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## BRONZE AGE SETTLEMENT AND NECROPOLIS OF TRNJANE, NEAR BOR – REVISION AND NEW RESEARCH RESULTS

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*Abstract.* – In archaeological literature, the site of Trnjane, near Bor in eastern Serbia is known as an urn necropolis, with 43 discovered urn graves. The excavations in Trnjane took place between 1985 and 1987–1989, and continued in 1998. The investigations also included an excavation of a nearby settlement, but the results of this research were never published. In most of the previous studies, Trnjane was assigned to the Middle and Late Bronze Age, while the necropolis was often connected with the spread of the Urnfield Phenomena from Central Europe toward the Balkans. New investigations started in 2017 as cooperation between the Archaeological Institute in Belgrade and the Institute for Oriental and European Archaeology (OREA) of the Austrian Academy of Sciences shed new light on the chronology and cultural assignment of Trnjane and other similar surrounding sites in the region of eastern Serbia. The excavation of the settlement area in 2017 and 2018 yielded numerous finds indicating metallurgical activities connected with copper ore smelting (slag and ores), while pottery finds showed a typological resemblance with an Early and Middle Bronze Age repertoire. The radiocarbon dates from the settlement area and from urn graves of the neighbouring necropolis also point to a much earlier time than previously assumed. The new chronological determination of Trnjane raises a set of new questions, especially regarding the cultural connections between central Europe and the Balkans and transfers of copper ore smelting technology in the Bronze Age.

*Key words.* – Bronze Age, eastern Serbia, urn necropolis, metallurgy, copper smelting

The site of Trnjane is situated near the village of Banjsko Polje, 7 km to the west of the city of Bor. The settlement and necropolis are located on a gently east-west sloping terrace above the creek depression that leads to the Brestovačka River in the south. The terrace is flanked by several hills, with Čoka Trnjana (544 m) to the north as the highest and two closer hills to the southwest and southeast (both around 450 m), creating a setting of a natural amphitheatre with the settlement and graveyard terrace orientated toward the south.

The discovery of the site goes back to 1984, when agricultural activities brought to light a number of pieces of prehistoric pottery and copper slag, which were collected by employees of the Museum of Mining and Metallurgy in Bor. Since then, Trnjane has been the subject of several excavations and the site has become known as the first investigated Bronze Age necropolis in eastern Serbia.<sup>1</sup> The burial practice

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<sup>1</sup> Jovanović, Janković 1990.

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The paper represents a result of the OI 177020 project (Archaeology of Serbia: Cultural Identity, Integration Factors and the Role of the Mid-Balkans in the Development of European Prehistory) and the projects “Visualizing the unknown Balkans”, supported by the Innovation Fond “Research, Science and Society” of the Austrian Academy of Sciences and “New insight in Bronze Age metal producing societies”, supported by the Austrian Science Fund (FWF-Project 32096\_G25).

included the building of circular stone constructions of a diameter of between 1.5 and 4 metres with an urn placed, usually in the centre or, more rarely, on the fringe of circular grave monument. Although such constructions had hitherto not been observed among known Bronze Age groups in the central Balkans, the necropolis in Trnjane was initially assigned to the Paraćin group of the Middle and Late Bronze Age, which had a distribution along the middle Morava valley.<sup>2</sup> The main reason for the correlation with the Paraćin group was a certain typological similarity of urn vessels, characterised by four horizontal handles.<sup>3</sup> Later discoveries of necropolises with comparable stone constructions and pottery spectra in Magura<sup>4</sup>, Borsko Jezero<sup>5</sup>, Hajdučka Česma<sup>6</sup> and Kriveljski Kamen<sup>7</sup> led to an attempt to define a regional group of the Bronze Age in north-eastern Serbia labelled the Timok group of Paraćin culture according to B. Jovanović<sup>8</sup> or Gamzigrad culture according to D. Srejšović and M. Lazić.<sup>9</sup>

The uncertainty regarding the cultural assignment and an absence of absolute dates caused differences in terms of the chronological assessment of Trnjane and other similar sites in the region. In his 1996 published paper, B. Jovanović stressed the presence of pottery typical of the so-called Vatin culture of Early and Middle Bronze Age<sup>10</sup>, whose occurrence and chronology in the regions south of the Danube has been discussed in numerous studies.<sup>11</sup> In summary, most of these studies assume the “survival” or endurance of Vatin pottery elements (e. g. biconical beakers with two handles) in the central Balkans, especially along the Morava valley, until the later stages of the Middle Bronze Age.<sup>12</sup> In his detailed study on Vatin pottery, C. Ihde described this specific phenomenon as the Morava group of Vatin culture,<sup>13</sup> while A. Bulatović and J. Stankovski appealed for the renaming of the horizon marked by two-handed beakers to the Bubanj Hum IV–Ljuljaci group, in order to make a distinction from the origin area of the Vatin group, north of the Danube.<sup>14</sup>

The occurrence of Vatin or Bubanj Hum IV–Ljuljaci pottery in the necropolis of Trnjane represents, according to B. Jovanović, more evidence of the durability of Early Bronze Age pottery until the start of the Late Bronze Age. This is the reason why, in 1996, he highlighted the possibility that the start of Trnjane could be somewhat older than had been assumed (Bz C – Bz D in terms of central European chronology).<sup>15</sup> Just one year later, B. Jovanović proposed the dating of the necropolises in Trnjane, Magura and Borsko Jezero as being between the 13<sup>th</sup> and 11<sup>th</sup> century BC,

with a reference to the Late Bronze Age Brnjica group in southern Serbia.<sup>16</sup> In this paper, B. Jovanović argues that both the Brnjica and Paraćin groups are closely connected both chronologically and culturally; in fact, he describes them as “different aspects of the same cultural circle” and cites the comparable funerary rites (cremation in urns with surrounding stone construction) as his main argument. To a certain extent, this statement appears contradictory, since graves of the Paraćin culture in the Morava Valley do not have the same kind of stone construction typical for Trnjane and other sites in the Timok area.

In opposition to B. Jovanović’s interpretation, D. Srejšović and M. Lazić, who excavated the necropolis of Magura, near Gamzigrad, identified the Bronze Age sites in eastern Serbia, including Trnjane, as a distinct cultural phenomenon described as the Gamzigrad culture.<sup>17</sup> According to D. Srejšović and M. Lazić, the emergence of the Gamzigrad culture dates back to the end of the Early Bronze Age with pottery exposing the evident influence of the Vatin culture from the north and the Verbicioara culture from the east.<sup>18</sup> Therefore, both authors proposed the dating of early graves from Trnjane with two-handed beakers into the Early Bronze Age or the early stages of the Gamzigrad culture. Similar pottery with obvious Vatin elements was also recorded in the settlement of Trnjane<sup>19</sup> and in the hill-

<sup>2</sup> Jovanović, Janković 1996, 185; Jovanović 1999; Vasić 2013.

<sup>3</sup> Гарашанин 1958, 299; Garašanin 1983, 725.

<sup>4</sup> Среjšовић, Лазич 1997; Lazić 2016.

<sup>5</sup> Jovanović 1999; Капуран, Миладиновић-Радмиловић 2011.

<sup>6</sup> Среjšовић, Лазич 1997.

<sup>7</sup> Капуран, Миладиновић-Радмиловић, Јовановић 2013.

<sup>8</sup> Jovanović 1999.

<sup>9</sup> Среjšовић, Лазич 1997; Lazić 2004.

<sup>10</sup> Tasić 1977; 1984; Hänsel, Medović 1991; Falkenstein 1998.

<sup>11</sup> Гарашанин 1973; Богдановић 1986; Стојић 1986; Стојић 1992, 133; Bogdanović 1996; Falkenstein 1998; Stojić 1998; Ihde 2001; Булатовић, Станковски 2012, 337; Ljuština 2012, 153.

<sup>12</sup> See for the latest overview Булатовић, Станковски 2012, 397.

<sup>13</sup> Ihde 2001, 362; Ljuština 2012, 153.

<sup>14</sup> Булатовић, Станковски 2012, 337.

<sup>15</sup> Jovanović 1996, 196.

<sup>16</sup> Jovanović 1999, 71. See for recent overview of Brnjica culture Lazić 1996; Bulatović 2011.

<sup>17</sup> Среjšовић, Лазич 1997, 241.

<sup>18</sup> Среjšовић, Лазич 1997, 242.

<sup>19</sup> Lazić 2004, Fig. 59. The beaker comes from one of the trenches in Trnjane (excavation 1985–1987), not from Куцајна as displayed in the quoted publication.



