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COPPER PROCESSING IN VINČA
NEW CONTRIBUTIONS TO THE THESIS ABOUT METALLURGICAL CHARACTER OF VINČA CULTURE

Abstract. – Abundant hand written documentation from excavations of Vinča (1908–1934) offers sufficient evidence that confirms the thesis established by investigator of Vinča M. M. Vasić himself that Vinča was metallurgical center. After comparing these data with the finds related to early copper processing on other sites of the central Balkans (Belovode, Pločnik, Gornja Tuzla, Fafos, Selevac) it could be assumed that Vinča culture was acquinted with metallurgy from its very outset. This assumption is supported by similar finds from other sides of the world (Tymna, Chinflon, Batán Grande) and even more so the results of experimental copper processing.

Key words. – Vinča, malachite, copper metallurgy, Neolithic, central Balkans.

In the recent years finds that inevitably and certainly confirm metallurgical aspects of the Vinča culture from its very beginning are becoming more and more frequent. Besides well known find of Vinča copper mine at Rudna Glava that confirmed with certainty that Vinča culture was acquainted with metallurgy[1] the new discoveries at Belovode and Pločnik have taken place in the last decades of the 20th century and they shifted the introduction of metal almost to the very beginning of Vinča culture.[2] However, the thesis that bearers of Vinča culture and particularly inhabitants of its eponymous site were engaged in metal processing is a good deal earlier than the mentioned finds.

The thesis of metallurgical character of the Vinča culture is almost whole century old and was established by the first and most prominent investigator of Vinča, Miloje M. Vasić. He related, of course, this thesis to the period in which he dated the site at Vinča because according to his opinion the settlement in Vinča was founded in the metal age, at the transition from Middle to Late Minoan period, under strong Aegean influence. The reason for establishing and prolonged existence of the settlement was the exploitation and processing of ore from the hilly surroundings.[3] Vasić was sure about the date of the Vinča settlement from the first contact with material from this site that reached him as chance finds[4] so metal using by Vinča inhabitants was not a bit odd to him. After first excavations in 1908 there were mentioned, among other finds, lumps of galena and cinnabar as well as oxidised pieces of the metal supposed to be copper.[5] With each new investigation campaign Vasić was more and more certain that it was the metallurgical centre where mostly cinnabar was processed in order to produce mercury. In the monograph on Vinča we find detailed description of the procedure of mercury processing in this settlement. Such activity is confirmed by numerous finds of cinnabar lumps found in all site layers, the construction of the furnaces in Vinča houses as well as exploitation of cinnabar mines on the Avala mountain.[6] Later on after refuting dating of Vinča as Greek colony and its determination as the Neolithic site[7] the theory about metallurgy in Vinča was forgotten although it was never scientifically dismissed.

After discovery of copper mine at Rudna Glava dating from the later phase of Vinča culture[8] and after investigations at Divostin,[9] Selevac[10] and especially at

[1] Jovanović 1982.
[2] Шљивар, Јацановић 1996, 1996а, 1997, 1997а, 1998; Шљивар, Кузмановић-Цветковић 1997.
[3] Васић 1932: 97, 111.
[4] Васић 1906: 127; Васић 1908: 115.
[5] Vassits 1910: 31.
[6] Васић 1932: 1–22, 104.
[7] Milojčić 1949; Garašanin 1951.
[8] Jovanović 1982.
[9] McPherron, Srejović 1988.
[10] Tringham, Krstić 1990.

Terms used in Vasić's journals	Depths of finds
Oxidised metal	1,0–10,25 (bottom of pit) m
Oxidised bronze or copper	1,2–8,7 m
Green oxide	4,3–5,1 m
Glass paste	1,4–8,0 m
Green faience	6,1–10,0 (Silo S) m
Green stone	8,5 and 8,7 m
Avalite	5,6 and 6,1 m
Green pigment	5,6 and 8,9 m
Blue colored iridescent glass	4,7 m
Blue pigment	3,8 m

Table 1. Terms used in Vasić's journals denoting finds of malachite and azurite

Pločnik and Belovode in last few years the thesis that Vinča was one of the metallurgical centres of Vinča culture became actual again. However, the accent is now on copper processing. Pretext for consideration of possible copper processing in Vinča was large number of lumps and decorative objects of malachite collected during Vasić's excavations at Vinča and nowadays gathered in the National Museum collection and Archaeological Collection of Faculty of Philosophy in Belgrade.[11] In his published works Vasić does not mention many finds of malachite but refers to some finds that could be related to this copper ore. It is mentioned that small lumps of green colour were frequently found so the author assumed that this pigment could have been used for cosmetic purposes in spite of the fact that green pigment was not confirmed on the single object from Vinča.[12] These small lumps of green pigment were, according to the words of author, looking »like pieces of oxidised copper or bronze and were considered to be so«. There were larger specimens as well that according to the author support the opinion that green mineral pigment was produced in Vinča.[13] For the green pigment at Vinča is explicitly said that it is not of malachite but of Avalite – chromium silicate originating from Avala, from cinnabar mine at Šuplja Stena.[14] Next group of finds that could be related to malachite are »trinkets of green paste« often found at Vinča.[15]

Mentioned attitude to this type of finds of Vinča investigator himself had also impact on later works about Vinča culture. There is almost no mention of malachite, copper objects or possibility of copper processing at Vinča itself in the later literature. The single exception is the necklace consisting of, as Vinča investigator mentions, »17 small, perforated bronze trinkets and one larger bronze pendant« found in 1911 at the depth of 6 m within one rectangular structure.[16] Later analyses of the material used for the beads revealed that it was copper metalized mineral with malachite overlay.[17]

Contrary to the published works Vasić in his daily logs recorded this kind of finds very meticulously[18] giving their precise number, often mentioning their size and sometimes precise finding place if they were found on house floors or in the pits. Depending on the depth where they were found Vinča investigator named them differently never using the term »malachite« (»azurite«). Most frequent term for this material is »oxidised metal« or »oxidised bronze or copper«. This kind of material is found mostly in the form of unworked lumps rarely as beads or pendants and it is encountered in all layers of the site at Vinča. The deepest find of this kind was recorded at the bottom of the pit investigated in 1911, 10.25 m under the ground level.[19] For certain finds in the layers between 6.0 metre and horizon of pit dwellings investigator himself has doubts that they are pieces of oxidised metal and

[11] This author had opportunity to study this material in 1988–1989 and results of that study are published in Антоновић 1992: 36, 40

[12] Васић 1932: 34–35.

[13] Васић 1932: 35.

[14] Васић 1932: 36.

[15] Васић 1936: 170.

[16] Васић 1936a: 43.

[17] Jovanović 1971: 22.

[18] I was able to examine original journals of Miloje M. Vasić from excavations in Vinča. They are now in the Archaeological Collection of Faculty of Philosophy in Belgrade and I am very grateful to Dr Dubravka Nikolić for the opportunity to study them.

[19] Journal for the year 1911, page 156.

Depth	Finds of malachite and azurite recorded in Vasić' s journals
1.0 m	1 lump of oxidised metal
1.1 m	1 lump of oxidised metal; 1 lump of oxidised bronze
1.2 m	2 lumps of oxidised bronze
1.4 m	1 bead of glass paste
1.5 m	1 lump of oxidised metal
1.6 m	2 lumps of oxidised metal
1.7 m	2 lumps of oxidised bronze
1.8 m	3 lumps of oxidised bronze; 2 lumps of oxidised metal
1.9 m	1 bead of oxidised bronze
2.0 m	1 bead of oxidised bronze or copper; 1 lump of oxidised metal
2.1 m	1 lump of oxidised metal
2.2 m	20 lumps of bronze; 1 lump of oxidised metal
2.25 m	large amount of lumps of oxidised metal
2.3 m	3 lumps of oxidised metal
2.4 m	1 bead of oxidised bronze or copper; 2 lumps of oxidised metal
2.5 m	large amount of bronze lumps; 6 lumps of oxidised metal
2.6 m	large amount of lumps of oxidised metal
2.8 m	large amount of bronze lumps
2.9 m	large amount of bronze lumps; 2 beads of oxidised bronze; large amount of lumps of oxidised metal
3.0 m	2 lumps of bronze; 1 lump of oxidised metal
3.1 m	1 bead of oxidised bronze or copper; 1 lump of oxidised bronze
3.2 m	large amount of lumps of oxidised metal
3.3 m	large amount of lumps of oxidised metal
3.4 m	3 lumps of oxidised metal
3.49 m – Grundris III	large amount of lumps of oxidised metal
3.5 m	2 lumps of oxidised bronze
3.6 m	2 lumps of bronze
3.7 m	1 lump of bronze
3.8 m	1 lump of oxidised bronze
3.9 m	1 bead of oxidised bronze
4.0 m	1 lump of oxidised metal
4.2 m	1 lump of oxidised metal
4.3 m	lumps of green metal oxide (bronze)
4.4 m	large amount of lumps of oxidised bronze; 1 bead and 1 fragmented pendant of oxidised bronze
4.5 m	large amount of lumps of oxidised metal (bronze)
4.6 m	1 lump of oxidised metal
4.7 m	large amount of lumps of green metal oxide (bronze); 1 lump of blue iridescent glass
4.9 m	1 lump of oxidised metal
5.0 m	1 lump of oxidised metal
5.1 m	lumps of green metal oxide (bronze)
5.3 m	1 bead of oxidised metal
5.4 m	2 beads of oxidised bronze or copper
5.5 m	2 beads of oxidised metal

