Association of Metallurgical Engineers of Serbia *Review paper*
AME *UDC:669.01"406"(497.11)=861*

CONTINUITY OF METALLURGY IN THE IBAR VALLEY

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ABSTRACT

The results of archaeological survey and excavations in the Ibar valey in the last two decades suggest the pressing need for modern archaeometallurgical investigations.On the basis of very short summery pro and contra the continuity of metallurgy we conclude that it exists during very long period of time, from Early Iron Age through Roman domination in the I st century AD, to the period of decline of Empire and to well-known features of the medieval mining and metallurgy. In this text we proved and emphasized the very significant moments shaping this process.

Key words: Ibar, Kopaonik, Kruševica, archaeometallurgy, furnace

INTRODUCTION

At the moment of writing of this text it would be premature to speak in detail about the evolution of the metallurgy in the Ibar valley but it is appropriate and useful to bring together all the published data and to estimate the potential importance and scopes of the future investigations. Meridian course of the river from the south to the north clearly distinguishes the geographical framework of examination of archaeometallurgical manifestations. Abundance of ore deposits, first of all of lead, zinc, iron and copper makes the observed area appropriate for the analysis and suitable geomorphologic potential for emergence of strong economic activities in the past (Mićić 1980:19-63, 111-119; Krstić 1971). The data recorded by the historians of metallurgy and mining are considered even today as useful starting points first of all for checking the data in the field (Simić 1988).

On the other hand, the results of archaeological survey and excavations of the Museum in Kraljevo in the indicated area in the last two decades suggest the pressing need for modern archaeometallurgical investigations. The occurrence of stone hammer-axes from the Eneolithic and the Bronze Age and the grave finds from the 'princely burials' in addition to the large number of registered slag deposits, smelterys and mining shafts are strong indications for investigation of development of mining and metallurgy in the central Serbia (Bogosavljević 1987:9-26; Srejović,Vukadin 1988:7-14), Fig. 1. I have chosen, at this occasion, the combined system of commenting about the already published finds and personal experience collected in the Museum documentation.