*Fig. 1. North Eastern Serbia with the main Bronze Age settlements and necropolises*

*Сл. 1. Водећи локалитети и некрополе из бронзане доба у североисточној Србији*

top site of Banjska stena, near Gamzigradska Banja, pointing to their occupation during this time. Regarding the relationship between eastern Serbia and the Paraćin group in the Morava Valley, M. Lazić and D. Srejšović underline that only few urn types from Trnjane and Magura correlate with vessels from the burial places such as the eponymic Paraćin or Rutevac.<sup>20</sup> Hence, the typological variety of urns from Magura and Trnjane indicates an autochthonous development with a small number of elements indicative of the Paraćin culture.<sup>21</sup> Both authors also emphasised the significant differences in the burial practices, with cremation as one of the few common elements between eastern Serbia and the Morava Valley. Complex stone constructions, such as those discovered in Trnjane and Magura, do not appear in the Morava Valley, while the incised and incrustated pottery, as one of the trademarks of the Paraćin group<sup>22</sup>, is missing in eastern Serbia. Following this argumentation, in his overview of the Bor region in the Bronze Age, M. Lazić dated most of the graves from Trnjane into the Middle Bronze Age or to the period between 1600 and 1400 BC, whereas

the few graves with Vatin vessels belong, according to M. Lazić, in the final stages of the Early Bronze Age.<sup>23</sup>

It is obvious that the chronological and cultural classification of Trnjane remains disputable, despite the fact that the site was discovered more than 35 years ago. Striking differences in the dating (between 1700 and 1300 according to M. Lazić, and 1300 and 1100 BC according to B. Jovanović) clearly demonstrate the limits and uncertainty of chronological classification based on premises and typological comparisons. Moreover, long occupied settlements that could provide a stratigraphic sequence are rare in eastern Serbia, with Banjska stena being the only one that has been archeologically investigated, but unfortunately still unpublished.<sup>24</sup>

<sup>20</sup> Срејовић, Лазић 1997.

<sup>21</sup> Срејовић, Лазић 1997.

<sup>22</sup> Стојић, Пађеновић 2006, 298–299.

<sup>23</sup> Lazić 2004, 121.

<sup>24</sup> Срејовић, Лазић 1997, 229.



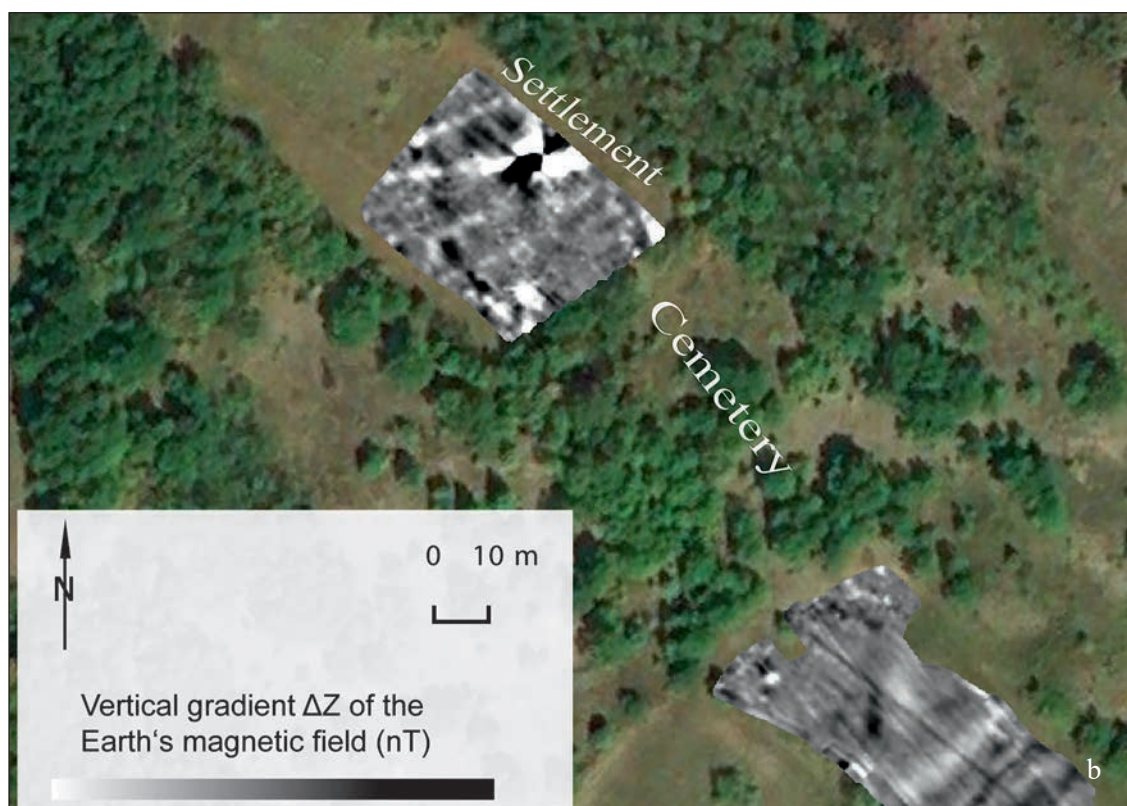
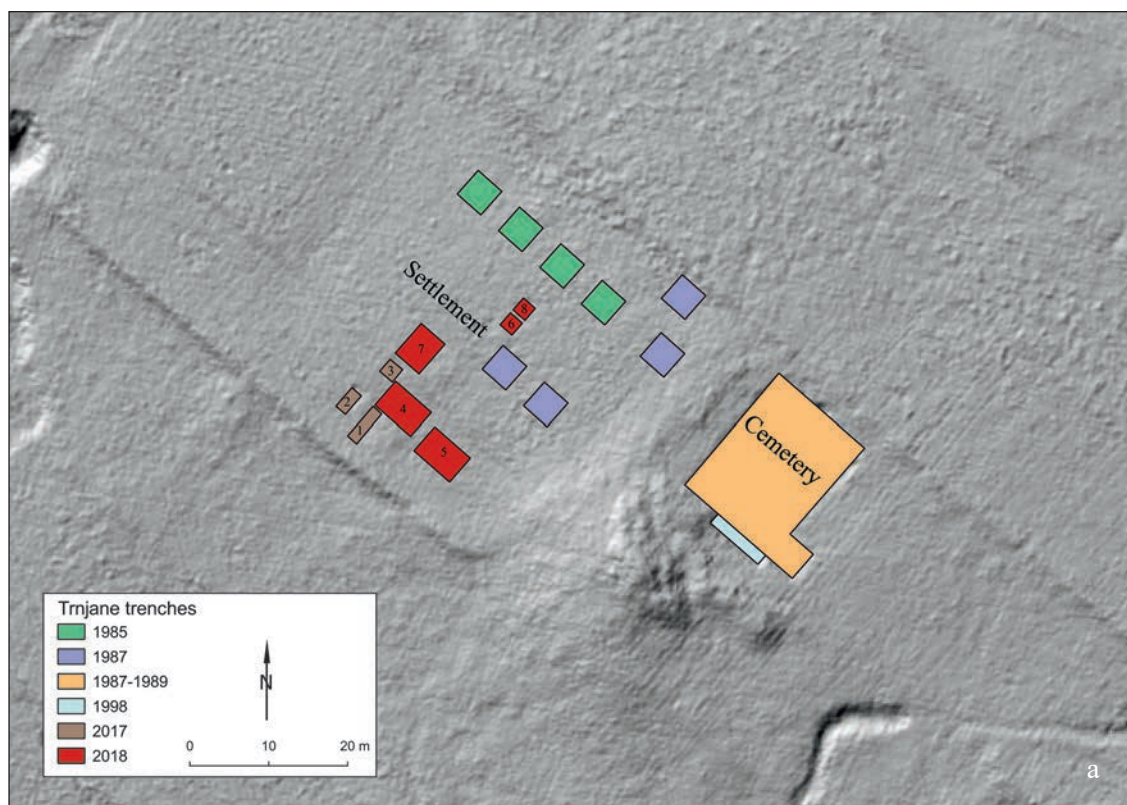


Fig. 2. a) Plane with trenches in settlement and necropolis; b) Results of geophysical prospecting  
Сл. 2. a) План са сондама на насељу и са некројолом; b) Резултати геопфизичке проспекције

Bearing in mind the deficiencies within the current state of the research, the main task of the new investigations started in 2017 is to provide new, much needed analytic data with its focus on chronology, anthropology and archaeometallurgy. Together with the achievements of previous researchers, this step aims to increase the current knowledge regarding the Bronze Age period in eastern Serbia.

### History of research

After the first results of the survey in 1984, a systematic excavation at the site Trnjane continued in 1985 within the framework of the scientific project “Exploration of the ancient mining and metallurgy on the territory of the Timok eruptive basin”, a cooperation between the Institute of Archaeology, in Belgrade and the Museum of Mining and Metallurgy, in Bor, and led by B. Jovanović and I. Janković.<sup>25</sup> The large amount of surface finds of pottery and metallurgical slag indicated the existence of a settlement involved in metallurgical activities. These assumptions were confirmed by G. A. Wagner who visited Trnjane during the survey in 1984 and estimated approximately 20,000 kg of slag over 2 ha of ploughed field along the terrace.<sup>26</sup> Some of the collected slag from Trnjane was also analysed and published by E. Pernicka and his team in 1993.<sup>27</sup>

The first excavations took place in July 1985 on the property of Čedomir Čorboloković, from the village Brestovac.<sup>28</sup> Altogether, four trenches (4 x 4 m) were opened in 1985, all positioned in a line from southeast to northwest, with 3 m between each (fig. 2a). Finds included pottery, daub, stone tools and slag. The remains of burned features came to light in trenches 1 and 3. According to the diary, the cultural horizon pointed to a single-phase settlement with no stratigraphical distinction. The investigation in Trnjane continued in 1987 with four new trenches (4 x 4 m) and the discovery of the first graves in the immediate vicinity of the settlement to the east. The recovery of the first graves moved the focus of the future investigation.<sup>29</sup> In the following two years (1988–1989), excavations included only the necropolis area, with 41 documented urn graves and circular stone constructions (fig. 4a). Finally, in 1998, M. Lazić carried out small-scale excavations and unearthed two further graves.