5.6 m	2 lumps of blue pigment; 1 lump of Avalite (of green color); 1 lump of green pigment; 1 lump of oxidised metal
5.7 m	large amount of lumps of oxidised metal
5.8 m	large amount of lumps of oxidised metal
6.0 m	2 lumps of oxidised metal
6.1 m	1 lump of Avalite (green color); 1 bead of greenish faience
6.2 m	2 lumps of green ore; large amount of lumps of oxidised metal
6.3 m	2 lumps of oxidised bronze; large amount of lumps of oxidised metal; 1 bead of oxidised metal
6.4 m	1 lump of green slag
6.5 m	2 lumps of oxidised metal or paste
6.7 m	1 lump of oxidised metal
6.8 m	1 lump of oxidised metal
6.9 m	1 lump of oxidised metal or paste
7.0 m	1 lump and 1 bead of oxidised green slag or paste
7.3 m	1 lump of oxidised metal
7.5 m	1 bead of bronze?
7.65 m	1 lump of oxidised metal
7.7 m	1 bead of oxidised bronze or copper
8.0 m	1 bead of oxidised metal; 16 semi-finished beads of green glass paste
8.1 m	1 lump of oxidised metal
8.15 m	2 lumps of green faience or Avalite
8.3 m	1 lump of green faience or Avalite (cosmetics)
8.34 m	2 lumps of oxidised metal
8.36 m	lumps of oxidised metal mixed with charcoal
8.41 m	large amount of lumps of oxidised metal
8.45 m	1 bead of faience
8.6 m	large amount of lumps of oxidised metal
8.7 m	1 pendant and 1 lump of greenish stone like salt; 1 lump of oxidised metal; 1 lump of green faience or Avalite; large amount of lumps of oxidised metal
8.9 m	1 lump of green color
9.0 m	1 lump of oxidised metal
9.1 m	1 lump of green color
9.24 m	1 lump of oxidised metal
9.5 m	1 bead of oxidised metal
10.25m (pit bottom)	1 fragmented bead of oxidised metal
Pit	1 lump of oxidised metal
Silo S – bottom	large amount of lumps of green faience or Avalite
Silo SS III (9.4–9.96 m)	2 lumps of green faience
Silo SS II (9.2–9.8 m)	2 lumps of green faience

Table 2. Depths and finds of malachite and azurite that Vasić recorded in his journals

assumes that it is green paste and possibly green faience. Extremely rarely in the journals are used terms »green stone«, »Avalite« or simply »green pigment«. Presence of azurite is recorded by expressions »blue tinted iridescent glass« and »blue pigment« at the depths between 3.8 and 4.7 metres (Table 1; Table 2).

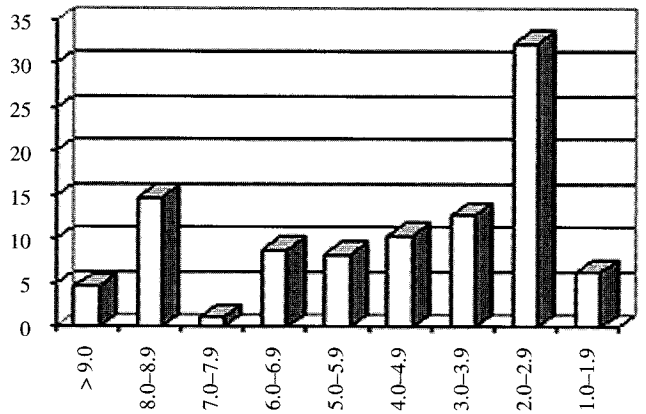
Comparing the data from Vasić's journals that mention the lumps of oxidised metal, bronze or

Depth	Find
1.1 m	1 lump of malachite (18×11×8 mm)
1.2 m	2 lumps of malachite
1.3 m	1/2 bead of malachite (diam 8 mm)
1.5 m	6 lumps of malachite
1.6 m	3 lumps of malachite
1.7 m	1 lump of malachite; 2 beads of malachite (diam 10 mm)
1.8 m	4 lumps of malachite
1.9 m	4 lumps (largest 8×7×14 mm) and 3 beads of malachite (diam 3, 4 and 5 mm)
2.0 m	1 lump (19×13×36 mm) and 1 bead of malachite (diam 6 mm)
2.1 m	1 bead (diam 7 mm) and 1 pendant (13×9×14 mm) of malachite; 3 lumps of malachite and 2 of azurite
2.3 m	1 lump of malachite
2.4 m	2 lumps of malachite (diam 5 mm)
2.5 m	40 lumps (largest 11×8×4 mm), 6 beads (diam 4,5 and 12 mm) and 1 pendant of malachite
2.6 m	5 lumps of malachite
2.8 m	6 lumps of malachite and 1 lump of azurite (largest 6×9×4 mm)
2.9 m	25 lumps (largest 6×9×6 mm) and 1 bead of malachite (diam 6 mm); 1 lump of azurite (14×11×9 mm)
3.1 m	1 lump of malachite and 1 bead of malachite (diam 8 mm)
3.2 m	1 lump of malachite (18×11×8 mm)
3.3 m	2 beads of malachite (diam 6 mm)
3.4 m	2 lumps of malachite
3.5 m	2 lumps of malachite
3.7 m	1 lump of malachite (diam 3 mm)
3.8 m	1 lump of malachite
3.9 m	5 lumps of malachite, some with traces of perforation (largest 7×6×5 mm)
4.5 m	1 pendant of malachite (21×13×9 mm)
4.9 m	1 bead of malachite (diam 4 mm)
5.5 m	1 lump and 1 bead (diam 4 mm) of malachite
6.3 m	1 lump of malachite
6.4 m	1 lump of malachite
7.3 m	1 lump of malachite
8,0 m	1 bead of malachite (diam 14 mm)
8.7 m	1 lump of malachite
9.24 m	1 lump of malachite
9.5 m	1/2 bead of malachite (diam 6 mm)

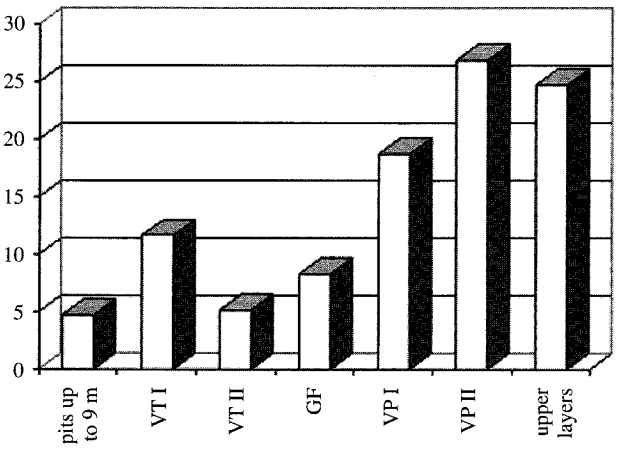
Table 3. Objects and lumps of malachite and azurite nowadays in Archaeological Collection of Faculty of Philosophy in Belgrade and in Prehistoric Department of National Museum in Belgrade

copper, green paste or faience with material in the collections of National Museum and Faculty of Philosophy in Belgrade we came to the conclusion that under all mentioned terms used by Vasić is actually contained malachite. Among the finds predominate amorphous lamps of malachite but certain amount of artefacts is recorded as well. In the collections of National Museum and Faculty of Philosophy in Belgrade are 18 beads[20] and 7 pendants, fragmented or complete, from Vasić's excavations at Vinča (Fig. 1: a–i). Finds originate from earlier and later Vinča layers respectively (Table 3). The largest bead is 13 mm in

[20] According to Vasić's records there were much more beads but nowadays only these are preserved.



