the Pek river; *metalla Pincensia*, 2. the area between Bor, Zlot, Crna Reka and Rgotina and 3. the area in the river basin of Beli Timok, two latter ones had been organized as *territoria metallorum*.

The archeometallurgical sites confirmed by investigations are: *Kraku lu Jordan* at the confluence of the Brodica river and the Pek river; *Rudna Glava*, *Tilva Roš* in Bor; *Gamzigrad – Romuliana*, *Rgotina* near *Zaječar* and *Timacum Minus* in the village *Ravna* near *Knjaževac*.

Roman mining-metallurgical activities in eastern Serbia flourished from the end of the 3<sup>rd</sup> century, were interrupted by the invasion of Huns in AD 441. and restored in the time of emperors Anastasius and Justin I, in the end of the 5<sup>th</sup> – beginning of the 6<sup>th</sup> centuries. The Roman mining-metallurgical centers functioned in the 6<sup>th</sup> century until the Slav invasion in the beginning of the 7<sup>th</sup> century.

**Keywords:** Roman period; Metallurgy; Eastern Serbia; *Dacia Ripensis*; *Romuliana*; *Timacum Minus*

### 1. Introduction

The archaeological traces of the Roman mining and metallurgy in eastern Serbia are rather frequent but insufficiently and often summary studied and published. The finds of metal slag and dross, metallurgical furnaces, casting moulds, casting vessels, semi-finished objects, castings and the like have

been recorded at almost every Roman site in this region. This relates particularly to the fortifications and settlements established in the end of the 3<sup>rd</sup> century, after abandoning of the Roman *Dacia* in the time of emperor Aurelian (AD 272) and when mining-metallurgical activities in that province came to an end.

The region of eastern Serbia including the

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border regions of the Carpathian and the Balkan Massif is characterized by the complex geological structure with mass of eruptive rocks in the center (Fig. 1) [1,2].



Fig. 1. Geographic map of eastern Serbia

Therefore, various magmatic, sediment and metamorphic rocks in this region originated in different geological periods from Proterozoic to Quaternary resulting thus in diversity of geomorphologic phenomena. In the north are limestone ridges of the Carpathians: Veliki Greben, Liškovac and the Homolje Mountains and in the west the limestone ridge Veliki Krš about 50 kilometers long with all characteristics of the karst, Kučaj and Veliki Maljenik between which is the conical Crni Vrh of volcanic origin. In contrast to the limestone zone of eastern Serbia, there are in the southwest and south the volcanic massifs of Rtanj and Tupižnica consisting mainly of andesite, in

the southeast is Stara Planina of granite consistency and in the northeast is Deli Jovan Mountain with the zones of gabbro rocks (Fig. 2).

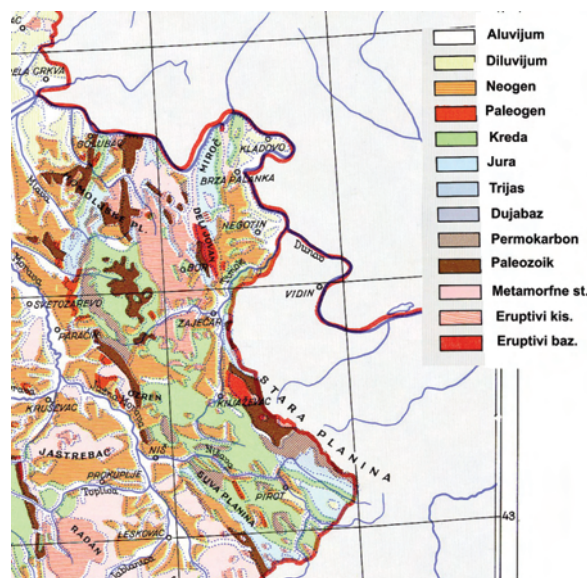


Fig. 2. Geological map of eastern Serbia

We will mention just the most important metallogenetic zones in eastern Serbia rich in gold, silver, copper, iron and lead ores, which are still being exploited today[3]: first of all there is the Bor zone with deposits of copper and polymetals with high percentage of gold, then there is Poreč-Stara Planina zone with deposits of magnetite (Rudna Glava) and gold bearing quartz veins and finally the Homolje-Beljanica zone with quartz veins containing gold and wolfram. There are also secondary gold deposits in the valleys of the Pek river and Crni and Beli Timok with their tributaries.