B. Jovanović published the first results from Trnjane in three papers, with a focus on the typology of the urns and the funerary rites, and the relationship with the neighbouring Bronze Age groups.<sup>30</sup> Unfortunately, the anthropological analyses of cremation re-

mains from the majority of the urns carried out by M. Roksandić were not included in the first reports (for results see below). In 2004, M. Lazić also discussed the finds from the necropolis in an overview of the Bronze Age in the area of the city of Bor.<sup>31</sup> The first insight into the pottery from the settlement was provided in a monograph on prehistoric sites in the area of the cities of Bor and Majdanpek, from 2014.<sup>32</sup> The results of excavations in the necropolis in Trnjane were also included in several articles on the Bronze Age in eastern Serbia, by A. Kapuran.<sup>33</sup> In 2017, A. Kapuran, N. Miladinović-Radmilović and N. Vuković also presented the results of the anthropological analyses of five graves from Trnjane missed by M. Roksandić from the late ‘90s.<sup>34</sup>

The next field activities in Trnjane started in 2017, in a joint action between the Institute of Archaeology, in Belgrade, the OREA Institute of the Austrian Academy of the Science, in Vienna, and the Museum of Mining and Metallurgy, in Bor. The first step involved a geomagnetic prospection on the accessible area of the settlement terrace and an area to the east of the necropolis in September 2017 (fig. 2b). In the same year, three trenches (T1, T2 and T3 – total area of 13 m<sup>2</sup>) were opened in the southern part of the settlement terrace. In 2018, five additional trenches (T4 – T8) were investigated with a total area of 64 m<sup>2</sup> (fig. 2). Both excavations yielded a large amount of pottery and metallurgical slag, while the remains of one object were uncovered in the southern part of Trench 7 and in the northern part of Trench 3.

<sup>25</sup> Jovanović, Janković 1990, 1; Jovanović, Janković 1996.

<sup>26</sup> Pernicka et al. 1993, pp. 38, Table 8. The assumption about 20,000 kg of slag appears to be too high judging by the results of investigations.

<sup>27</sup> Pernicka et al. 1993.

<sup>28</sup> All information about the scope of the excavations in Trnjane is provided by the documentation of the Museum of Mining and Metallurgy, in Bor. The authors wish to thank Igor Jovanović, the custodian of the archaeological collection for the opportunity to examine the documentation (diary, drawings).

<sup>29</sup> Jovanović, Janković 1990; Jovanović, Janković 1996.

<sup>30</sup> Jovanović, Janković 1990; Jovanović, Janković 1996; Jovanović 1999.

<sup>31</sup> Lazić 2004.

<sup>32</sup> Капуран, Булатовић, Јовановић 2014, 107, Т. XV–XXIX.

<sup>33</sup> Капуран 2014; 2014а; Капуран, Милadinović-Radmilović, Вuković 2017.

<sup>34</sup> Капуран, Милadinović-Radmilović, Вuković 2017, 138–139.

The investigations in 2017 and 2018 confirmed previous assumptions about the Bronze Age settlement activity on the terrace that apparently also included cooper ore smelting. However, the recorded cultural layer was relatively thin (15–25 cm) and disturbed by recent agricultural activities. A number of organic finds (animal bones and charcoal) provided an opportunity for radiocarbon dating, while more detailed metallurgical analyses enabled new insights into Bronze Age copper extraction technologies.

### Settlement

The results of the older and more recent excavations in the settlement area indicate that there is no distinct vertical stratigraphy in Trnjane, which is to be expected in the case of long-term occupation. At this point, it is difficult to estimate the extent of the settlement beyond the terrace next to the graveyard. Surface finds suggest it extends to the west and north of the investigated terrace, yet the spatial range of the settlement activities has not been assessed at this point.

Excavation diaries from previous investigations in 1985 and 1987 point to the existence of burned house floors with a significant amount of finds, including mostly coarse pottery (fragments of pots, pyramoids, and bowls), a few examples of cups and beakers, stone tools and slag.<sup>35</sup> On the floor of one of the uncovered objects, two bronze sewing needles were found. No further information or documentary data is available.

New investigations in the settlement started with geophysical prospection in October 2017. The company Eastern Atlas, from Berlin, Germany, carried out the geophysical prospection and C. Meyer and W. Hupiak wrote the subsequent report.<sup>36</sup> The results of the prospection were biased by the inhomogeneous distribution of magnetic minerals in the bedrock. The visible anomalies with high magnetic amplitudes (black features) are mostly attributed to near surface formations of magnetic bedrock (fig. 2b). The extremely high amplitude of a star-shaped pattern at the north-eastern edge of the settlement terrace was probably caused by a lightning strike.<sup>37</sup> Other, weaker anomalies are probably signaling concentrations of pottery and daub, but objects or features with clear borders have not been detected. A small zone of dipole anomalies of high amplitudes (whitish spots in the southeast) could indicate slag concentrations. Clearly visible in the geomagnetic picture is the outline of the trench (4 x 4 m) excavated in 1987.

Taking into account the results of geomagnetic prospection with no distinct features pointing to prehistoric objects and the fact that previous actions spanned over the northern part of the terrace, the excavations in 2017 and 2018 focussed on the south-eastern part of the terrace. Particularly in the area with indications of slag concentrations, the objective was to confirm or reject the existence of potential metallurgical installations or copper smelting spots.

The distribution of layers/stratigraphic units from the excavations in 2017 and 2018 revealed the following sequence:

Surface – 0.10 cm

**SU1** – Dark brown, relatively loose humus surface layer with sods and a number of finds in a secondary position. Recorded in all trenches, thickness between 10 and 15 cm.

0.15–0.25 cm

**SU2** – very hard, brownish layer of vertisol soil (high content of clay minerals) with stone inclusions from the bedrock and a number of archaeological finds in a secondary position. Also disturbed by ploughing and the vineyard, thickness between 5 and 10 cm. Recorded in all trenches.

0.25–0.40 cm

**SU4** – slightly looser and darker soil (vertisol), less destroyed by agricultural activities. No recognisable structures/features (pits, floors or post holes). Thickness 10–15 cm, laying mostly on whitish bedrock (except in T7 with SU5). In T4 there is a noticeable concentration of metallurgical slag in SU4 (fig. 6). Other finds from SU4 included pottery, stone tools and animal bones. It is to assume that parts of SU4 represent the original Bronze Age horizon, probably partly disturbed by erosion and agriculture.

0.40–0.65 cm

**SU5** – dark brown, filling in the southern part of T7, dug in into whitish bedrock in several steps. Larger concentration of burnt daub and pottery, though no coherent structure. Small amount of animal bones and slag. Clear border to bedrock in the north of the trench.

<sup>35</sup> Јовановић 2013, 4.

<sup>36</sup> Meyer, Hupiak 2018.

<sup>37</sup> Meyer, Hupiak 2018, 18.



0.35–0.65 cm

SU3 – Whitish bedrock, mixture of sand and rock.

Altogether, the cultural layer in the investigated part of the settlement terrace in Trnjane averages between 20 and 30 cm (SU2 and SU4), with one object (SU5) reaching a depth of 65 cm. Despite the obvious slag concentrations in trench 4, traces of smelting in-

stallations were not observed. Agriculture activities in the last 50 years and the position on a gentle slope (erosion) contributed to the bad preservation of the objects.

However, the repertoire of finds with fragments of storage vessels (Pl. I–II), animal bones and remains of metallurgical activity (fig. 7) clearly confirms the sedentary character of the site.



Fig. 3. Trench 7: a) western section with SU; b) plan with SU5

Сл. 3. Сонда 7: а) зајадни профил са сиврајинирафским јединицама; б) план са SJ5

### Necropolis

The necropolis in Trnjane was unearthed in four excavation campaigns. In the first three years from 1987 to 1989, 41 graves were discovered (10 graves in 1987, 19 graves in 1988, 12 graves in 1989). The smaller excavation in 1998 revealed two further graves on the southern fringe of a previous trench. In total, the investigated space of the necropolis covered an area of 280 m<sup>2</sup>. The framework and size of the burial place are not clearly defined. The eastern edge of the necropolis is marked by the immediately neighbouring settlement terrace. The results of the geophysical prospection in 2017 indicate the expansion of the graveyard to the west. The rectangular and oval shaped structures with positive magnetization on the edge of the woodland may indicate further grave constructions, which, at the same time, mark the western limit of the necropolis (fig. 2a). Still unknown is the extent of the necropolis to the south and to the north.