Graph 1. Distribution of malachite and azurite in Vinča (according to depth)



Graph 2. Distribution of malachite and azurite in Vinča according to cultural periods (VT – Vinča–Tordoš, GF – Gradac phase, VP – Vinča–Pločnik)

diameter. These are all cylindrical beads with biconical perforation (Fig. 1: a–b). Among pendants the largest is 21×13×9 mm (Fig. 1: i). There are also in the National Museum in Belgrade somewhat larger, well-worked malachite pendants, which Museum acquired as chance finds from Vinča (Fig. 1: f–h). All mentioned objects are polished to some extent and perforated. In his 1930 journal Vasić mentioned one pendant (2.3× 2.0×0.6 cm) of stone, which by description corresponds to the malachite found at the depth of 8.7 m (Fig. 1: d).[21] It seems that objects of malachite were produced in the settlement itself. In favour of this speaks the information from Vasić's 1930 journal. In that year at the depth of 8.0 metres was discovered interesting find consisting of 16 semi-processed beads (without perforation), up to 8 mm in diameter, made of soft green stone suggested by Vasić to be the glass paste (Fig. 1: c).[22] Unworked lumps of malachite are of various sizes: from the small ones having 3 mm in diameter to the somewhat larger specimens with diameter ranging from 1 to 2 cm. Some of them were burnt and are found stuck together in larger lumps mixed with charcoal. Azurite occurs very rarely. Just a few amorphous lumps are recorded.

Malachite was found in all Vinča layers and as it seems according to descriptions in the excavation journals it looks to be evenly represented at all depths. It was also found in the pits excavated in the virgin soil: at the bottom of silo S, and in silos SS II between 9.2–9.8 m and SS III (9.4–9.96 m) situated next to pit dwelling D, all investigated in 1934.[23] Also, in 1911 one fragmented bead was found on the bottom of the pit that was at the depth of 10.25 m under original ground level.[24] Finds of malachite were also encountered on house floors. Lumps of malachite or identified by Vasić as »small lumps of oxidised metal« were found on the floors of the houses from depths of 2.5 m, 2.6 to 2.8 m and 3.49 m (Grundris III) investigated in 1912 as well as on the floor of the house from the depth of 6.7 m investigated in 1911.[25] Occasionally these lumps were mixed with pieces of coal. According to general estimate of quantity of malachite found in Vinča based on the data from Vasić's journals, find frequency within cultural phases is higher in the later periods of Vinča culture. However, there is no extreme difference in number of finds between cultural phases (Graph 1; Graph 2).

For the time being objects of malachite were found besides at Vinča also at Selevac, Divostin, Gornja Tuzla, Belovode and Čoka. At Selevac was found one bead of malachite.[26] In the Late Vinča horizons at Divostin were found only few perforated pendants and many discoid beads the largest being 7 mm in diameter, 4 mm high and with 2 mm perforation (Fig. 1: l–o). There was discovered the complete workshop for manufacturing malachite beads.[27] Many beads 3–8 mm

[21] Journal for the year 1930, page 30.
[22] Journal for the year 1930, page 15.
[23] Journal for the year 1934, pp. 67–70.
[24] See footnote 3.
[25] Journal for the year 1912, page 29; journal for the year 1911, pp. 69, 126.
[26] Glumac, Tringham 1990: 554.
[27] Glumac 1988: 458.

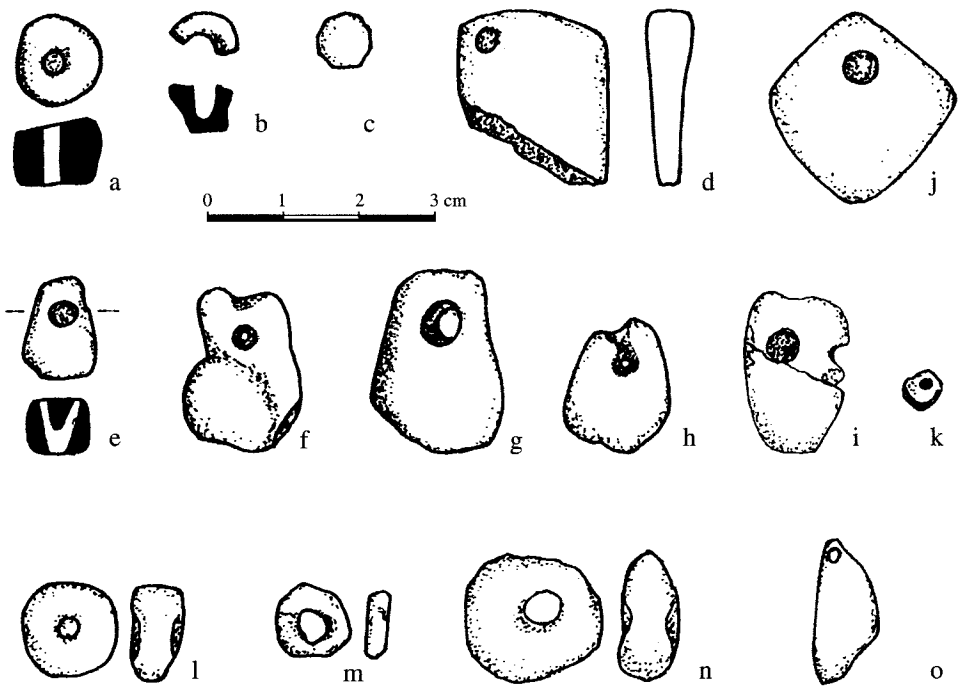


Figure 1. Objects of malachite. Vinča: a) bead from 2.3 m; b) bead from 1.3 m; c) bead from 8.0 m; d) pendant from 8.7 m; e) pendant from 2.1 m; f–h) pendants acquired for National Museum, Belgrade; i) pendant from 4.5 m; Belovode: j–k) trenches I and II from 1994 (after Шљивар, Јацановић 1997a); Divostin: l–o) horizon II (after Glumac 1988)

in diameter and one nicely worked pendant were found at Belovode (Fig. 1: j–k). They were found in all settlement layers dating from Vinča Tordoš and Gradac phase.[28] At Tisza culture site Kremenjak near Čoka, in pit 2 were found 14 beads of malachite in a vessel containing also other types of decorative objects assumed to be Vinča culture import.[29] Decorative objects of malachite were in use also earlier of the Vinča culture in the territory it later encompassed. One pendant is recorded at Lepenski Vir in settlement IIIa[30] while in pits and pit dwellings of Lepenski Vir IIIb settlement occur the beads of azurite and malachite.[31] At Divostin I dated in Starčevo culture was found one pendant and one conically shaped piece of azurite.[32] This is the only specimen of azurite in Starčevo culture so far. At Zmajevac near Smederevska Palanka, also the Starčevo culture site, was recorded the lump of malachite.[33] These isolated cases should not be connected with metallurgy because malachite was used exclusively as decorative stone but this undoubtedly confirm that bearers of Starčevo culture were acquainted with deposits of copper ore. Cases of the use of malachite for production of decorative objects, also entirely exceptional, were recorded in the Early Neolithic of surrounding areas. All these finds, as well as those from the Starčevo culture territory occur in the immediate vicinity of copper bearing regions.[34]

Finds of malachite, as unworked lumps are much more numerous. They were recorded at Vinča, Belovode, Pločnik, Opovo, Fafos, Divostin, Selevac. According to the number of finds Belovode certainly stands out.[35] Just during one season at this site as much as 0.4 kg of malachite was found in trench 5 within small area dating from the Gradac phase.[36] Thermally treated lumps have been frequently found although it is not precisely stated whether they were found in the layer of conflagration or it was the case of ore processing.[37] At Selevac were

[28] Шљивар, Јацановић 1996: 187; Шљивар, Јацановић 1996a: 58; Шљивар, Јацановић 1997: 121.

[29] Banner 1960: 18; Гарашанин 1973: 148.

[30] Srejović, Babović 1981:92.

[31] Срејовић 1969: 173.

[32] Glumac 1988: 460.

[33] Chapman 1981: 131.

[34] Chapman, Tylecote 1983: 374–375.

[35] Шљивар, Јацановић 1997a: 192–193.

[36] Шљивар, Јацановић 1997: 121.

[37] Шљивар, Јацановић 1996: 187; Шљивар, Јацановић 1997: 124; Шљивар, Јацановић 1998: 77.