Three mining-metallurgical regions, which almost completely correspond with the mentioned metallogenetic zones, could be distinguished in eastern Serbia in the Roman times: 1. valley of the Pek river, metalla Aeliana Pincensia with the center in

present-day Veliko Gradište (Pincum), 2. area between Bor, Zlot and Rgotina with the valleys of the tributaries of Crni Timok and Timok and 3. area of the river basin of the rivers Svrlijski, Trgoviški and Beli Timok. Two latter areas were organized in *territoria metallorum*, which belonged to the *metalli Aureliani*, the hypothetical imperial mining region most probably with the center in present-day Ravna (Timacum Minus). The mining regions were independent, i.e. exterritorial although the *metalla Aeliana Pincensia* was within the borders of the Moesia Prima province and *metalli Aureliani* within the borders of Dacia Ripensis [4-6]. Besides, the smaller units of mining regions, *territoriae metallorum*, had each one its own center for processing and distribution [4] (Fig.3).



Fig. 3. Roman provinces in eastern Serbia

Although there are some indications for the beginnings in the 2<sup>nd</sup> century AD, the intensive mining-metallurgical activities in the eastern Serbia in the antique period

commenced in the end of the 3<sup>rd</sup> century and flourished during the 4<sup>th</sup> century and in the first half of the 5<sup>th</sup> century.

After abandoning rich gold and silver mines in Roman Dacia in AD 272, the focus of exploitation of the ore resources was transferred to the provinces on the right bank of the Danube, to Moesia Prima and Dacia Ripensis and farther into the hinterland of the Balkan Peninsula, in Dacia Mediterranea and Dardania.

The first to register the traces of the Roman mining and metallurgy in eastern Serbia were the mining-geological experts who had been invited by prince Miloš and prince Mihailo Obrenović in the middle of the 19<sup>th</sup> century, to study and record the ore resources of the newly-established principality of Serbia [7].

The Austro-Hungarian scientist and traveler Felix Kanitz discovered the traces of the Roman mining-metallurgical activities in the eastern Serbia in the end of the 19<sup>th</sup> century [8,9].

Also, Jovan Žujović and Dimitrije Antula, the pioneers of the Serbian geology, paid attention to the archeometallurgical traces in the eastern Serbia [7].

The founders of the Serbian archaeology, Miloje M. Vasić and Nikola Vulić published the data about the Roman mining-metallurgical complex at the site Tilva Roš near Bor in the beginning of the 20<sup>th</sup> century [7].

The establishing of the National Museum in Bor, i.e. the Museum of Mining and Metallurgy marked the beginning of systematic archaeological investigations in eastern Serbia, that were crowned in 1968 with the project 'Investigation of Ancient



Mining and Metallurgy in the Wider Zone of the Timok Eruptive Basin' and the Institute of Archaeology in Belgrade, Institute for Copper and Technical Faculty in Bor also took part in that project [10].

In addition to many sites with archeometallurgical remains of the Roman works, particularly important are the sites confirmed by archaeological investigations as mining-metallurgical centers (Fig. 4).

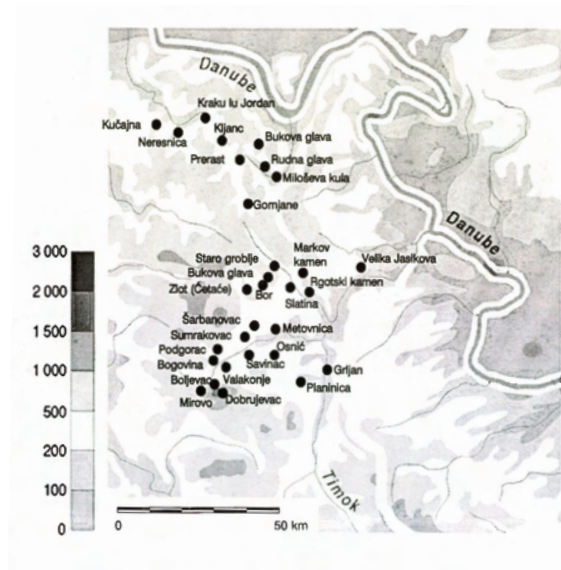


Fig. 4. Mapped traces of Roman mining and metallurgy in eastern Serbia

At Rudna Glava has been investigated the Late Roman gallery of the Roman mine dating from the 4<sup>th</sup> -5<sup>th</sup> centuries [11].