One of the main characteristics of the Trnjane necropolis was the cremation of the deceased with their urns placed within circular stone rings made of crushed stones and large pebbles. The outer ring of the grave constructions was made of bigger stones, while the inner space consisted of smaller stones. The size of the circular stone tombs varies between 1.5 and 4 m in diameter (fig. 4a). All graves were discovered immediately under today's surface with no traces of mound building upon them. Densely arranged stones covered and protected the urns. In grave 12, fragments of an urn with cremated remains were found on the fringe of the stone circle construction, which was, unlike the other graves, empty and without any inner filling (fig. 4a). In general, each stone tomb contained only one urn. In some cases (graves 9, 20, 31 and 32) the surrounding stone construction was lacking, although an outer ring made of large stone pebbles appeared to be partly in place (fig. 4a). Most of the constructions in Trnjane were erected next to each other without significant traces of the interruption of existing monuments. This situation would indicate a horizontal stratigraphy and chronological development of the graveyard. Nevertheless, one should also consider the possibility that the grouping of graves reflects burial places of family/clan members and not only a chronological sequence.

In his paper from 1996, B. Jovanović presented a typological distinction of urns from Trnjane, with six different types.<sup>38</sup> Variations of biconical vessels with four horizontal handles on the belly and slight differ-

ences in the shape and length of the neck section characterise types A, C and D. Type B includes biconical vessels with a cylindrical neck and a combination of two horizontal and two vertical handles placed on the belly. Urns of type E are cups with an S-shaped body, high handle and flat base. Finally, as a special type, B. Jovanović described “vessels of the Vatina type”, represented by a few distinct shapes as are a two-handed beaker, a bowl with triangular extensions on the rim and an S-shaped cup handle above the rim. The closest analogies for the urns of types A–E are found in necropolises in eastern Serbia, assigned to the Timočka group of the Paraćin culture, according to B. Jovanović, or the Gamzigrad culture according to M. Lazić, such as Magura (graves 51 and 59)<sup>39</sup>, Kriveljski Kamen,<sup>40</sup> Bor Lake<sup>41</sup> and Hajdučka Česma.<sup>42</sup> Further parallels for biconical urns from Trnjane come from the necropolises of Gloždar and Obrež and in Morava Valley, assigned to the Paraćin culture, and from site of Ostra near Čačak in western Serbia.<sup>43</sup> Regarding vessels of the Vatina type from Trnjane, according to the typological analysis of Vatina pottery by C. Ihde, they belong to types F3e (a bowl), M7c (a cup) and O6h (a beaker-kantharos) and date to the start of the Middle Bronze Age.<sup>44</sup> In terms of distribution, vessels from Trnjane represent, in all three cases, the south-eastern fringe.<sup>45</sup> According to A. Bulatović and J. Stankovski, the three vessels from Trnjane are indicative of the early stage of the Middle Bronze Age in central Balkans, characterised as the Bubanj–Hum IV–Ljuljaci group, which preceded the Paraćin group.<sup>46</sup> The same authors included a beaker from Trnjane in beakers of the Ljuljaci type that they emphasise as one of the most illustrative forms of the Bubanj–Hum IV–Ljuljaci group. Thus, from the typological point, the three vessels provide a reasonable argument for the start of the necropolis in Trnjane at the onset of the Middle Bronze Age.

<sup>38</sup> Jovanović, Janković 1996, 187–188.

<sup>39</sup> Срејовић, Лазич 1997, 228, сл. 28–29; Lazić 2016, Fig. 2.

<sup>40</sup> Капуран, Миладиновић–Радмиловић, Јовановић 2013, 146, сл. 2.

<sup>41</sup> Капуран, Булатовић, Јовановић 2014, 100–102, 212–214.

<sup>42</sup> Капуран, Булатовић, Јовановић 2014, 112–113, 216–217.

<sup>43</sup> Стојић 2000, 18–19, Т. III/1; Стојић, Пађеновић 2006, 298.

<sup>44</sup> Ihde 2001, 129, 133, 136, Maps 9, 18 and 40.

<sup>45</sup> Ihde 2001, Maps 9, 18, 40.

<sup>46</sup> Булатовић, Станковски 2012, 363.



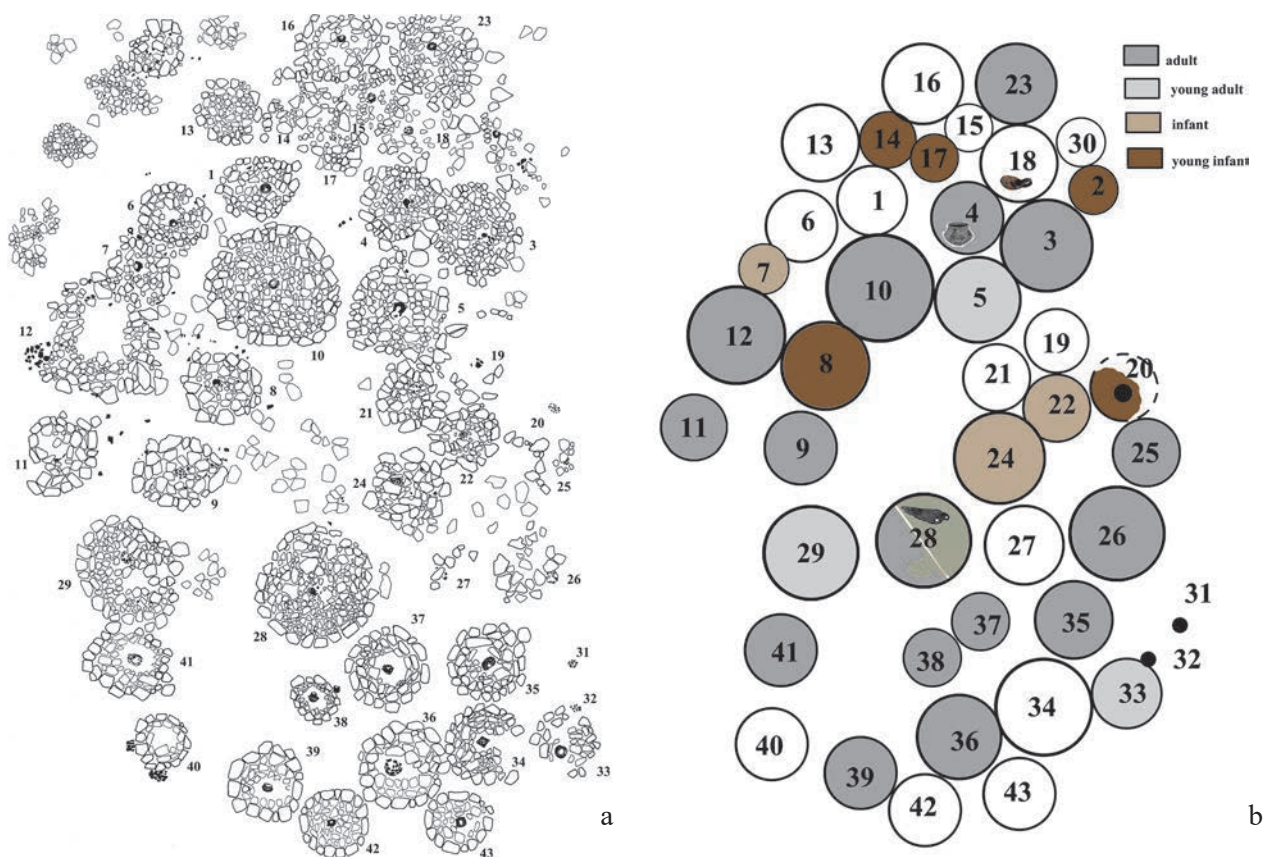


Fig. 4. Plane of the necropolis: a) with stone constructions; b) schematic plane with age groups

Сл. 4. План некрополе: а) са каменим конструијама; б) шемајски приказ са сјајарским групама покојника

Characteristic of Trnjane and all other surrounding necropolises in the Timok region of eastern Serbia is a small amount of grave goods. Within 43 discovered graves in Trnjane, only five grave offerings were found: a bronze knife from the urn of grave 28,<sup>47</sup> a fragmented bronze tin sheet and a spindle whorl found beside an urn in grave 11,<sup>48</sup> a ceramic lamp/ladle found in a charcoal layer beside the urn of grave 18 and a tong shaped stone axe found beside the urn of grave 33.<sup>49</sup> In addition, in some of the grave constructions, few pottery fragments also occurred in the layer above the graves. An example of this is grave 41, with three spindle whorls and two fragmented beakers/bowls; however, the assignment of these finds to the actual burial is questionable.<sup>50</sup> Finds of copper slag in the area of the necropolis and around the stone grave constructions were, in some of the papers by B. Jovanović<sup>51</sup> and A. Kapuran<sup>52</sup>, regarded as remains of burial activities connected with offerings and cult. Yet, after the recent investigations and surveys in the

last two years in Trnjane it is almost certain that finds of copper slag in the necropolis area are a result of the erosion process and agricultural disturbances that led to the relocation of finds from the higher parts of the settlement. Based on the few burial gifts, it would be more than premature to draw conclusions about the possible social fragmentation of the Bronze Age population in the Timok region and any presumable reflection of the social status of the deceased in the burials. At the present state of research, graves in eastern Serbia do not point strong social stratification of the Bronze Age societies in the region.