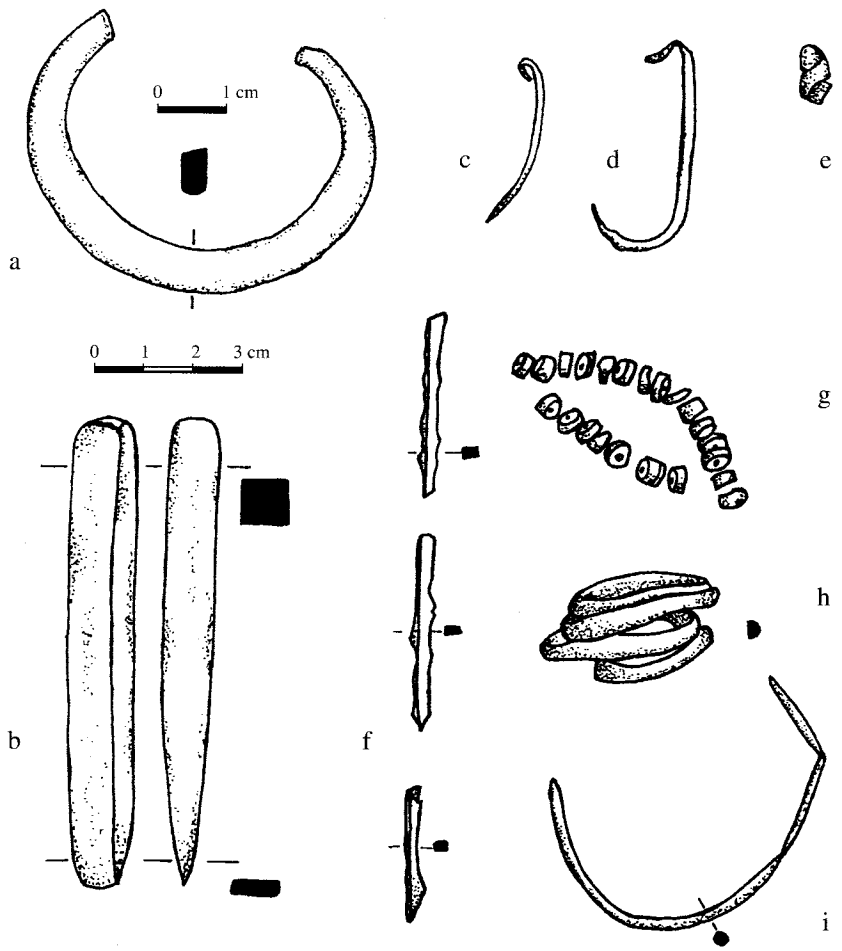


Figure 2. Objects of copper. Divostin: a) horizon II (after Glumac 1988); Pločnik: b) trench VIII, horizon III (after Šljivar 1996); Gornja Tuzla (after Čović 1961): c–e) stratum II; f–i) stratum III

collected all in all 209 malachite lumps, 87% of which were smaller than 5cu mm.[38] At Divostin II slightly less than 100 lumps of malachite were found within entire excavated area and 75% of them are smaller than 1 cm.[39] According to Vasić's notes number of untreated lumps at Vinča was considerably larger than at Divostin and Selevac: more than 500 of them distributed within all settlement layers were found. At Pločnik near Prokuplje large amount of malachite lumps was recorded in Vinča–Tordoš horizons.[40] At Gornja Tuzla, in stratum III, the earliest settlement horizon dated in the period Vinča–Pločnik I was found large amount of small lumps of copper oxide which the author relates with production of copper objects at this very site.[41] There is one more case of large amount of malachite that could be according to the opinion of investigator related to the copper processing in the settlement. At the site Fafos I near Kosovska Mitrovica, settlement dating from Vinča–Pločnik phase, in the pits 16 and 38 were recorded intensive remains of native copper mineral defined by petrologic analysis as malachite with cuprite and azurite.[42] We would also like to mention two lumps of copper oxide at Late Vinča site in Opovo.[43] This find could not be related so far to copper processing at this site.

Facts that certainly confirm the knowledge of copper processing are the finds of copper objects registered at Vinča culture sites. Most have been found at Gornja Tuzla (Fig. 2: c–i) if we exclude hoards from Pločnik whose dating is still questionable. In the

[38] Glumac, Tringham 1990: 555.

[39] Glumac 1988: 457.

[40] D. Šljivar, Report on the meeting of Prehistoric section of Serbian Archaeological Association, delivered on the 15. 11. 2001.

[41] Čović 1961: 103.

[42] Jovanović 1961: 42.

[43] Tringham, Brukner, Voytek 1985: 443.

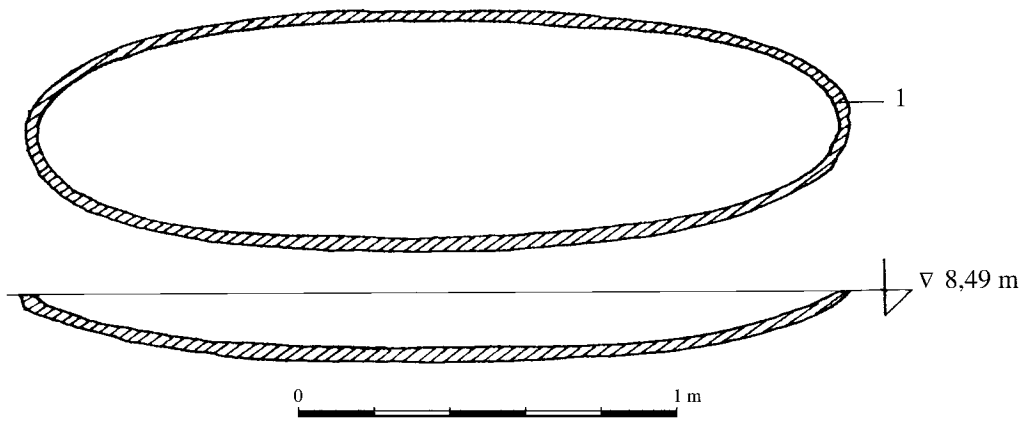


Figure 3. Boat-like recess in Vinča (after Vasić's journal for 1913, pp. 125–148): 1) wall of red baked clay

stratum III dating from Vinča–Pločnik I period two groups of small copper beads, one of 22 and other of 13 pieces, the spiral ring of the wire of segment section, fragment of thin wire of circular section, possibly part of bracelet and 3 fragments of some tool, presumably awl were found.[44] In the stratum II attributed to the very end of Vinča culture were found few small beads, one fragmented saltaleon, small needle with twisted eye, 2 fishhooks and few fragments of wire of circular section.[45] Massive copper chisel stratified and dated with certainty was recorded at Pločnik (Fig. 2: b). It was found in the intact layer at the border of III and II horizons attributed to the Gradac and Vinča–Tordoš II phases.[46] Pločnik hoards are still considered as dubious find concerning chronological attribution. They were considered so far to be Eneolithic hoards buried into earlier Vinča culture layer. More prevailing opinion after recent investigations at Pločnik is that mentioned hoards could be attributed to the Gradac phase of Vinča culture and subsequently that they are not buried later but that they are closed associations from the last phase of the life at Pločnik.[47] In the light of this new opinion the Pločnik hoards appear to be the most significant find of copper products in the Vinča culture: in all four hoards 45 massive copper tools – axe-hammers and chisels were found.[48] According to earlier conducted analyses two chisels from hoard 1 discovered by Grbić in the course of his excavations were made most probably of the native copper while most of the artefacts has great resemblance of metal composition with copper finds from Selevac and Gomolava[49] and that might indicate same source of raw material but we shall discuss that later. At other sites copper in the form of completed artefacts or lumps is recorded in very few instances. From Divostin originate few small copper beads, one pendant and bracelet (Fig 2: a) all found in undisturbed Vinča–Pločnik horizon.[50] One rather small copper bead along with few rather corroded small granules were found at Selevac.[51] At Grivac, in the block Barice IA, in the Late Vinča horizon was found one copper bead almost completely crumbled.[52] From Early Vinča layers in the trench I at Belovode originate few finds of small copper lumps. According to the opinion of investigators of this site it is most probably native copper.[53] This is for the time being the earliest find of copper in Vinča culture. At Ratina near Kraljevo presence of copper jewellery is confirmed in the shape of one loop of copper wire. This is confirmed by green remains of copper oxide on fragments of anthropomorphic figurines.[54] At Gomolava were found 3 small metal beads in exclusively Late Vinča horizon[55] as well as 7 beads and a bracelet in the burials of the Vinča–Pločnik I cemetery.[56] At Velika Gradina in Stapari near Užice in the II cultural layer dating from Vinča–Pločnik period was found a bracelet of copper wire of square section.[57]

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[44] Čović 1961: 98.
[45] Čović 1961: 102–103.
[46] Šljivar 1996: 96–97.
[47] Шљивар, Кузмановић-Цветковић 1998: 82–83.
[48] Сталио 1964; Сталио 1973.
[49] Pernicka et al. 1993: 4, 16.
[50] Glumac 1988: 458–460.
[51] Glumac, Tringham 1990: 554.
[52] Гавела 1956–1957: 265.
[53] Шљивар, Јацановић 1996: 187.
[54] Љамић-Валовић, Валовић 1988: 23.
[55] Ottaway 1979: 53, 55.
[56] Брукнер 1980: 32, 34.
[57] Jurišić 1960: 97.