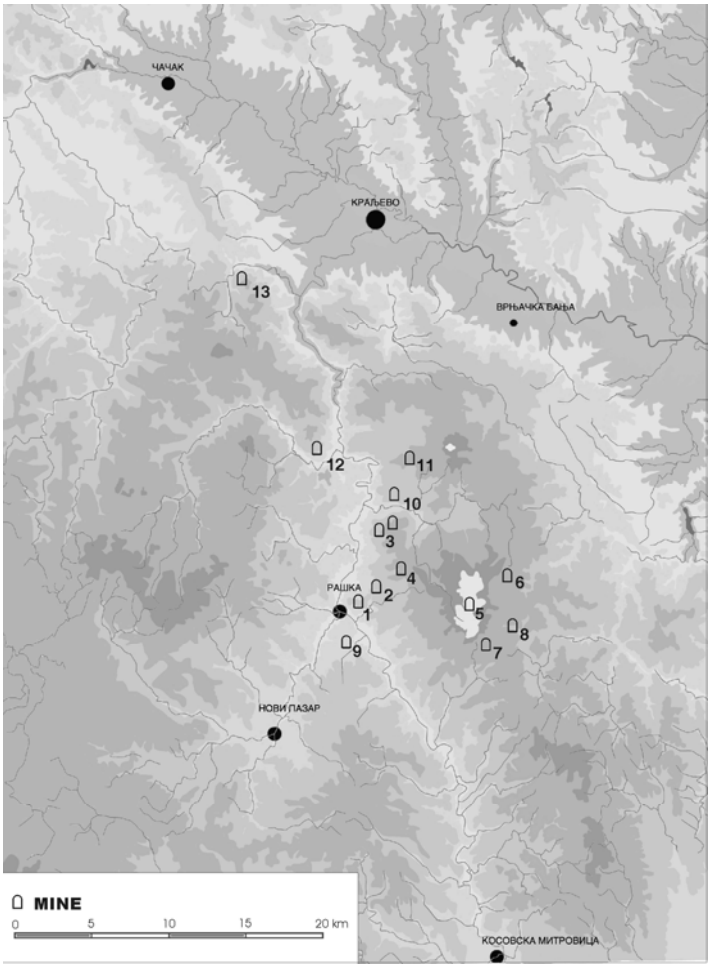

Fig. 1 - Ancient mines in Ibar valley: 1. Kiževak, 2. Badanj-Sastavci, 3. Zajačak-Kremićke mountain, 4. Suva Ruda, 5. Suvo Rudište, 6. Ošta Čuka, 7. Belo Brdo, 8. Zaplanina, 9. Rantište, 10. Plana, 11. Gokčanica, 12. Železnica-Studenica, 13. Majdanski potok-Lopatnička reka.

FIND FROM KRUŠEVICA AND PROBLEM OF DEVELOPMENT OF THE EARLY METALLURGY

Fortuitously discovered grave association from Kruševica near Rudno (Golija) without actual archaeological context is certainly very impressive because of its possibilities for extensive and complex interpretation particularly concerning the craftsmanship and techniques of manufacture of the objects. This find has been published and exhibited on many occasions in the previous decades (Grupa autora 1990:188-192; Cvjetićanin 1994a:155-158; Krstić 2004:100), advancing in the analyses from first general observations about homogeneity of style with the jewelry from Novi Pazar and influences of the

Archaic art and Attic workshops to the assumption about the existence of independent local workshop for production of silver fibulae and pins after the given models (Vasić 1990: 67-74), (Fig. 2) The location of the workshop is supposed to be between the St. Peter's church near Novi Pazar and Atenica near Čačak (Srejović,Vukadin 1988:12; Cvjetićanin 1994: 20-21). This assumption to some extent indicates wider surroundings of Kruševica as potential zone of such activities. Considering the fact that in the collection of discovered jewelry there are the specimens of silver and gold but also one bronze oinochoe the question could be asked about the origin of three metals, i.e. their ores (Fig. 3).