<sup>47</sup> Jovanović, Janković 1990, 9; Паровић-Пешикан 1995, 16.

<sup>48</sup> Јовановић, Николић, Јовчић 2018, 25.

<sup>49</sup> Капуран, Булатовић, Јовановић 2014, 211.

<sup>50</sup> Јовановић 2013, 24–25.

<sup>51</sup> Jovanović, Janković 1996, 195.

<sup>52</sup> Капуран, Миладиновић-Радмиловић 2011, 150.

Grave	1 person	2nd person	inside construction	outside of construction	diameter of construction	burial gifts	absolut date
1					1,5 m		
2	younger infant		•		1,5 m		
3	adult		•		2,25 m		
4	adult		•		2 m	bowl	
5	younger adult		•		2,3 m		
6	?		•		2 m		
7	infant		•		1,5 m		
8	younger infant		•		1,8 m		
9	adult		•		1,8 m		
10	adult		•		3,2 m		1981–1876 (84,7%)
11	adult		•		2 m	spindle whorls, bronze sheet	
12	adult ?		•		3 m		
13	?		•		1,5 m		
14	younger infant		•		1,5 m		
15	adult		•		1,7 m		
16	?		•		2 m		
17	younger infant		•		1,7 m		
18			•			lamp	
19			•		2 m		
20	younger infant		•		?		
21			•		1,8 m		
22	infant		•		1,75 m		
23	adult		•		1,5 m		
24	infant		•		2 m		
25	adult		•		1,2 m		
26	adult		•		1,7 m		
27			•		0,8 m		
28	adult	infant	•		2,6 m	knife	1762–1627 (95,4%)
29	younger adult		•		2 m	stone axe	
30			•				
31				•			
32				•	destroyed		
33	younger adult		•		destroyed	stone axe	
34			•		2,7 m		
35	adult		•		1,7 m		
36	adult		•		1,7 m		
37	adult		•		2,1 m		
38	adult	fetus	•		2 m	oker	
39	adult		•		2,1 m		
40			•		2,7 m		
41	adult		•		2,6 m		
42			•				
43			•				

Table 1. Graves on the Trnjane necropolis

Табела 1. Грбови на некрополи Трњане



Fig. 5. a) Grave 10; b) Grave 28

Сл. 5. a) Гроб 10; b) Гроб 28

What are of note are the different dimensions of the grave constructions and, consequently, the different amount of invested labour for the erection of the grave monuments. The anthropological analyses of cremation remains from Trnjane carried out by M. Roksandić<sup>53</sup> and N. Miladinović-Radmilović<sup>54</sup> suggest that the size of the stone grave construction and the age of the deceased are not correlated. Represented among 43 graves in Trnjane are all age groups (fig. 4b), including newborns and a pregnant female (Table 1). Only one urn (grave 28) contained the remains of two individuals, one female and an infant. Noticeable is a relatively high rate of infants and juveniles in Trnjane, which is also observed in the preliminary analyses of cremation remains from the necropolis of the same type in Hajdučka Česma, situated in the river valley, about 1.5 km southwest of Trnjane. The first two urns from Hajdučka Česma came to light in the early 1990s, during construction works.<sup>55</sup> One of them contained the remains of a juvenile and the other one the cremated remains of three individuals (a juvenile, an infant and a foetus). In the excavations in 2018, four further urn graves in Hajdučka Česma were unearthed.<sup>56</sup> Three of them belong to juvenile individuals, while the fourth grave contained the cremated remains of a younger female and a newborn child. Interestingly, the available anthropological results from other neighbouring urn necropolises revealed contrasting results, with three graves in Krivaljski Kamen<sup>57</sup> and eleven in Borsko Jezero<sup>58</sup> all assigned to adults or juvenile/adults.

Based on the last publication by B. Jovanović,<sup>59</sup> the principal investigator of previous excavations, the necropolis in Trnjane was primarily considered as a Bronze Age burial site, often connected with groups of the Urnfield culture from the southern part of the Carpathian Basin.<sup>60</sup> In contrast, M. Lazić refers to Trnjane as a site of the Gamzigrad culture and proposed an earlier date based on typological criteria.<sup>61</sup> The here presented radiocarbon dates from graves 10 and 28 point to the occupation of the cemetery in Trnjane during the Early Bronze Age and the beginning of the Middle Bronze Age, in terms of Central European chronology (fig. 9).

<sup>53</sup> The anthropological report was found in the documentation of B. Jovanović and was never published. We would like to take this opportunity to thank M. Roksandić for the possibility to present her results within this paper.

<sup>54</sup> Kapuran, Miladinović-Radmilović, Vuković 2017, 138.

<sup>55</sup> Kapuran, Miladinović-Radmilović, Vuković 2017.

<sup>56</sup> The archeological and anthropological results from Hajdučka Česma are currently in the process of publishing. Lukas Waltenberg (Institute OREA, Austrian Academy of Sciences) carried out the mentioned anthropological analyses of cremation remains from the graves discovered in 2018.

<sup>57</sup> Kapuran, Miladinović-Radmilović, Vuković 2017, 133.

<sup>58</sup> Kapuran, Miladinović-Radmilović, Vuković 2017, 137.

<sup>59</sup> Jovanović 1999.

<sup>60</sup> Капуран, Милединовић-Радмиливић, Јовановић 2013.

<sup>61</sup> Lazić 2004.