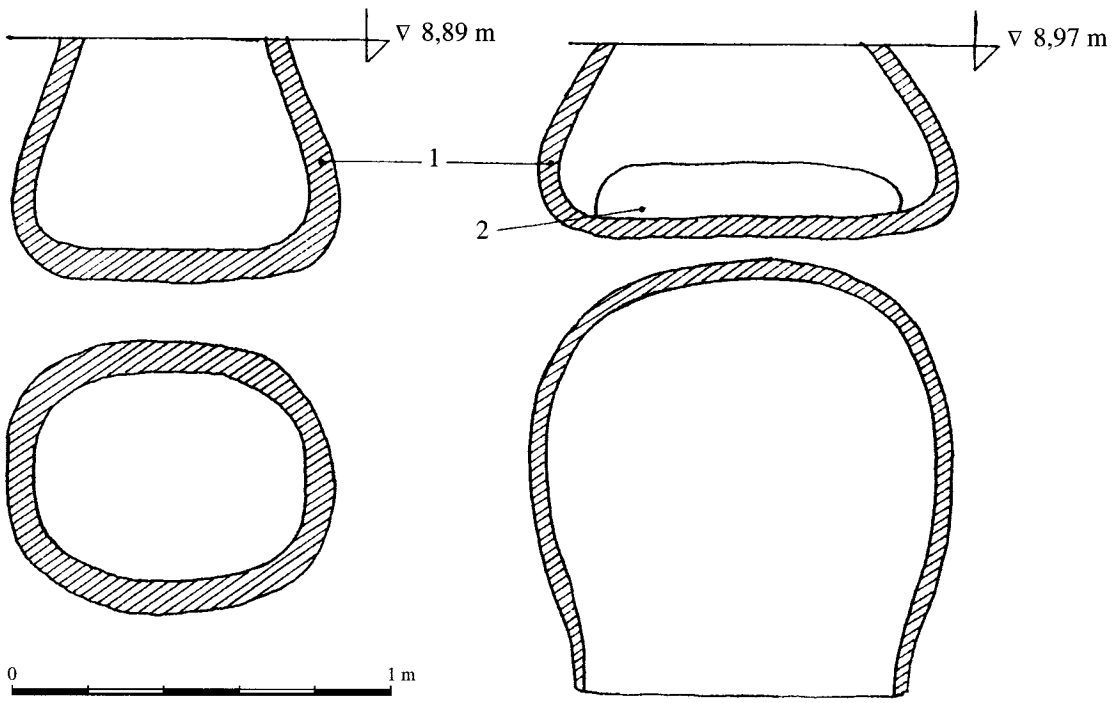

Figure 4. Pits with wider bottoms (after Vasić's journal for 1913, pp. 125–148): 1) wall of red baked clay; 2) opening by the bottom of larger pit

The question raised after everything we said is where was organised production of copper from which the objects recorded at Vinča culture sites were manufactured. Clearly defined working and smelting place in the Vinča culture has not yet been encountered. However, that is how it looks like only at first glance. Possible working places are already described in certain published works – precisely these sites are Pločnik, Fafos, Selevac and Belovode. Even Vasić in his already mentioned journals from excavations at Vinča described situations which indubitably indicate smelting activity in this Neolithic settlement. Thus Vasić recorded that at depth of 6.7 m (house ground plan) and 8.36 m investigated in 1911 were found pieces of malachite in a lump with charcoal that conclusively confirms presence of malachite in the fire with coal. We are inclined to explain this as intentional activity and not incident because at mentioned house plans wasn't any trace of conflagration.[58] At the depths of 6.2 m, 6.4 m and 7.0 m in 1930 were found »pieces of greenish slag resulting from intense fire«.[59] In the 1913, within small area at the depths from 8.10 to 8.97 m many shallow pits and flat inclined surfaces possibly floors of horseshoe-shaped kilns with walls of unevenly fired clay were discovered.[60] These pits Vasić called »boat-like recesses« because of specific shape. All the recesses are of elongated ellipsoid shape on plan and very shallow (Fig. 3), the largest being 2.10×0.53×0.14 m. Walls of these recesses, 8 cm thick are of unevenly fired clay in a way that it is red in the central zone turning to brown in the periphery. As a rule soot and ash were found at the bottom. Besides these recesses but within same area and at the depth of 8.89 and 8.97 m 2 pits with bottom wider than opening were discovered. Smaller pit, 0.47×0.34×0.55 in size, with 5–8 cm thick red baked walls was 0.71×0.55 m at the bottom (Fig. 4). Bigger pit,0.87×0.67×0.45 m, with 4–5 cm thick baked walls was at the bottom 1.11×1.04 m. This pit had at one side near the bottom an aperture of almost rectangular shape 0.83×0.14m and the edge of it was also of red baked clay as well as the entire interior of the pit (Fig. 4). Vasić explained this pit as metallurgical kiln. Looking from modern perspective when we know about the earliest Chalcolithic metallurgical kilns at Sinai we see how Vasić was right when he explained the described pits as metallurgical structures. Thus, in Tymna, the mentioned Chalcolithic kilns had almost

[58] Journal for the year 1911, pp. 69, 148.
[59] Journal for the year 1930, pp. 151, 173, 219.
[60] Journal for the year 1913, pp. 125–148.

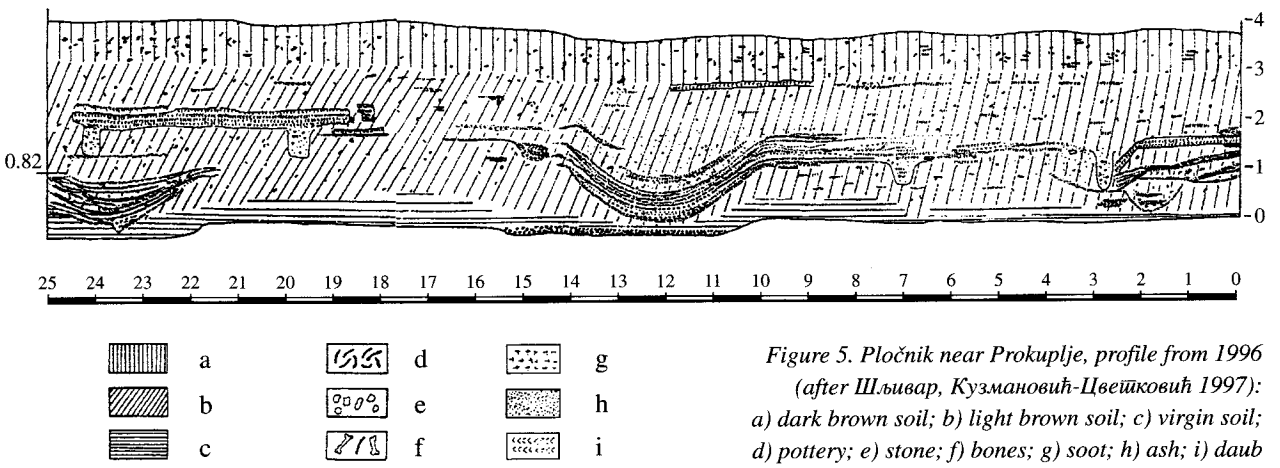

Figure 5. Pločnik near Prokuplje, profile from 1996 (after Шљивар, Кузмановић-Цвешковић 1997): a) dark brown soil; b) light brown soil; c) virgin soil; d) pottery; e) stone; f) bones; g) soot; h) ash; i) daub

identical shape as these ones in Vinča.[61] In larger pit were found fragments of »brazier«, as Vasić says, of square shape. Brazier was 10 cm deep and had 5 cm thick walls unevenly fired. We would explain this brazier as vessel for metal smelting. Because of found pieces of galena and on the basis of ethnographic analogies Vasić explained this complex of pits and recesses as smelting kilns for melting lead. According to Vasić's notes, in some of our regions before modern mining, the peasants were smelting lead in ordinary pits where they heated charcoal mixed with pieces of galena and melted lead then flowed to the pit bottom producing lead cake. It is interesting that Vasić did not envisage this possibility for copper smelting although similar technology is used for its primitive production from copper carbonate ore i.e. malachite. Reason is probably because malachite and copper slag were not found there.[62]

This type of finds was also recorded at other Vinča culture sites. Situation most similar to the one at Vinča with recesses with baked clay was recorded at Pločnik. At this site was (in the middle of south-eastern profile exposed in 1996) encountered a pit 8 m in diameter and 2 m deep with soot in successive 2–3 cm thick layers (Fig. 5). According to the opinion of investigators that looked for analogies in Antique metallurgy the appearance of the feature is the result of metallurgical activity. This pit was an integral part of larger structure, most probably the house and this is indicated by layer of rubble mixed with soot that spreads from the pit for about 9 meters. This entire find belongs to Vinča–Tordoš I horizon.[63] Similar situation was recorded at Fafos I. Pits 16 and 36 where large quantity of malachite in lumps or powder mixed with layers of burning were found as integral part of the houses behind them and according to the investigator's opinion these are residues discarded after metallurgical processing.[64] The copper mineral was also encountered in these houses so it is even more so believed that copper processing was being carried out within this complex.[65]

Situations and finds similar to these described above are well known in the world and were recorded on the sites – mining-smelting complexes – with earliest types of primitive copper metallurgy. The earliest, Chalcolithic kilns for copper smelting were recorded at Tymna (Sinai) at the site 39. Kilns, up to 50 cm in diameter are in fact holes in the ground lined with stones (Fig. 6). The ore and charcoal were mixed in them and copper melting temperature of 1083°C and higher was achieved by constant flow of air through bellows. After transformation of ore into slag furnace was closed and cooled. In this process the molten metal was not separated on the bottom but it remained enclosed within the slag in the form of smaller metal beads of

[61] Rothenberg, Tylecote, Boydell 1978: 10–11.