At the site Kraku lu Jordan, at the confluence of the rivers Brodica and Pek, the fortified metallurgical complex for production of gold that was active from the end of 3<sup>rd</sup> to the end of 4<sup>th</sup> – beginning of the 5<sup>th</sup> century has been systematically investigated [12] (Figs.5-6).

At the site Bukova Glava near Majdanpek has been investigated rather small smelting complex with many furnaces for smelting



Fig. 5. Kraku lu Jordan, panoramic view from the southeast



Fig. 6. Kraku lu Jordan, plan of the fortification at the confluence of Brodica and Pek

iron ore scattered over rather large area. The entire complex was located on the hill surrounded by streams while its accessible side was protected by the small fortification (speculum), 8 x 8 m in size, at the site Četaće. The abundance of water and timber as most probably the proximity of ore deposits made possible smelting of iron ore and casting iron. On the basis of the archaeological finds these metallurgical structures could be dated with certainty in the 4<sup>th</sup> century [1,10].

At the site Tilva Roš in Bor was encountered the fortification of rectangular plan and judging by the analyses of slag it was the center of ferrous metallurgy while

the settlement and necropolis from the end of the 3<sup>rd</sup> – beginning of the 4<sup>th</sup> century have been discovered at the base of the site. In the immediate vicinity were recorded the traces of exploitation of gold, the diggings in the banks of the Bor river and Popov potok. The site is destroyed by modern mining and from this site comes the exceptional tombstone of the Roman dignitaries from the end of 3<sup>rd</sup> – beginning of the 4<sup>th</sup> century [10] (Fig. 7).



Fig. 7. Roman tombstone from the necropolis of the settlement at the base of Tilva Roš in Bor

It is worth mentioning that at the site Markov Kamen in Donja Bela Reka near Bor has been investigated the ferrous metallurgy center from the 4<sup>th</sup> century.[7]

At Rgotiski Kamen was situated the fortified artisan-commercial center, which had been established in the end of the 3<sup>rd</sup> century and existed according to the investigated segment of the necropolis in Rgotina until the end of the 4<sup>th</sup> century but most probably at least until the mid 5<sup>th</sup> century, i.e. the invasion of the Huns in AD 441. This fortification controlled the intersection of important roads connecting the Danube basin, Timok valley, the mines in

the Bor basin and the Morava valley. From this point the castings, ingots and finished products of bronze, silver, gold and iron had been distributed for further processing and this indicates the existence of primary metallurgy at this location and in the vicinity.

In favor of this conclusion speaks the fortification at the nearby site Straže, which is of hexagonal ground plan with 5 semicircular towers at the corners and the gateway in the east side. The fortification was built in the 4<sup>th</sup> century and was restored in the time of emperor Justinian I in the 6<sup>th</sup> century (Fig. 8) [10].

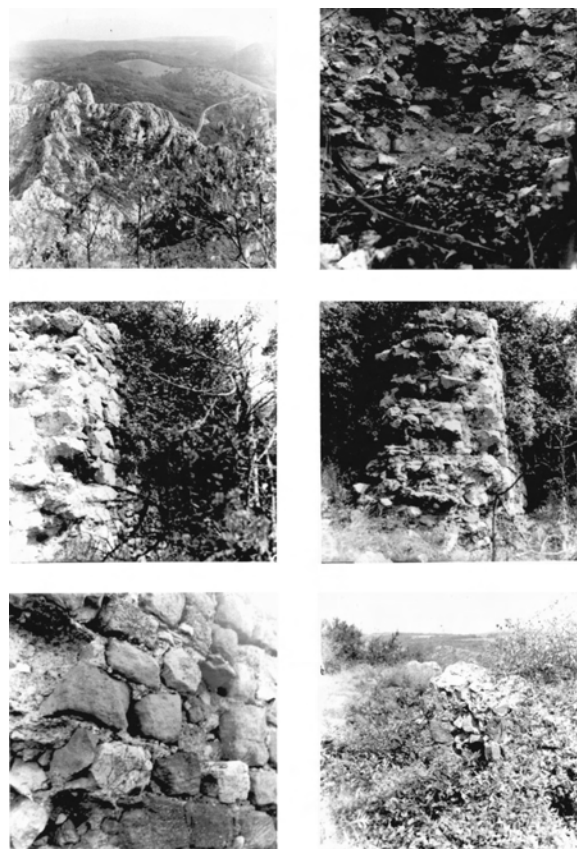


Fig. 8. Rgotiski Kamen, segments of the fortification walls.