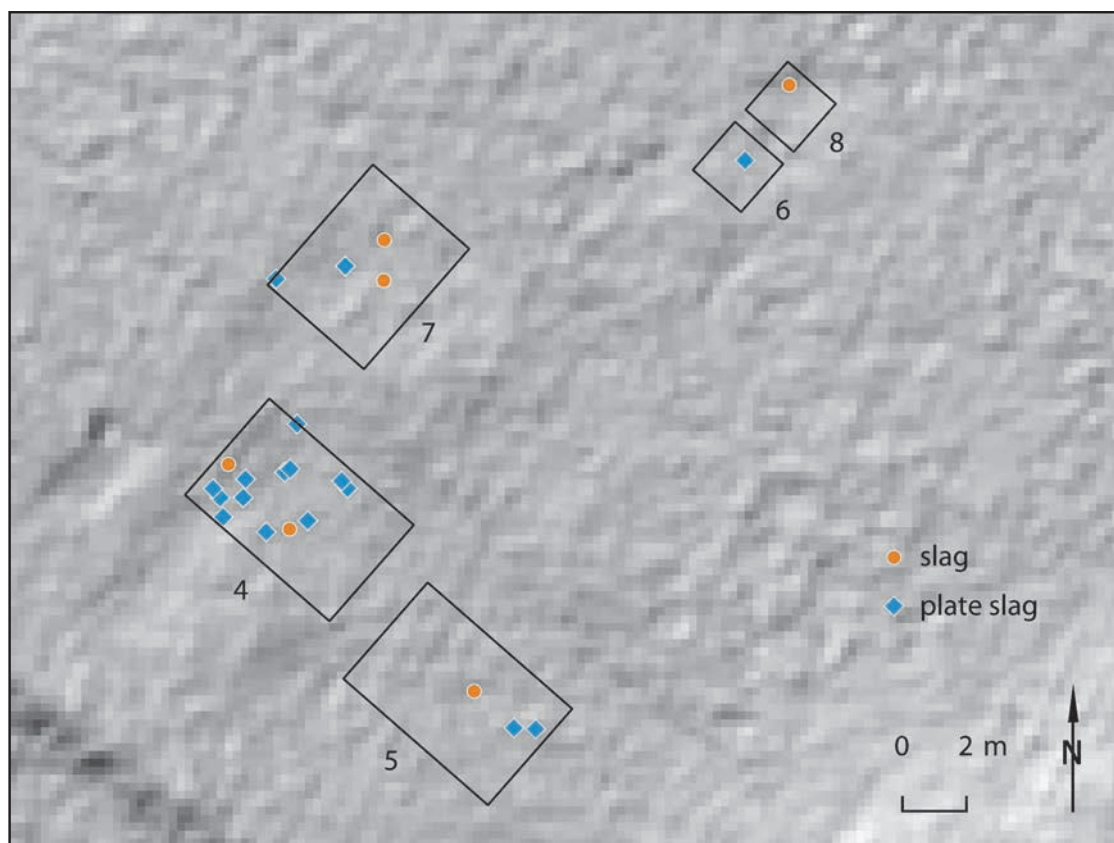


Fig. 6. Distribution of the different slag types in the trenches 4–8 from 2018

Сл. 6. Дистрибуција различитих типова шљаке у сондама 4–8 из 2018. године

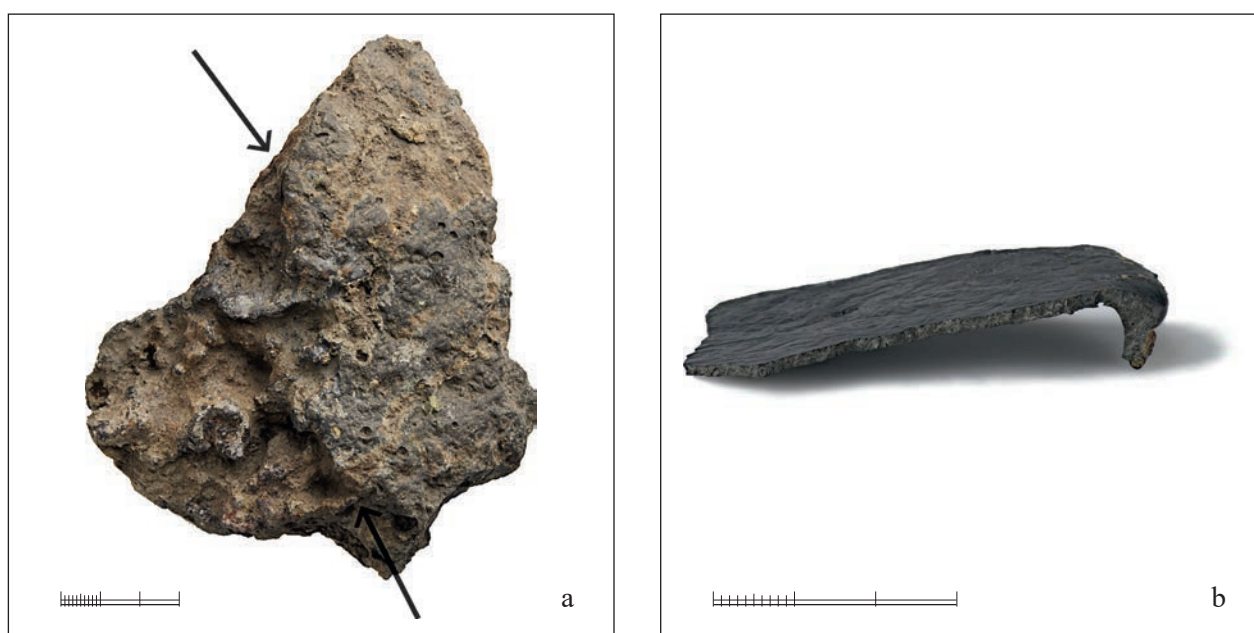


Fig. 7. Examples of massive slag with a step (arrows) at the underside (a) and plate slag (b) from Trnjane settlement

Сл. 7. Изглед шљаке у грумену (a) равна шљака (b) са локалитета Трњане

### Metallurgy

The excavations in the urn cemetery and in the settlement revealed numerous slag fragments and metallurgical remains, which allowed for a detailed reconstruction of the conducted smelting processes. This is of high importance as, to date, our knowledge regarding Bronze Age metal production in the Balkans is very limited. Besides the earlier dated metallurgical remains of the 5<sup>th</sup> and 4<sup>th</sup> millennium BC,<sup>62</sup> one can only list comparable Bronze Age sites and contexts which are located in the Alpine or the Mediterranean region, while copper producing sites for the Balkans are lacking thus far.<sup>63</sup> Therefore, the results of the ongoing research project are a significant step further toward closing this obvious research gap.

During the various campaigns in the necropolis of Trnjane, a total amount of 18.1 kg of slag was excavated.<sup>64</sup> It was distributed above or outside the urns. In the nearby settlement the excavations yielded an additional 10.3 kg of slag (fig. 6). Based on its morphological characteristics and microstructure, it can be concluded that it represents the waste product of three separate smelting steps (fig. 7) to produce copper. Group 1 (first step) consists of coarse/blocky slag with an irregular surface and shape, a blackish to dark grey colour and a thickness up to 10–12 cm. No flow features are visible, which leads to the conclusion that tapping was not performed. In the cross section, bubbles and/or charcoal are visible. Also detectable are small matte inclusions (1–5 mm) and processed remains of gangue. The highly viscous slag prevented good gravity separation of the matte, which was more or less evenly dispersed.

These characteristics separate the coarse/blocky slag from the second type of slag, which was formed in a small bowl-shaped smelting installation during the second smelting step. These finds have a circular shape, a flat upper surface and a dense microstructure with fewer bubbles than in the coarse/blocky slag. Their thickness varies between 0.5 cm and 3.5 cm. In the cross section, one can recognise larger matte inclusions (> 1 cm) and, more rarely, small copper droplets. On the lower surface, the imprint of the bottom of the furnace and a step,<sup>65</sup> which evolved during the smelting process as the slag was still hot and (semi)liquid, are visible.

The plate slag is the remains of the third smelting step (fig. 7). It, again, has a circular shape with a thickness of 1.5–3 mm, a flat upper and lower surface and the typical rim, which is bent down. Both (group 2 and

3) floated on a layer of matte or copper metal during the smelting process. The nearby situated smelting site of Ružana revealed slag of a comparable size and shape which, from a technological point of view, links the two smelting sites together.<sup>66</sup>

The chemical and mineralogical analyses of the Trnjane slag makes it possible to conclude that it represents rare evidence of early dated sulfidic copper ore smelting. The mineralogical composition of the copper ore (covellite) found in the area of the settlement corresponds very well with the copper deposits in the Bor ore district. This correlation is corroborated by the results of the lead isotope ratios of the slag and ores.<sup>67</sup> During the geological surveys in 2018, in the settlement's surrounding, no nearby mines were detected. In 2019, however, the research included an inspection of several copper deposits and mines<sup>68</sup> in the wider area around Trnjane.<sup>69</sup> At this point, it is hypothesised that the ore sources were reachable to a maximum distance of 1–2 day's walk.

### Finds/Material culture

During all undertaken campaigns in the area of the settlement at Trnjane, ceramics and metallurgical slag represented the most numerous categories. Other finds included stone tools, a small amount of animal bones and rare metal objects.

In the trenches excavated in 2018, a total of 7,320 pottery fragments were recorded, 1,048 or 13% of which belonged to diagnostic fragments. The proportion of diagnostic fragments in excavated layers shows a comparable value, with a slightly higher percentage in SU4 (fig. 8a). The diagnostic fragments included rims, handles, bases, decorated sherds and fragments of pyraunoi with typical perforations or a lower stand. In all stratigraphic units, rims represent a leading category,

<sup>62</sup> Jovanović 1980; Pernicka et al. 1993; Begemann, Schmitt-Stecker 2005; Radivojević et al. 2010.

<sup>63</sup> Jovanović 1980; Eibner 1982; Shennan 1995; Pernicka et al. 1997; Gale et al. 1997; Stöllner 2003; Cierny 2008; Pernicka, Lutz, Stöllner 2016.

<sup>64</sup> Pernicka et al. 1993, 38.

<sup>65</sup> This technological feature can also be observed on slag from Aqua Fredda cf. Herdits 2017, 187.

<sup>66</sup> Kapuran, Jovanović 2013.

<sup>67</sup> Pernicka et al. 1993, 41.

<sup>68</sup> The observed mining activities can be dated to the last 200 years.

<sup>69</sup> Jelenković et al. 2016, 145, Fig. 2.