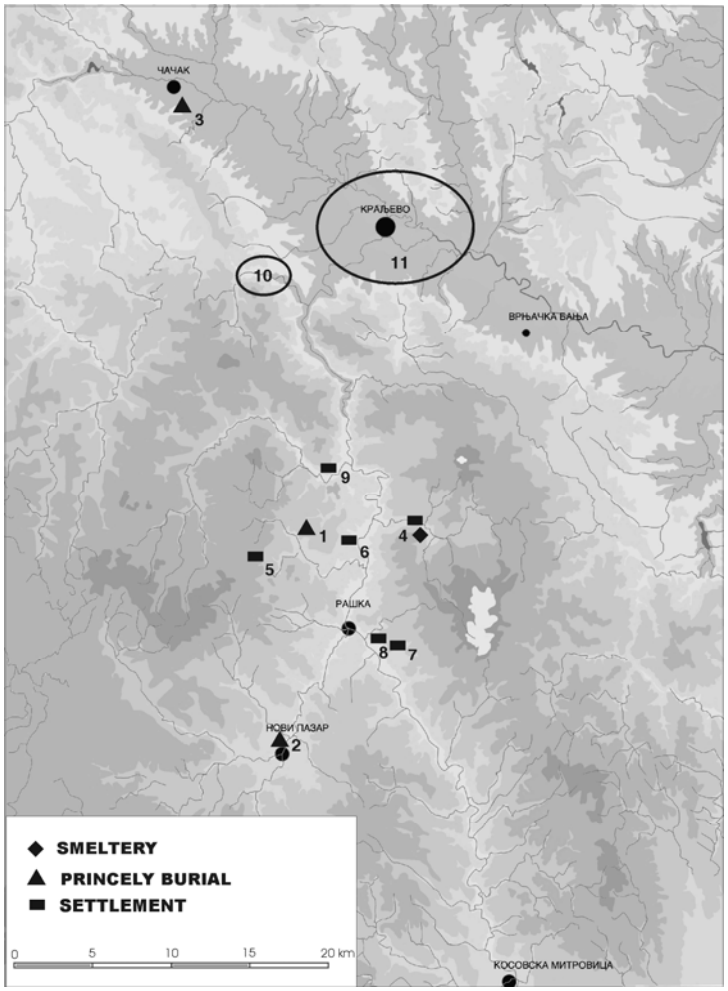

Fig. 2 - Prehistoric sites in Ibar valley: 1. Kruševica, 2. Petrova Crkva, 3. Atenica, 4. Jošanička banja-Djorov most, 5. Rudno-Čista, 6. Baljevac (Bela Stena-Čerenjski potok), 7. Rudnica- Beglučka, 8. Karadak-Tomovićke njive, 9. Ušće-Rudnik, 10-. Area of Lopatnička reka, 11. Kraljevo – confulence, Early Iron Age): ◆ smeltery; ■ settlement; ▲ princely burial.

Fig. 3 - Jewelry of Kruševica.

First data about silver production in our territory date from the Early Iron Age that is rather late considering the neighboring territories (Jovanović1995:31-37). The production of bronze is genetically connected with the development of early copper metallurgy and introduction of alloys in the technology of manufacture. However, the data about the quality of bronze objects as well as about their provenance are limited in scope as well as in final answers. Although there are numerous finds of hoards, molds for casting and production of objects there was still no attempt to systematize the archaeological finds and to analyze (and explain) their structure, except the samples from Trnjane necropolis (Jovanović, Janković 1987-1990:1-10; Janković et al. 1987-1990: 13-19). In the historical studies of mining the examples of iron production with connotation that it generally dates from the middle and late medieval period have been rather scrupulously recorded, first of all by gathering the data from the archives,

recording of traces at the sites, as well as by gathering administrative reports, contracts and receipt from the time of concessional activities of large mines and smelteries in the 19th century in our country (Simić 1988; Ćirković et al. 2002). When we talk about early iron metallurgy in the studies concerning the course of changes we rely on the close analogies from the neighboring Balkan regions and on basic assumptions of the date when iron came into use. The lack of analyses also in this segment does not make possible analytical judgment about quality of ingots, semifinished objects, techniques of remelting and locations of workshops in our territory except in very rare situations (Medović 1988: 416-417).

In addition to the Kruševica find originating from the area to the west of the Ibar River also worth mentioning is the situation between the settlement Baljevac and Jošanička Banja in the northeast (Fig. 2).Namely, published finds of fragment of varnish-decorated vessel body and fragment of base and body of the Megarian cup, both being the Greek pottery from the Hellenistic period, discovered among the surface finds of the Illyrian provenance at the hillfort Djorov most near Jošanička banja (Vučković-Todorović 1961:123-124) definitely raises the question of character of the autochthonous population and the influx of Greek imported material, influences and models (Fig 4/12).The revisional site survey at the area Djorov most in the 1980s revealed the remains of destroyed smeltery, which was dislocated by the construction of modern road running towards the mountain top and the National Park entrance gate. The hillfort of the same name in the vicinity of Jošanička banja was not registered as it also proved to be futile attempt to identify the 'Illyrian material'. To the west of the Ibar in the village Rudno (area Čista) at the Golija mountain was identified an Early Iron Age settlement with one meter thick cultural layer and remains of slag in the collected archaeological material (Fig. 4/10-11). In the configuration of the terrain on the nearby slopes were encountered the circular remains of furnaces for ore smelting that were shaped like rather small conical elevations (Documentation National Museum Kraljevo, Dossier 1). Large settlement dated to the analogous period according to the shapes and rims of vessels and the area of distribution of the surface material was encountered in the zone of modern settlement of Baljevac (Fig. 4/1-9). It had been discussed about developing of this manifestation into a larger antique center some time earlier in connection with the finds from the Lanište necropolis (Bogosavljević-Petrović 2003: 191-194).