[62] We would like to mention here one interesting idea of M. M. Vasić. Thus, on the basis of mentioned finds of smelting pits for lead and horseshoe-shaped kiln for cinnabar Vasić in his journal for 1913 suggests that Vinča was an industrial-mining place where ore from the vicinity of Avala was processed. According to the finds he concludes that in Vinča since its foundation mining must have been very advanced and it is confirmed by sophisticated kilns for burning cinnabar. It was actually the fact that was decisive for Vasić's dating established for Vinča (Bronze Age) although he distinguished the finds from these lower layers as dating from the Neolithic! But as he thinks that mining and metallurgy in Vinča are not autochthonous but imported from the southeast hence the beginning of life in Vinča could not be earlier than the time of foundation of Troy II (journal for the year 1913, page 148). Consequently, he denies any connection of the site in Vinča with Neolithic period.

[63] Шљивар, Кузмановић-Цветковић 1997: 107.

[64] According to the description it looks more like introductory phase for ore smelting judging by analogies and from experimental investigations.

[65] Jovanović 1961: 42–43.

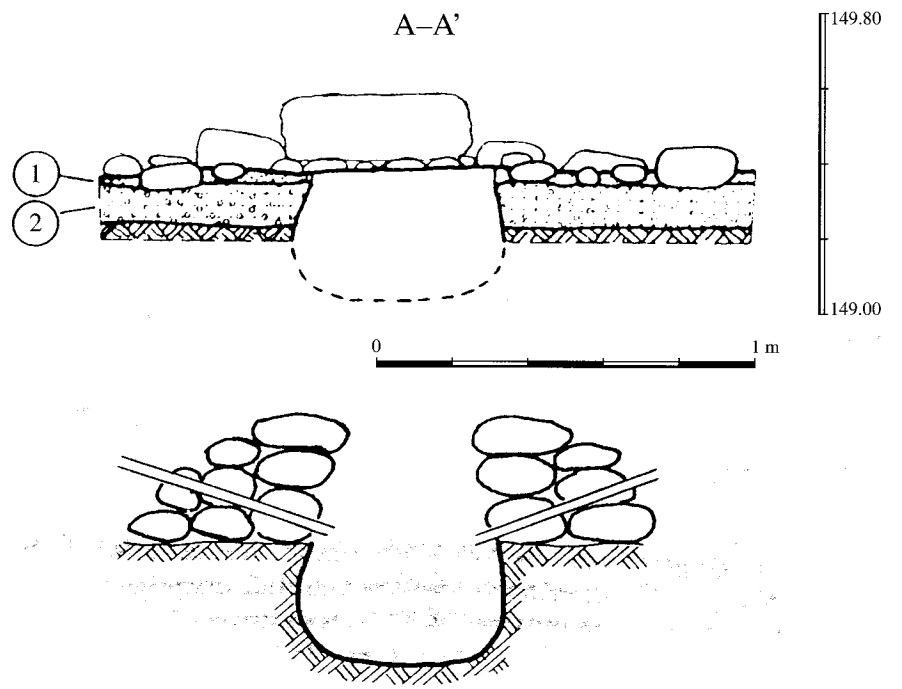

Figure 6. Chalcolithic kiln for smelting copper ore from Tymna (Sinai), site 39B. Top: section of kiln during excavations (1. working surface, 2. undisturbed sand layer). Bottom: reconstruction of kiln with bellows (after Rothenberg, Tylecote, Boydel 1978).

pure copper. Thus the next step in metal production was crushing of slag and mechanical retrieval of beads later to be melted in the melting vessels.[66] Small kilns recorded in Tymna provided good results. In them in a single turn could be obtained 0.3 kg of copper after 2 hours of thermal treating of ore in case of maximal filling of 5 kg of ingredients (ore, charcoal and flux).[67] In Spain, in Chalcolithic mining-smelting complex Chinflon are not recorded either lined kilns for ore processing or bellows so it is assumed that plain pits in the ground lined with clay were used and hide bellows. Slag collected at this site indicates that earliest, primitive technology of ore smelting was employed and as result molten metal (copper) stayed contained in slag.[68] These finds from Spain are identical with our finds from Vinča, Pločnik and Fafos where pits in the ground coated (lined) with fine clay burnt due to high temperature were recorded. Close to these entities, except in Vinča, was found large amount of malachite lumps with clear evidence of thermal treating.[69] Unambiguous find of slag with copper beads within is recorded at Selevac. There in the trenches 12 and 15 was found metallurgical slag and analyses revealed that it originated from copper ore and investigators of this site relates it with certainty to copper processing at the site.[70] In addition, the investigators linked striking concentration of malachite in houses 1–4 investigated between 1977–78 and even more striking absence of this mineral in other stratigraphic units with organised copper processing just in the distinct section of the settlement.[71] So called thermally treated malachite lumps are encountered in large amount also at Belovode[72] so we can rightfully conclude that Belovode undoubtedly represents still another place of copper processing in Vinča culture. Confirmation for such copper processing is also offered by some ethnographic data from North and South America. Same technique (ore smelting with charcoal in the pits lined with fine clay then crushing of cold slag and remelting of copper in small pottery vessels) was practised by North America Pueblo Indians and pre-Columbian population of

[66] Rothenberg, Tylecote, Boydell 1978: 28.

[67] Rothenberg, Tylecote, Boydell 1978: 49.

[68] Rothenberg, Blanco Freijeiro 1980: 52.

[69] As these finds almost had not been analysed – exception is one analysis from Fafos, which confirms that it is malachite – we can not state with certainty whether it is malachite or slag as result of ore smelting.

[70] Glumac, Tringham 1990: 553.

[71] Glumac, Tringham 1990: 557.

[72] Шљивар, Јацановић 1996: 187; Шљивар, Јацановић 1997: 124; Шљивар, Јацановић 1998: 77.

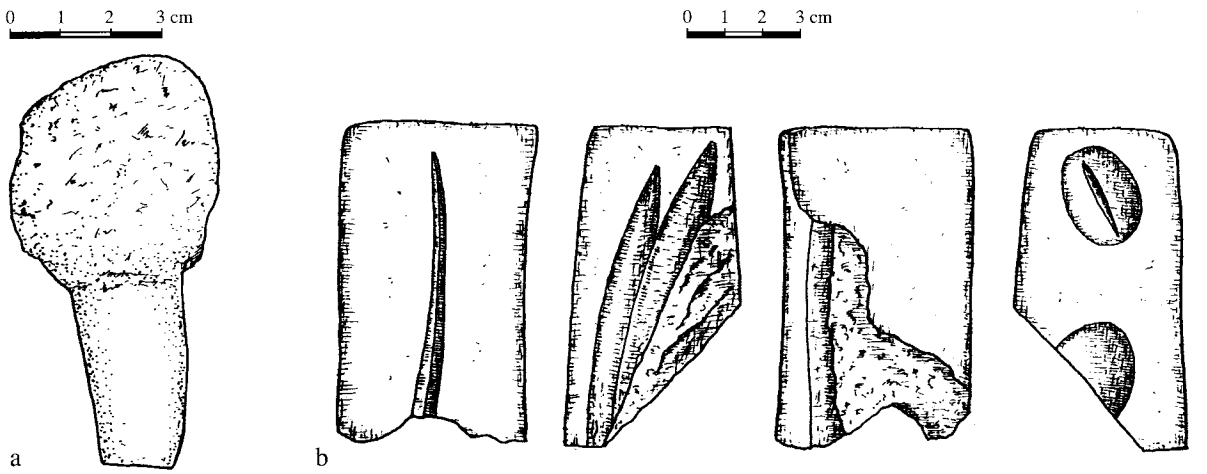

Figure 7. Molds for casting copper objects: a) Gornja Tuzla (after Čović 1961); b) Grivac (after Antonović, in preparation)

Peru.[73] Bearers of the Vinča culture were obviously competent for extractive reduction technology of processing of copper oxides where it was necessary to achieve temperature when copper separates from ore and it is 1083°C. This reduction process of copper processing could be compared with reduction baking of pottery that Vinča culture bearers used and produced already from the first occurrence of the Vinča culture in this area as this pottery should be produced at the temperature of about 1100°C.[74] Thus, there should not be any doubt that Vinča culture population was capable of achieving temperature necessary for copper smelting.