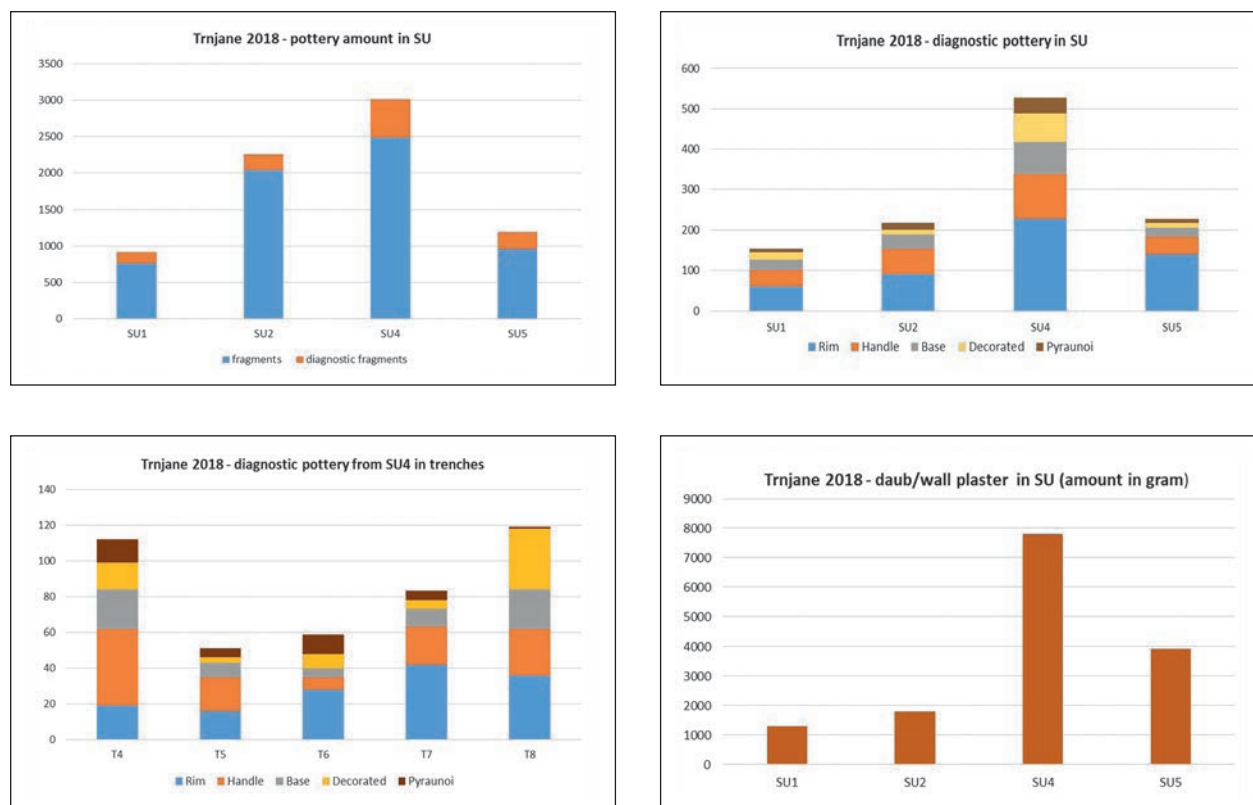


Fig. 8. Statistic evaluation of pottery finds from the excavation in 2018

Сл. 8. Статистички приказ налаза керамике са исцрживања из 2018. године

followed by handles, bases, decorated pieces and pyraouoi (fig. 8b). A minor exception is again observed in SU4, with a higher ratio of decorated sherds and pyraouoi (fig. 8b). The spatial distribution of diagnostic pottery in SU4, which occurred in all investigated trenches, indicates minor deviations (fig. 8c). Noticeable is the ratio in trench 8, with more decorated pottery and smaller number of pyraouoi fragments than in other investigated areas of the settlement (fig. 8c). The distribution of handles (cups or beakers) points to a certain concentration in trench 4, yet at this stage of the research (due to a lack of clear settlement structures), it is difficult to estimate the significance of this frequency. The fragments of wall plaster, some of them with a traces of wooden beams in negative, occurred in all layers, but a clear prevalence is observed in SU4 (fig. 8d). This is one further indication that SU4 partly represents the Bronze Age horizon. Several larger concentrations of fragmented wall plaster and pottery suggest the existence of houses, yet, due to the slope of the terrain, erosion and intensive agriculture, traces

of the objects were not recognisable. Similar accumulations of wall plaster and pottery also appeared in older excavations, especially in trenches 1 from 1985 and 9 from 1987.<sup>70</sup>

Regarding the ceramic typology, the spectrum of identified vessel forms from Trnjane includes pots, bowls, beakers, cups, pyraouoi and small lamps/ladles. Also made of ceramic are spindle whorls, found both in the settlement and in the necropolis.

### **Pots**

Pots are the most numerous pottery forms in all Bronze Age sites in north-eastern Serbia.<sup>71</sup> The limited variety of shapes and decorations makes it difficult to determine significant types with specific cultural and chronological affiliation. Important to underline for Trnjane is the stylistic and typological distinction

<sup>70</sup> Information from the diary of B. Jovanović.

<sup>71</sup> Капуран, Булатовић, Јовановић 2014.



between pots from the settlement and urns from cemetery. Most of the pot fragments from the settlement were too small for complete reconstruction. Erosion and modern activities led to the fragmentation of bigger storage vessels with just a few remaining diagnostic sherds. Furthermore, due to fragmentation, it was not easy to differentiate between pot and pyraonoi fragments, since both groups include coarse ware with thick walls and simple profiles/sections.

Within the material from Trnjane, three general pot types occur: pots with an S-profile (Pl. I/1–11), slightly curved or “bell shaped” pots (Pl. I/12–15) and pots of a semi-spherical shape (Pl. I/17–18). All types are made of clay with the addition of ground calcite stone chunks, added most probably to make the vessels more resistant to fire/heat. With very few exceptions (Pl. I/20), pots have vertical strap handles. The rims are flat or sharply profiled and slightly everted. The most common decorations are short parallel incisions on the rim (Pl. I/6, 13, 15, 17) and modelled plastic ribbons with fingerprints (Pl. I/2–4) that sometimes extend with vertical ribbons along the neck of the vessel (Pl. I/9). Decorations below the rim with plastic ribs (Pl. I/20) and channels (Pl. I/21) are, thus far, singular. The same also applies to a fragment with incised ornaments in the shape of a pine branch (Pl. I/22).

### **Bowls**

Based on results of numerous studies on Bronze Age pottery from Serbia and the surrounding regions,<sup>72</sup> the bowls discovered at the site of Trnjane consist of two major stylistic and typological groups, which are also of importance for the chronological determination and tracking of different cultural influences on the territory of north-eastern Serbia. The first group includes vessels with attributes of the pottery assigned to the Vatin culture, while the second group represents bowls that are common in the material culture of the Bronze Age groups in the central Balkans.

Bowls associated with the pottery repertoire of the Vatin culture are of a semi-spherical shape with a rim that has a cross section in the shape of the letter “T” (Pl. II/1–5) or shallow, conical bowls with the very similar rim section (Pl. II/6–12). Very often, the decoration of the rim includes triangular „wing” shape extensions. The bowls of this group usually have a ribbon shaped handle just below the rim. Generally, besides rare examples with a buckle decoration (Pl. II/3), other ornamental techniques are not observed among vessels of this group.

The second group of the bowls from Trnjane are biconical shapes with an everted rim and without decoration (Pl. II/17–20). One bowl of this group was also found in the necropolis, in grave 33, as the lid of an urn.<sup>73</sup> Other close analogies can be found in the nearby sites of Ružana 1 and 2.<sup>74</sup> Assigned to the bowls is also one wall fragment with incised ornaments typical of the Early Bronze Age Verbicioara culture in neighbouring Oltenia.<sup>75</sup>

### **Beakers**

Beakers represent a rare but, for the analogies, significant group among pottery from Trnjane. Characteristic is the biconical shape with two handles extending beyond the height of the rim. For that reason, some of the authors described them also as kantahroi.<sup>76</sup> The two main handle shapes are ansa lunata with a slight depression in the middle axis (Pl. III/1, 3) or with round section (Pl. III/2). In terms of the vessel shape, there are two groups to distinguish. The first group are beakers with a sharp biconical profile (Pl. III/1, 7–9), while beakers with a slightly curved shape (Pl. III/2, 6) represent another group. One or two triangular extensions on the rim are very common for all beakers from Trnjane (Pl. III/1–2, 4–5). Other decoration includes buckle ornaments, incised parallel lines and impressed circular ornaments (Pl. III/8–9).

With regard to cultural affiliation, beakers from Trnjane are typical representatives of the Bubanj-Hum IV Ljuljaci group or the Morava-Timok variation of the Vatin group, as described by A. Bulatović and J. Stankovski.<sup>77</sup> Both authors proposed the dating of this phenomenon to the transition between the Early and Middle Bronze Age, without explicitly naming an absolute period. The same dating is also assumed for one beaker of this type from the hilltop site of Banjska Stena, which D. Srejšević and M. Lazić claimed represented an import object from the area of Vatin culture north of the Danube.<sup>78</sup> Similar beakers also appear,

<sup>72</sup> Богдановић 1986; Стојић 1992, 133; Bogdanović 1996; Falkenstein 1998; Ihde 2001; Булатовић, Станковски 2012; Ljuština 2012.

<sup>73</sup> Jovanović, Janković 1996, Abb. 9/4.

<sup>74</sup> Kapuran, Živković, Štrbac 2016, T. 2/1–3, T. 5/4,5.

<sup>75</sup> Crăciunescu 2004.

<sup>76</sup> Ihde 2001, 136.

<sup>77</sup> Булатовић, Станковски 2012, Табела 14, 363.

<sup>78</sup> Среjšević, Лазич 1997, 237, fig. 69.

however, in a number of sites south of the Danube, including Ružana 1 and 2 next to Trnjane<sup>79</sup>, Ostra–Sokolica in western Serbia,<sup>80</sup> Bubanj and Velika Humska Čuka near Niš,<sup>81</sup> Ljuljaci<sup>82</sup> and Dobrača near Kragujevac<sup>83</sup> pointing to the fact that they are an element of domestic repertoire rather than imports.

### *Cups*

Fragments of vessels with a semi-spherical shape and one handle below the rim or at the same height as the rim are associated with cups. Due to the small number of finds, a detailed typological classification is still lacking for the Bronze Age in this region. The handles, as an important typological marker, are usually missing (Pl. IV). Assigned to this category is also a double (or binocle) vessel, discovered in the previous excavations in the settlement area in Trnjane (Pl. IV/7).