The point of this digression is to emphasize the wider area around Baljevac as an exceptionally important zone where could be encountered processes of advancement of local population concerning economic and social characteristics. Within the diameter of only 15 kilometers are concentrated the sites revealing distinct interrelationship, first of all 'hillfort Djorov most' and 'Treasure from Krusevica' and then the settlements Čista and Baljevac-Bela Stena. There are no traces of trade and import, putting it simply, commission from the Attic workshops or independent products of local workshop after the models from the

metropolis and without consolidated ruling class and complex social structure with established institutions. Varnished skyphos and deformed bronze oinochoe in the Kruševica material are commissioned objects, which are precisely dated between 480 and 450 BC. They originate from the Attic workshops, which were in that time very well-known and highly esteemed.

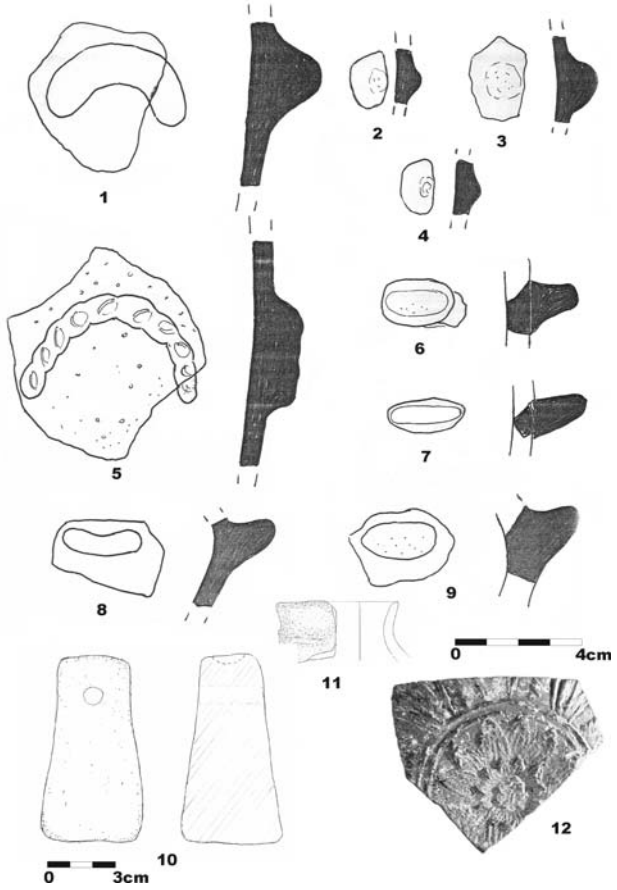

Fig. 4 - Prehistoric pottery:
1-9, Baljevac, 10-11, Rudno-Čista, 12, Jošanička banja-Djorov most.

What had been happening before the time from which the jewelry from Kruševica dates could be concluded on the basis of registered sites the traces of which start around the village Rudnica and spread on the plateaus of earlier river terraces to Baljevac and northwards towards Kraljevo. Stone hammer-axes originating from the diabase-hornstone formation along the Lopatnička river to the north of Baljevac (Bogosavljević 1987:26) indicate the traces of development of the metal age settlements that are closely connected with the exploitation of the ore resources. Defining of importance and role of these prehistoric stations is another step in the process of archaeological investigations and these results will indubitably illuminate in more details the course of evolution of the early metallurgy in the territory of central Serbia.