At the base of the site Rgotiski Kamen was

a civil settlement, the town (*civitas*) or the village (*vicus metalla*), which was the center of mining-metallurgical territory and there was also the necropolis dated from the end of 3<sup>rd</sup> to the middle of the 5<sup>th</sup> century. There have been found besides the 4<sup>th</sup> century masonry tombs also the stone tombstones and altars dedicated to the Roman gods (Hecate) (Fig. 9).



Fig. 9. Stone monuments from Rgotina (Argentares)

The Roman settlement at Rgotina is because of the modern toponym associated with Roman Argentares. There is also the opinion that Argentares is located in the valley of the Crni Timok river, in the area

between Lukovo and Valakonje because of the alleged proximity of the silver mines.[4]

New archaeological investigations at Gamzigrad revealed in the horizons of the Late Roman Romuliana dating from the end of 4<sup>th</sup> to the middle of the 6<sup>th</sup> century, the traces of metallurgical activities including the fascinating smelting furnace and workshop of ferrous metallurgy from the end of 5<sup>th</sup> – the beginning of the 6<sup>th</sup> century [13,14] (Fig. 10).



Fig. 10. Felix Romuliana, aerial view of the fortified palace from the east

However, the most recent results of the geophysical prospection of this site outside the walls of the fortified palace as well as the investigations in the southeast section of the fortification have been confirmed the remains of rather large urban settlement, probably a town (*civitas*) from the 2<sup>nd</sup>-3<sup>rd</sup> centuries and this revives the hypothesis that municipium Aureliani or Aureliana, [16] the center of the metallurgical region metalli Aureliani [4,6,17] existed at the site of Late Roman Romuliana (Figs.11,12). If this hypothesis is correct Gamzigrad could have been perhaps the earliest Roman mining-metallurgical center in eastern Serbia, established already in the 2<sup>nd</sup> century, i.e. in





Fig. 11. Geophysical recording of Felix Romuliana palace at Gamzigrad with surrounding earlier settlement (Aureliana, municipium Aureliani)



Fig. 12. Aerial photo of Felix Romuliana palace at Gamzigrad with the area of surrounding earlier settlement (Aureliana, municipium Aureliani)

the time of the Antonines, most probably the emperor Marcus Aurelius (161-180).

The remains of mining-metallurgical

settlements, which gravitated towards the assumed center at Gamzigrad, could be identified in the neighboring settlements: Lubnica (Lupinitia), Metovnica (Mutatio ...), Osnić (Ossinissa), Savinac, Valakonje (Valla cunei, Vulcanei), Boljevac, Lukovo (Locui, Lucui). Also, an earlier assumption that municipium Aureliani is located in Kostol near Zaječar has been refuted by the discovery of large fortified villa rustica at that site [6].

Finally, the center for processing non-ferrous metals including silver, copper and lead existed in the fortification Timacum Minus (Figs.13,14), today in the village Ravna near Knjaževac, where a circular structure for ore separation has been investigated in the northeastern corner of the fortification (Figs. 15,16). Petar Petrović was of the opinion that this fortified town was the center of the metallurgical region metalli Aureliani [2]. In any case, the fortification Timacum Minus defended the metallurgical-artisan center while large settlement with