The following find from Vinča from the depth of 4.2 m could be directly related with smelting activity. It is fragmented bottom of crude vessel, which was half full of green pigment as Vasić said[75] that is with pulverised malachite as was established after much later analyses.[76] Such pulverised ore was used in the primitive technology of copper producing. Experiments carried out with ore from Tymna required ore to be crushed in granules of less than 5 mm[77] while in experiments with ore from Rudna Glava it was crushed in granules up to 100 μm.[78] This information could be linked with above-mentioned fragmented bottom of crude vessel from Vinča containing pulverised malachite and explained as the initial stage in the process of copper ore smelting.

At some sites indirect evidence of smelting activity is recorded comprising vessels and moulds for metal casting. Small vessel for metal casting is encountered so far only in the fourth Pločnik hoard.[79] Large number of miniature vessels discovered at Vinča was never related to metal smelting even though some of them by shape and fabric are quite appropriate for metallurgical purpose.[80] Moulds for casting copper artefacts (Fig. 7) are mentioned at Gornja Tuzla where a piece of mould, in fact its sprue cap, for casting of axes was found[81] and at Grivac where in the layers of Vinča–Pločnik I phase was found fragmented mould of sandstone secondary used as bone pin sharpener.[82]

In favour of early introduction of copper processing speaks the fact that bearers of Vinča culture were by all accounts well acquainted with ore deposits in their territory. This is confirmed also by good knowledge about high quality stone raw material used for production of stone tools in the Vinča culture.[83] Some of this raw material was certainly acquired in organised way possibly even by quarrying although there is not comprehensible evidence for such assertion. As the territory of Vinča culture was and remained exceptionally rich in copper ore deposits it is beyond doubt that bearers of Vinča culture got acquainted rather early with those deposits and commenced their exploitation.

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[73] Tylecote, Merkel 1984: 4; Renfrew, Bahn 1998: 328–329.
[74] Renfrew 1969: 38.
[75] Васић 1932: 35.
[76] Chapman, Tylecote 1983: 373.
[77] Rothenberg, Tylecote, Boydell 1978: 31.
[78] Tylecote 1982: 463.
[79] Сталио 1973: 157.
[80] Летица 1967.
[81] Čović 1961: 103.
[82] Antonović, in preparation.
[83] Antonović 1998: 17–41; Богосављевић-Петровић 1992: 9–12.

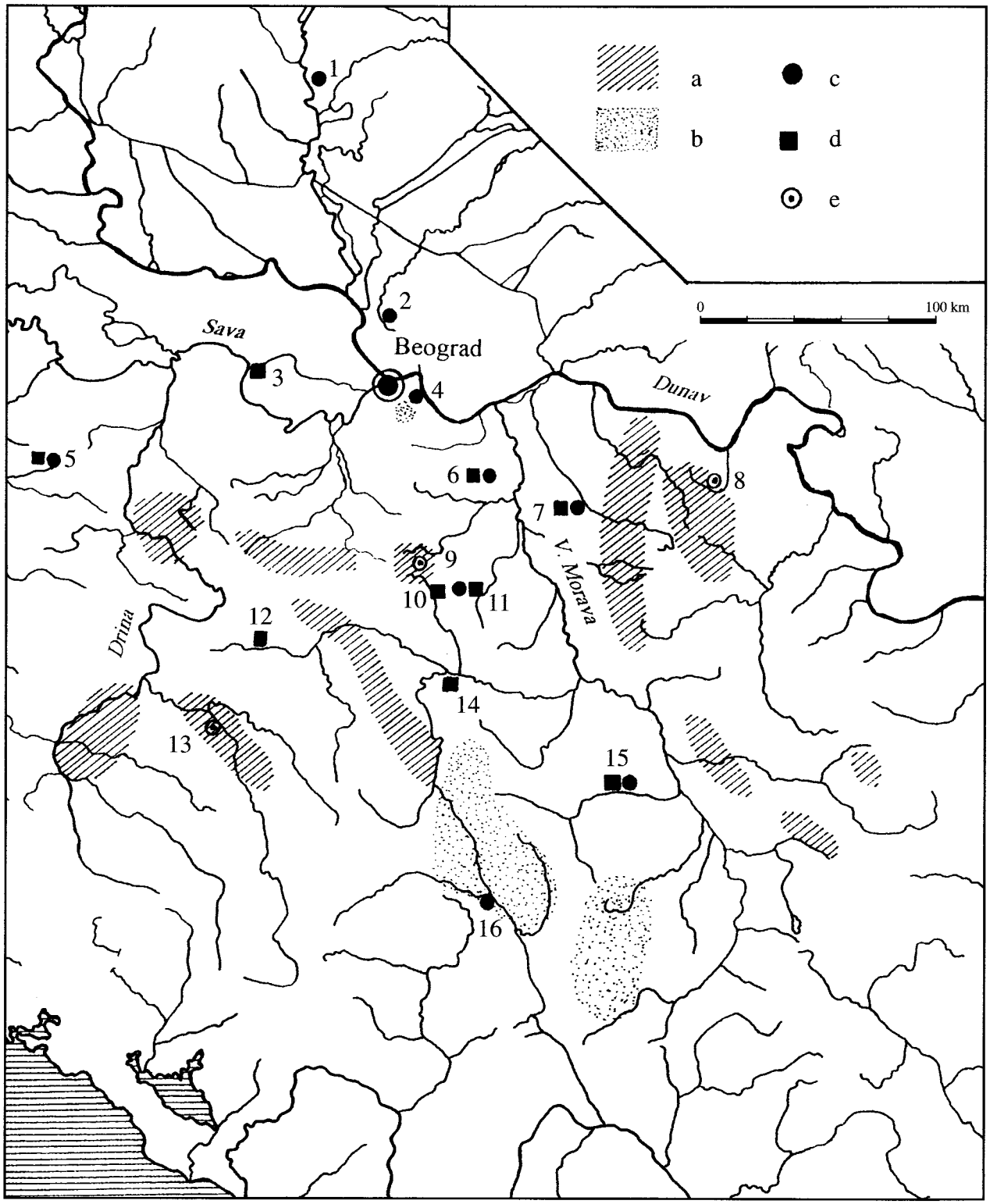

Figure 8. Finds of malachite, azurite and copper objects from Vinča and copper ore deposits within Vinča territory: a. ore deposits (after Simić 1951; Putnik 1981), b. regions where copper exploitation was possible in prehistory (after Simić 1951; Putnik 1981), c. sites where malachite and azurite are registered, d. sites where copper objects are found, e. prehistoric copper mines (after Jovanović 1982, Јовановић 1988, Davies 1937).
1. Čoka, 2. Opovo, 3. Gomolava, 4. Vinča, 5. Gornja Tuzla, 6. Selevac, 7. Belovode, 8. Rudna Glava, 9. Mali Šturac, 10. Grivac, 11. Divostin, 12. Stapari, 13. Jarmovac, 14. Ratina, 15. Pločnik, 16. Fafos.

Already mentioned malachite and azurite, basic carbonates of copper, resulting from decomposition and transformation of all copper ores and frequently present at Vinča culture sites are very widely distributed in the Central Balkans. Their occurrence in prehistory could be related to present occurrence of copper ores deposits (Fig. 8). Malachite and azurite are today almost impossible to find in the nature but it does not necessarily means that it was the case in the Neolithic. It is absolutely certain that they were much more abundant in the past but their exhaustion is undoubtedly in relation with primitive prehistoric metallurgy but also with the fact that malachite was in all epochs, like it is today, appreciated as ornamental stone. For the time being we can not say anything more concrete about origin of copper ore used for primitive metallurgy on the Vinča culture sites because of exceptionally small number of precise analyses. According to the latest and most advanced investigations of samples of malachite, ore, slag and metal objects from some of Vinča culture sites (Selevac, Pločnik, Gomolava, Rudna Glava) the only definite conclusion reached was that for the time being we can not identify the source of ore used during the earliest metallurgic period in our territory. Unfortunately, there is also missing the expected confirmation that Rudna Glava mine was the main source of copper ore in the Late Vinča period. Something that analyses called our attention to is the fact that inhabitants of Selevac, Pločnik and Gomolava seem to have been using the same source of raw material but this source was certainly not in the eastern Serbia nor at Rudnik, the ore deposits, which are so far noted as the earliest mines in our region.[84]

After everything said it is obvious that metallurgy, that is copper ore processing and producing of copper was practised in the Vinča culture from its very beginning. This statement does not seem controversial after results of excavations at Pločnik and Belovode as well as after new examination and explanation of material and journals from Vinča. Much more important question that is being raised now is when bearers of Vinča culture got acquainted with new technology and whether this knowledge of metallurgy was autochthonous or initiated by external influences. In any case this is the direction to be followed in future investigations of the Vinča culture that will shed entirely new light on the character of this exceptional Neolithic culture, which with every recently discovered site proved to be the culture we still know little about.

Translated by: Mirjana Vukmanović

[84] Samples from ore deposits at Bor, Majdanpek, Rudna Glava, Crnajka, Rudnik, Lajkovac, Čadinje and Šatorica were investigated (Pernicka et al. 1993: 16–50).