ZAJAČAK – HIGHLY-ORGANIZED SYSTEM OF METALLURGICAL STRUCTURES

The data for the antique period are more apparent and more abundant and they partially come from the archaeological excavations. First of all the test trenching metallurgical center at Zajačak and commenced excavations of the necropolis Lanište near Baljevac unambiguously confirmed the thesis about the strong continuity of mining among local population from the proto-historical period to the Roman times (in the grave goods from Laniste from the 1st century BC). The finds of bronze arc fibulae and an anonymous quadrans as well as autochthonous characteristics of the mortuary practice until the discovery of Early Byzantine tomb from the 5th century AD confirm the prolonged inhabiting of the area in the vicinity of Baljevac (Bogosavljević-Petrović 2003:191-208). It is only natural to look for the settlement in the vicinity of registered necropoles on both river banks. When the results of test trenching at Zajačak were carefully analyzed they confirmed highly organized technological activities and existence of structures including many furnaces for roasting and smelting the ore and workshops for processing semifinished objects during the 4th century AD(Bogosavljević-Petrović 2005:79-83). It became rather obvious that an blank map of the region from Novi Pazar to Kraljevo published sometime ago is now filled with dense network of settlements, hillforts, necropoles and archaeometallurgical sites (Fig.5).

Thanks to the discovery of mining and metallurgical complex at Zajačak large number of registered sites far from waterways and isolated at the high altitudes at the drafty locations near the forests got their real analogies and explanations. In that context could be understood the isolated profile of the road from Kopaonik to Rudnica at 1400 meters above sea level (site Trsove Bare) where is clearly discernible intersected furnace for ore processing. In the background, closer to the forest are by all appearances situated other structures of this site (Fig.6).

When finds from Lanište are concerned the uniform style of bronze jewelry production and manufacture of functional elements of clothing were emphasized on many occasions. This fact indicated one source of production, i.e. the existence of local *officina* in this part of Serbia that was working to satisfy the needs of local population but also accepting, in the course of time, general trends and some foreign ethnic impulses. When we analyze this information in relation to abovementioned assumptions about the existence of the workshop from the 5th century BC at the longitude Novi Pazar-Atenica rather subtly is imposed the idea about long continuity of attempting of local population to produce in a long period of time and using their own forces different types of jewelry for their own need and using by all appearances local ore resources. Its location in the antique period was within the 15 kilometers circle in the surrounding of Baljevac.

When we locate the registered sites from the area of Kopaonik and Golija including also the sites from the territory of Kraljevo municipality, the important points from the south towards the north, from Rudnica via Baljevac with Zajačak and Cerje are hillfort Gradište in the village Čukojevac in the immediate vicinity

of Kraljevo (Mihailović 2003:54-58). Together with the chance find of grave offering, the three-handled pot from the village Cerje and surface finds from the surrounding fields the Ibar gorge (Fig.7) reveals lively activity in its lateral water courses in the 4th century AD (Documentation of National Museum Kraljevo, CSA 1). To this should be added the finds from Gradište near Kraljevo dating from the 3rd-4th century AD, first of all the find of iron slag in the cultural layer. The information about metallurgical activities at Ulpiana and later at Sočanica with the data from the mountains Rudnik and Kosmaj revealed spatial and chronological hiatus established on the basis of preliminary investigations of the centers distinguished in the written sources (Dušanić 1980:7-55) and on the basis of the rather recent archaeological investigations. In this text concerning the activities of miners and metallurgists at Kopaonik and in the Ibar valley in the Roman times are quoted the data, which affirm the opinion about existence of highly developed organization in the time of early Roman domination, i.e. already in the 1st century AD.