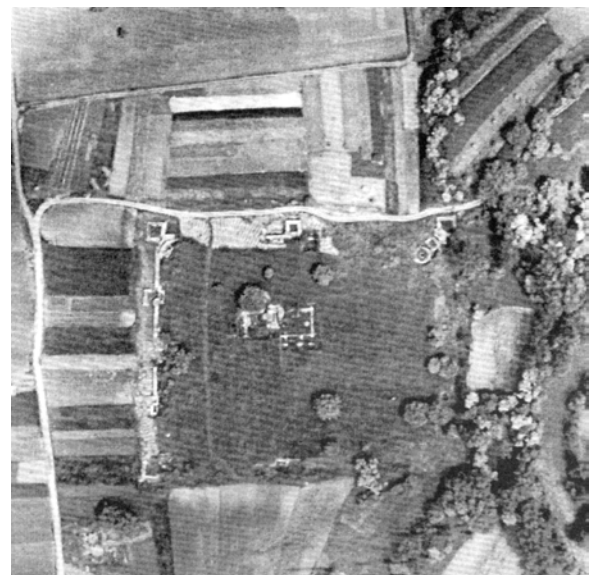


Fig. 13. Aerial photo of Timacum Minus fortification, orthogonally

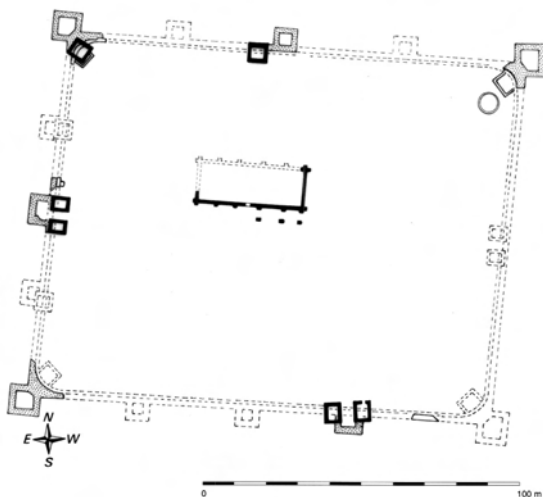


Fig. 14. Ground plan of Timacum Minus fortification with circular metallurgical structure 'for ore separation' in northeastern corner

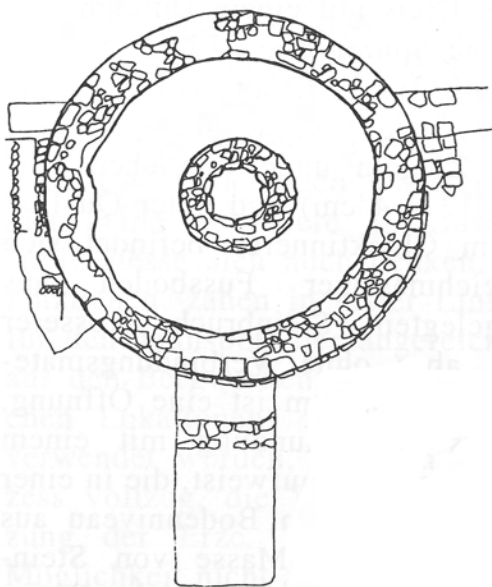


Fig. 15. Ground plan of circular structure 'for ore separation' in northeastern corner of Timacum Minus fortification

baths, temples and other public buildings developed in the course of time to the south of the fortification. The prosperity of this settlement is also confirmed by large necropolis with many stone funerary stelae.



Fig. 16. Circular structure 'for ore separation' in northeastern corner of Timacum Minus fortification, from the east

Timacum Minus was most probably the center of one of *territoria metallorum* from the end of 3<sup>rd</sup> to the middle of the 5<sup>th</sup> century.

The invasion of the Attila's Huns and the fall of the Danube frontier in AD 441 brought to an end mining-metallurgical activities organized and controlled by the imperial administration. However, the restoration of mining and metallurgy took place in Dacia Ripensis already in the final quarter of the 5<sup>th</sup> and the beginning of the 6<sup>th</sup> century, in the time of emperors Anastasius and Justin I as a result of reconstruction of towns and fortifications on the Danube frontier. The Roman mines and metallurgical centers in eastern Serbia were restored during the 6<sup>th</sup> century and they were active until the invasion of the Avars and the Slavs in the end of 6<sup>th</sup> – beginning of the 7<sup>th</sup> century.

Preliminary archeometallurgical analyses performed on the samples of by-products of metallurgical production from the mentioned sites confirmed the archaeological finds concerning the traces of the Roman metallurgy. The ferrous metallurgy in the second and third stage, i.e. smelting with



casting and forging has been confirmed in the horizons from the end of 4<sup>th</sup> to the middle of the 6<sup>th</sup> century at Romuliana [18]. I think that further archeometallurgical analyses could provide information about exploitation and metallurgy of the non-ferrous metals like gold, silver and copper that was, according to the archaeologists' opinion, highly developed in the Roman times in the discussed region.

Gamzigrad – Romuliana, August 2008.

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