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Резиме:

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ПРЕРАДА БАКРА У ВИНЧИ:
НОВИ ПРИЛОЗИ ТЕЗИ О МЕТАЛУРШКОМ КАРАКТЕРУ ВИНЧАНСКЕ КУЛТУРЕ

Последњих година све су учесталији налази који неумитно и сигурно потврђују металуршки аспект Винчанске културе од самих њених почетака. Поред већ добро познатог открића Винчанског рудника бакра на Рудној Глави, ту су и нова открића на Беловодама и Плочнику која су упознавање са металом померила скоро до самог почетка Винчанске културе.

Теза о металуршком карактеру Винчанске културе стара је безмало цео век, а поставио је први и највећи истраживач Винче Милоје М. Васић. Он је Винчу сматрао пре свега центром за прераду живе и олова, а због погрешног датовања Винче у позно минојски период прерада бакра је за њега представљала потпуно очекивану делатност којој није посветио редове у својој монографији. Насупрот публикованим радовима Васић у својим дневницима веома уредно нотира сваки налаз малахита односно оксидираног метала, дајући тачне податке у ком су броју нађени, често наводи њихове димензије, а понекад и тачно место налаза ако су нађени на подовима кућа или у јамама (табела 1–3).

Открићем рудника бакра на Рудној Глави и након истраживања на Дивостину, Селевцу, Плочнику и Беловодама последњих година, теза да је Винча била један од металуршких центара Винчанске културе поново постаје актуелна. Међутим, сада се акценат ставља на прераду бакра. Директан повод за разматрање могућности прераде бакра у Винчи био је велики број груменова и украсних предмета од малахита прикупљених током Васићевих ископавања Винче, а који се данас чувају у Народном музеју и у Археолошкој збирци Филозофског факултета у Београду.

У материјалу преовлађују аморфни груменови малахита, али је забележен и известан број предмета од овог минерала (сл. 1: a–i). Налази подједнако потичу из старије и из млађе Винчанских слојева (табела 3). Малахит је налажен у свим слојевима Винче и како се чини на основу описа у дневницима са ископавања, изгледа да је био равномерно заступљен на свим дубинама (графикон 1–2).

Предмети од малахита до сада су нађени, осим у Винчи, још и на Селевцу, Дивостину (сл. 1: l–o), Горњој Тузли, Беловодама (сл. 1: j–k) и Чоки. Налази малахита у облику необрађених груменова су знатно бројнији. Забележени су у Винчи, Плочнику, Опову, Фафосу, Дивостину, Селевцу, Горњој Тузли, а по броју налаза предњачи свакако Беловоде, где су често налажени и термички третирани груменови, мада се не прецизира да ли су они нађени у слоју пожара или је у питању прерада руде. Украсни предмети од малахита користили су се и пре Винчанске културе на територији коју је она покривала: на Лепенском Виру у насељу III, Дивостину I и Змајевцу код Смедеревске Паланке. Ове усамљене случајеве свакако не треба доводити у везу са познавањем металургије, јер је малахит коришћен искључиво као украсни камен, али то свакако сведочи да су се носиоци Старчевачке културе већ били упознали са лежиштима бакарне руде.

Оно што свакако сведочи о познавању прераде бакра јесу налази бакарних предмета забележени на Винчанским локалитетима. Највише их је нађено у Горњој Тузли (сл. 2: c–i), ако изузмемо налазе остава из Плочника чије је датовање још увек под знаком питања. У Плочнику је, као сигурно стратификовано и датовано забележено једно масивно бакарно длето (сл. 2: b), нађено у интактном слоју са почетка градачке фазе. Након новијих истраживања у Плочнику, чини се и да се 4 оставе, раније откривене, могу определити у градачку фазу Винчанске културе, па се тако оне показују као најзначајнији налаз израђевина од бакра из Винчанске културе – из сва 4 депоа потиче укупно 45 масивних бакарних алатки. На осталим локалитетима бакар, у облику готових предмета или груменова, забележен је на Дивостину, Селевцу, Гривцу, Беловодама, Ратини код Краљева, Гомолави и Великој Градини у Сатапарима код Ужица.

Након свега намеће се питање где се вршила производња бакра од кога су били направљени предмети забележени на Винчанским локалитетима. Јасно дефинисано радионичко-топионичарско место у Винчанској култури до сада није констатовано. Међутим, тако изгледа само на први поглед. Потенцијална места прераде бакра већ су описана у неким публикованим радовима – конкретно реч је о локалитетима Плочник, Фафос, Селевац и Беловоде. Васић је такође у већ поменутим својим дневницима са ископавања Винче описао ситуације које недвосмислено упућују на топионичарску делатност у овом неолитском насељу. Тако Васић бележи како су често налажени на котама од 6,2 до 7,0 m »комади малахита у грудви са гаром« и »комади зеленкасте шљаке добијени при јакој ватри«. Током 1913. године откривено је, на једном мањем простору, на дубинама од 8,10 до 8,97 m, више плитких јама издуженог елипсоидног облика у тлоцрту (сл. 3). Зидови ових удубљења су од неравномерно запечене земље, а на њиховом дну је по правилу налажен гар и пепео. Осим ових удубљења на истом простору су, на дубинама 8,89 и 8,97 m откривене 2 јаме са ширим дном од отвора (сл. 4). Једна јама имала је при дну отвор скоро правоугаоног облика површине такође од црвено запечене земље, а коју Васић тумачи као топионичарску пећ. У Тимни су халколитске пећи имале скоро идентичан облик као ове у Винчи (сл. 6).

Оваква врста налаза забележена је и на другим Винчанским локалитетима. Најсличнија ситуација оној у Винчи, са удубљењем са запеченом земљом, забележена је на Плочнику (сл. 5), а на Фафосу I, у јамама 16 и 38, нађено је обиље малахита у облику груменова и праха, измешаног са слојевима горења. Ситуације и налази слични овим управо описаним добро су познати у свету и забележени су на локалитетима са најранијим облицима примитивне прераде

бакра – у рудно-топионичарским комплексима Тимна на Синају и Чинфлион у Шпанији, при чему су налази са овог последњег истоветни са оним из Винче, Плочника и Фафоса. Такозвани термички третирани груменови малахита забележени су у већим количинама и на Беловодама, па с правом можемо да закључимо да Беловоде сигурно представљају још једно место прераде бакра у Винчанској култури. У директну везу са топионичарском делатношћу можемо да доведемо и налаз дна грубог суда из Винче, са коте 4,2 m, до пола напуњено спрашеним малахитом. Овако спрашена руда користила се у примитивној технологији добијања бакра. Експерименти који су извођени са рудом из Тимне захтевали су руду уситњену у зрна испод 4 mm величине, док је у експерименту са рудом из Рудне Главе она била спрашена у зрна величине до 100 μm. На неким локалитетима (Плочник, Гривац, Горња Тузла) забележени су индиректни докази топионичарске активности као што су судови и калупи за ливење метала (сл. 7).

У прилог раног упознавања прераде бакра говори и чињеница да су носиоци Винчанске културе, по свему судећи били добри познаваоци рудног богатства на својој територији. О томе сведочи и одлично познавање квалитетних сировина коришћених за израду камених предмета у Винчанској култури. Како је територија коју је покривала Винчанска култура изузетно богата лежиштима бакарне руде (сл. 8), без сумње је да су се Винчанци врло рано упознали са њима и започели њихову експлоатацију. Малахит и азурит, хидрокарбонати бакра настали распадањем и трансформисањем свих бакарних руда, а који се јављају као чести налази на Винчанским локалитетима, су врло раширени на територији централног Балкана. За сада ипак не можемо да кажемо ишта конкретније о пореклу бакарне руде која је коришћена у примитивној металургији на Винчанским локалитетима због изузетно малог броја егзактних анализа. Према последњим и најсавременијим испитивањима узорака малахита, руде, шљаке и металних предмета са неких Винчанских локалитета (Селевац, Плочник, Гомолава, Рудна Глава) дошло се само до једног сигурног закључка, а то је да за сада није познат извор руде коришћене током најранијег металуршког периода на нашем простору.

Након свега изнетог евидентно је да је металургија, односно прерада бакарне руде и добијање бакра, присутна у Винчанској кутлури од самих њених почетака. Ова тврдња се, након резултата истраживања у Плочнику и на Беловодама, као и новим увидом и тумачењем материјала и дневника са Винче, не чини спорном. Много важније питање које се сада поставља је када су се носиоци Винчанске културе упознали са новом технологијом и да ли је то упознавање металургије било аутохтоно или иницирано спољним утицајима. У овом правцу у сваком случају треба усмерити будућа истраживања Винчанске културе која ће бацити сасвим ново светло на карактер ове изузетне неолитске културе која се, сваким новооткривеним локалитетом показује као култура о којој још увек мало знамо.