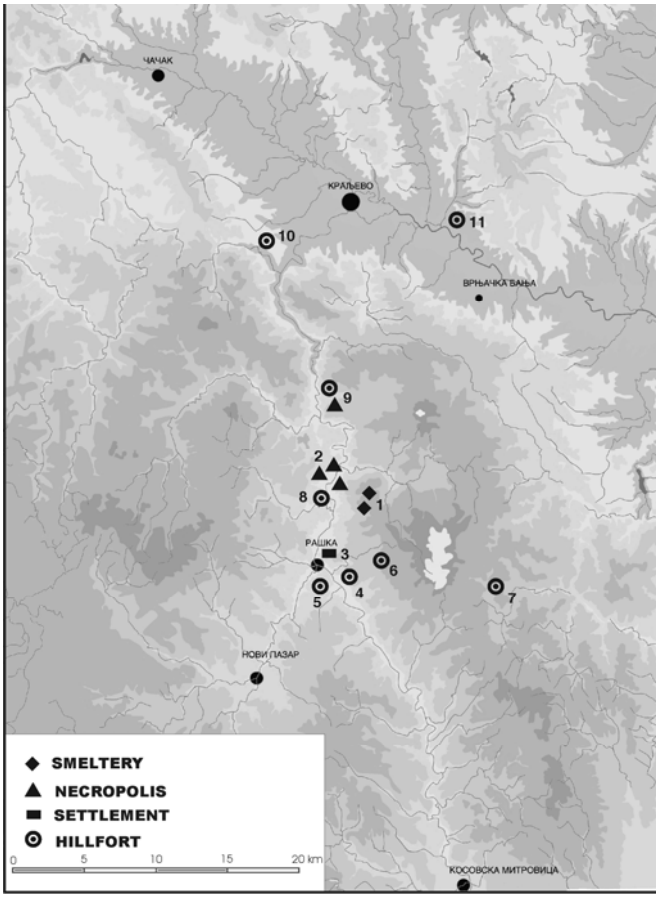

Fig. 5 - Archeometallurgical sites of Roman period: 1. Zajačak-Kremiće, 2. Baljevac - Lanište-Bela Stena, 3. Rvati-Dobrinac, 4. Rudnica, 6. Lisina, 8. Brvenik, 9. Cerje, 10. Bogut, 11. Gradište. ◆ smeletery; ▲ necropolis; ⊙ hillfort, ■ settlement.

Fig.6 - Trsove Bare (Kopaonik), potential metallurgical roman feature.

Fig. 7 - Cerje, three-handled pot (IVst century AD).

METALLURGICAL SITES FROM THE MEDIEVAL PERIOD – OR ARCHAEOLOGICAL SITES WITHOUT CULTURAL AND CHRONOLOGICAL ATTRIBUTION

Thematic site surveying of the mountain regions and oases of župa type and gathering of the data from the Ibar valley is not completely systematized (Fig.8). Even though many works of different kind have been published on many occasions including the ore-bearing region (Bogosavljević et al.1988:9-45), theoretical approaches to the problem of metallurgical complexes in particular

those without archaeological material and individual sites or finds the medieval mining and metallurgy have been treated fragmentarily and with considerable restrictions. In other words, all registered smelteries did not yield archaeologically relevant material. The only source of information are results of physical and chemical analyses of ores and slags and reconstruction of the smelting process on the basis of archaeological excavations, which have not been conducted so far.

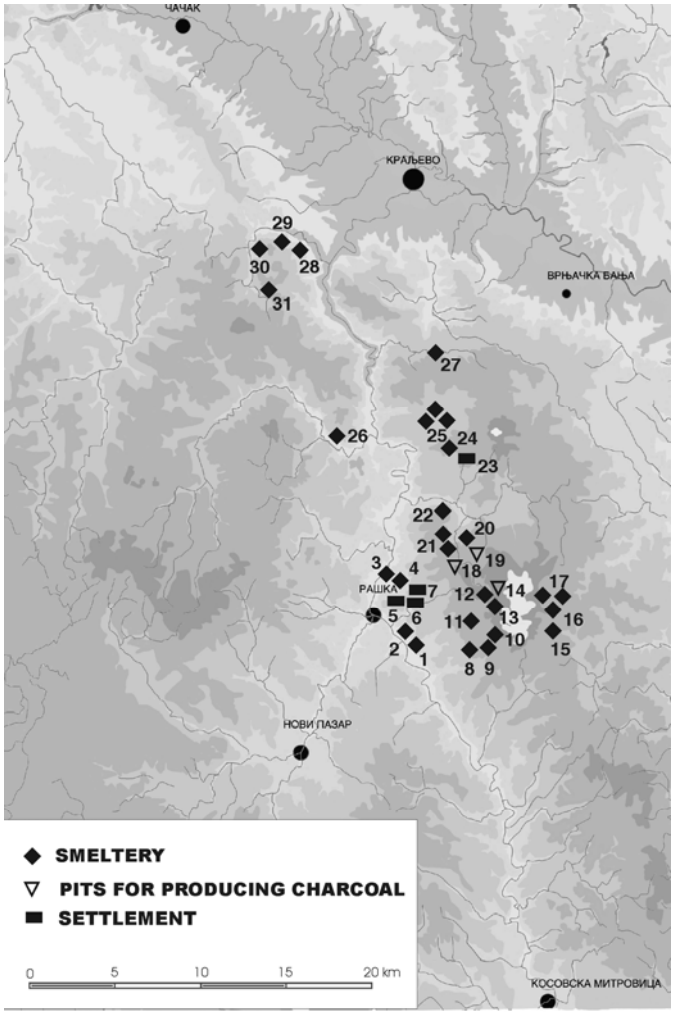

Fig.8 - Medieval and Turkish metallurgical sites: 1,2. Rudnica, 3. Karadak, 4. Kaznoviće, 5. Duvarine, 6. Staro Selo, 7. Kućetine, 8-10. Zimovnik (Velika reka), 11. Vignje (Lisina), 12-14. Novoselske bačije, 15. Zaplanina, 16. Bela reka, 17. Brzećka reka, 18. Gvozdac, 19. Jelak, 20. Samokovka-Kadijevac, 21. Samokovka, 22. Jošanička banja-Djorov most, 23-24. Plana, 25. Gokčanica, 26. Železnica, 27. Brezna (Goč), 28-29. Lopatnička reka, 30. Ušće Borošnice, 31. Tolišnica-Propljenica. ◆ smeltery; ■ settlement; ▽ »žežnice«.

The answers to the numerous questions about functioning of smelting complexes in the Middle Ages and Late Middle Ages in the Ibar valley are essential as they will have an impact on more realistic comprehension of rise and gradual fall of Serbia in the time of the Nemanjić dynasty as well as of later activities in the Turkish period. An attempt to reconstruct the processes of shaft exploitation on the basis of preserved supporting walls and other structural elements from the mines Kiževak and Suvo Rudište contributed greatly to the introduction of first and indispensable methodology for archaeological investigations of the continuity of mining and metallurgy in the mountain systems of Serbia. The dating proved to be the greatest problem as at the time of publishing there were no analogous published entities (Bogosavljevuć et al. 1988: 30-31). Today, after two decades, when these results compare with interdisciplinary investigations in Bulgaria or Turkey a series of analogous details could be noticed. The term 'Vigne' for type of furnaces at the site Demirköy-Malki Samakov is recognizable toponym from Kopaonik mountains where at the site called Gornje i Donje Vignje were encountered the remains of metallurgical structures nearby the forests and water as important resources. Description of the furnace of 'vigne' type corresponds to our data. These structures often occur in pairs in the workshop centers and it is assumed that they were used for maintaining heat (Yalçin, Özbal 2005:151). Results of analyzed slag samples reveal similar components as our sparse samples from Zimovnik and Bela Reka, fayalite with magnetite and vistit (Stojanović 1995:72). In that respect, our often general dating of such sites without archaeological material in the late Middle Ages or in the period of Turkish occupation seems justified for the time being until the systematic archaeological excavations.

Fig. 9 - Karadak, plateau under the deposite of slag.

In the investigated region, on the basis of archaeological notes and the published results, could be distinguished the valleys of the rivers at Kopaonik (Brzećka, Duboka, Bela Reka, Samokovka, Rudnička reka, Velika reka) as well as the *župa* regions that are the centers of the metallurgical activities (Fig.8). Their main characteristics are locations near the rivers with system of directing water through artificially made channels – *vada* and proximity of forests as sources of fuel. As a result of advancement of the smelting techniques in the medieval period, the smelteries were organized in such environments while the proximity of the ore deposits was not crucial. Transport of ore from different mines could have been organized using the convoys of pack animals. Smelteries in the valleys of the Kopaonik rivers processed the ore from many mines as we can conclude taking into account the large plateau in the village Karadak that even today after decades of destruction of structures and slag looks like the landscape on the moon (Fig.9). In Karadak existed series of furnaces for smelting ores that were mostly destroyed after the Second World War (Fig.10).

Fig. 10 - Karadak, remain of destroyed furnace, in situ.

An isolated find of preserved waterwheel (samokov) is the iron axis (local *grivna*) from the valley of the Samokovka that is now in the courtyard of the Museum in Kragujevac. In the Museum in Kraljevo is the rather large collection of the study material including samples of ores and slag as well as fragments of furnaces from many destroyed sites as was the case with smeltery destroyed in the course of construction of ski lift for the skiing piste Duboka in Bela Reka at the eastern Kopaonik (Fig.11).

About the form of furnaces in the Middle Ages that are nowadays preserved under thin layers of earth and visible in the configuration of the terrain we could talk taking as an example the structure from the complex Zimovnik (Fig.12). However, the time of their use is hypothetical for the time being although quoted analogies with metallurgical workshops from the Turkish Thrace are very

convincing. Considering the fact that in these territory archaeometallurgical investigations (including dating) are also in the beginning phase, both regions have many work to do. From one of three registered working areas from the Samokovka valley comes a part of the structural element of the furnace (Fig. 13). According to its preserved shape of funnel-like tube of baked clay that was wrapped in the layers of earth burnt to different intensity and at the narrow segment of the opening with melted metal cover it resembles rather recently published find from the territory of Hungary (Gömöri 2005: 131). Analogy from the site Bodrod-Alsóbű is the end of opening for introducing air to help the ignition and after that this narrow part of tube was sealed with clay. This piece is dated in the early 10th century and related to the long tradition of the Avarian metallurgy, which, however, originally based its knowledge on the Byzantine experiences.

Fig. 11 - Bela reka, remains of devastated furnace and water channel (»vada«); detail: fragments of ruined furnace

Fig. 12 - Zimovnik, remain of oven (configuration of the terrain).

Fig.13 - Samokovka, structural element of furnace, fragment.

CONCLUSIONS

On the basis of very short summary pro and contra the continuity of metallurgy in the Ibar valley we should bear in mind the following positive data resulting from this text. Even though the examined territory is at the very beginning of archaeological works of larger scope the enclosed data fit into the theory about very advanced mining and metallurgy during very long period of time. Our investigations identify concretely the Early Iron Age as the period of development at the broad level both activities while indirect data indicate more distant past as the period of exploitation of copper ores at the western and eastern Kopaonik . Of exceptional significance for the future investigations of the continuity is the period of development between the 5th century BC and the time of establishing of Roman domination in the 1st century AD. During these six centuries the neighboring regions experienced many changes while the Ibar valley came into focus in the time of 'princely burials' in the period of introduction of Roman organization and during the 4th century AD when the Roman power was on the decline. Within limited group of sites in the region Kruševica-Baljevac-Jošanička banja and the Kremićke mountains, we witnessed during that millennium the metamorphosis of many phenomena with strong autochthonous characteristics in production and probably also in the social organization. Third and very serious problem is reconstruction of medieval mining and metallurgy especially at the sites lacking the pottery material so they could not be precisely dated. First excavations in the intact oases including Zimovnik under Suvo Rudište, the Samokovka valley or areas of Plana, Gokčanica and Lopatnica will improve our technological knowledge, which is nowadays based on the analogies from rather distant territories and on the written sources and rather late interpretations.

Detected similar phenomena in organization of metallurgical structures as well as the elements of structural character (Samokovka, Bodrod-Alsóbű) indicate sound traces from which could commence the investigations of continuity of metallurgy from the time of decline of Roman administration and beginning of transformation of local population in the contacts with new experiences of many ethnic changes in the Late Roman times. In the time before the introduction of concessionary arrangements in the 19th century Serbia worth of the attention of investigators and of indisputable significance for solving the problems of continuity are systematic investigations and analyses of metallurgical centers and workshops from the valleys of many lateral waterways in the Ibar valley.

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