### *Pyraunoi*

Relatively common among pottery finds from Trnjane are fragments of pyraunoi (fig. 8b–c). The pyraunoi is a type of double vessel whose upper part has the function of a recipient (wide open with handles), while the lower part served for fire keeping with large or small openings on it.<sup>84</sup> In the Carpathian Basin, pyraunoi started to appear more frequently from the beginning of Middle Bronze Age, i.e. in the same period as they also occur in north-eastern Serbia.<sup>85</sup>

Among the finds from the Trnjane site two basic types of pyraunoi can be distinguished: those that have a base with perforations (sieve-like) and those that do not have a perforated base. The pyraunoi without perforations on the bottom are common for the sites assigned to the Verbicioara and Vatin cultures.<sup>86</sup> Comparable pyraunoi shapes are also known from the Early and Middle Bronze Age settlement layers of the site of Feudvar in Vojvodina.<sup>87</sup> In Feudvar, the pyraunoi were a part of house inventory and it is assumed that they had a function of a portable hearth used for heating and/or cooking. Since in Trnjane no preserved house objects have been found, the numerous finds of pyraunoi fragments were, in the interpretation of the authors of the first excavation B. Jovanović and I. Janković, associated with the process of copper ore roasting.<sup>88</sup> The main argument for this theory was the significant amount of metallurgical slag from the settlement and the first results of residual chemical analyses that confirmed the presence of metallic remains in the pyraunoi fragments.<sup>89</sup> However, the use of pyraunoi in the metallurgical process remains disputable, simply because

the possible use for ore roasting does not appear to be functionally adequate.

Regarding the typological classification of the finds from Trnjane, the forms of the upper part varies between S-shape (Pl. V/1, 4–6) and cylindrical (Pl. V/1–9)<sup>90</sup>, while the lower half with the perforation, which served as a flame keeper, differs only by the presence or absence of edge decoration (strips with fingerprints or ornaments impressed with an instrument). In the nearby site of Ružana, some of the pyraunoi also had buckle decoration in the middle part of the upper vessel.<sup>91</sup> A massive vertical ribbon handle below the rim also appears on some of the better-preserved pieces. Well recognisable on the surface of the pyraunoi from Trnjane is a high content of quartzite in the clay as well as traces of long-term exposure to an open fire that eventually led to fragmentation and damage.

The relatively large number of pyraunoi findings from the Bronze Age sites in north-eastern Serbia indicates their massive production, but their usage has still not been clarified. It is hoped that future investigations in the area will contribute toward a better explanation for the frequent occurrence of pyraunoi in sites like Trnjane, Ružana or Čoka Njica.<sup>92</sup>

### *Lamps/ladles*

Currently, this group includes only three finds, one was found in grave 18 in the necropolis, while the other two originate from the excavation in the settlement area in 2018. The reason for determining their

<sup>79</sup> Kapuran, Živković, Štrbac 2016, T. 2/6, T. 5/6–7.

<sup>80</sup> Стојић 2000, Сл. 1.

<sup>81</sup> Булатовић, Станковски 2012, Т. XI.

<sup>82</sup> Tasić 1986, 60, Taf. XII/1,3.

<sup>83</sup> Гарашанин, Гарашанин 1958, У17а, 5.

<sup>84</sup> Crăciunescu 2004, Pl. LXI/1.

<sup>85</sup> Jovanović, Janković 1990, 1; Fishel, Kiss, Kulcsár 2001, 127, Abb. 3.

<sup>86</sup> Fishel, Kiss, Kulcsár 2001, 127.

<sup>87</sup> Ihde 2001, 177, Abb. 99/U1d; Falkenstein, Hänsel, Medović 2016, 143.

<sup>88</sup> Jovanović, Janković 1990, 1.

<sup>89</sup> Janković, Bugarski, Janjić 1987–1990, 13. The Institute for Mining and Metallurgy, in Bor conducted the analyses.

<sup>90</sup> Ihde 2001, 177, Abb. 99/U1d.

<sup>91</sup> Kapuran, Živković, Štrbac 2016, Т. 4/3.

<sup>92</sup> The first excavations in the settlement of Čoka Njica in 2019, situated about 3 km to the east of Trnjane also yielded a number of pyraunoi finds. The results of the first campaign in Čoka Njica are currently being processed.

function as a lamp rather than a cup or ladle is the fact that the volume of the recipient is too small, and the massive handle probably served to balance the horizontal position. Furthermore, half of the recipient's interior is burnt more than the other one. Comparable lamps are also known from nearby contemporary necropolises in Borsko jezero<sup>93</sup> and Hajdučka Česma.<sup>94</sup>

#### *Other finds*

Included in ceramic findings are also one spoon (Pl. VI/6) and spindle whorls (Pl. VI/1–5, 7). It is interesting to highlight that the ceramic spoon has a hollow handle and recipient. The function of the spoon with the drilling between the recipient and handle is not quite clear. Spindle whorls occur in conical (Pl. VII/1–4) and discoid (Pl. VII/7–8) shapes. The cross section of the latter is either flat (Pl. VII/7) or almond shaped (Pl. VII/8). Among other ceramic objects is one piece of a conical shape with a hollow, but not drilled, middle part (Pl. VII/5). This kind of tool could have been applied in a drilling process with the function to protect the palm of the hand.

#### *Stone finds*

The stone finds from Trnjane include three parts of artefacts: stone axe, core remains from stone axe drilling process, and grinding tools. The tong shaped axe found within the stone constructions of grave 33 (Pl. VII/2) shows the typological characteristics of Neolithic axes from the central Balkans.<sup>95</sup> This object stands out in the context of the Bronze Age burial customs in north-eastern Serbia and is, thus far, a unique find. Found in the area of the necropolis, but not assignable to any of the burials, was an axe fragment with a curved body (Pl. VII/3). The hammer-axe from the settlement layers has a round, hollow middle part and one sharp edge (Pl. VII/1). The stone core remains from the excavations in 2018 demonstrate the production of stone axes in the settlement (Pl. VII/4–5). The purpose of grinding stones is still unknown (Pl. VII/6–8).<sup>96</sup> Grain remains (burned) have, thus far not been recovered from the settlement layers. The stones could also have been used for the grinding of temper for pottery.

#### *Metal finds*

Despite the fact that the Trnjane site was obviously involved in copper production, so far only four metal artefacts have been uncovered in all the excavations. The absence of copper based objects is typical also for other Bronze Age sites in the area with remains

clearly indicating metallurgical or, rather, smelting activities.<sup>97</sup> This phenomenon is even more curious, considering that Bronze Age graves from the neighbouring regions usually do not lack metal finds.<sup>98</sup>

In the Trnjane necropolis two bronze finds were discovered. The first one is a small, slightly curved knife with two rivet holes, found in the urn of grave 28 (Pl. VI/12). The handle of the knife is also curved and very short. According to M. Parović-Pešikan, the knife from Trnjane has certain typological similarities with Early and Middle Bronze Age finds from Troy, Epirus and the Aegean islands.<sup>99</sup> Within the typological classification of Early and Middle Bronze Age knives from western and central Balkan presented by B. Hänsel and B. Teržan, the find from Trnjane was assigned to type IIb, which appears at the beginning of the Middle Bronze Age.<sup>100</sup> In this paper, the Aegean background of the knives from the Balkans is also assumed with references to studies by N. Sandars and K. Branigan.<sup>101</sup> Comparable, to a certain extent, with the knife from Trnjane, are finds from Radonice and Pšov in Bohemia.<sup>102</sup> Distant analogies have also been observed in later periods, e.g. in the Early Iron Age Villanova culture, in northern Italy.<sup>103</sup> Due to the remote position of the Trnjane site in relation to possible provenance regions, the question of the origin for the knife from grave 28 remains open.

The second bronze find from the Trnjane necropolis was discovered within the stone constructions around grave 1. It is part of a fragmented bronze sheet<sup>104</sup> that maybe represents a fragment of another knife (Pl. VI/13). However, the bronze fragment is covered with a thick corrosion layer that cannot be removed without seriously damaging the object, which makes it difficult to determine the original shape.

<sup>93</sup> Капуран, Булатовић, Јовановић 2014, 214, Fig. 96/F.

<sup>94</sup> In the excavations from 2019 in Hajdučka Česma, several lamps were found both in the urns as well as directly beside urns.

<sup>95</sup> Antonović 2003, 53, fig. 31.

<sup>96</sup> Antonović 2003, 61.

<sup>97</sup> Капуран, Булатовић, Јовановић 2014, 31.

<sup>98</sup> Булатовић, Станковски 2012, 255–256; Dmitrović 2016; 161; Булатовић, Филиповић, Глигорић 2017, 53.

<sup>99</sup> Паровић-Пешикан 1995, 16.

<sup>100</sup> Hänsel, Teržan 2000, 180–181.

<sup>101</sup> Hänsel, Teržan 2000, 172, Type 6 after Sandars (1955, 183) or Types II or V after Branigan (1974, 27).

<sup>102</sup> Jirán 2002, 64, Taf. 21/229, 230.

<sup>103</sup> Bianco-Peroni 1976, 83, Taf. 47/433, 95, Taf. 59/553.

<sup>104</sup> Јовановић, Николић, Јовчић 2018, 25.



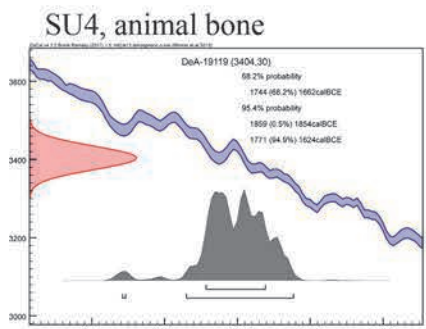
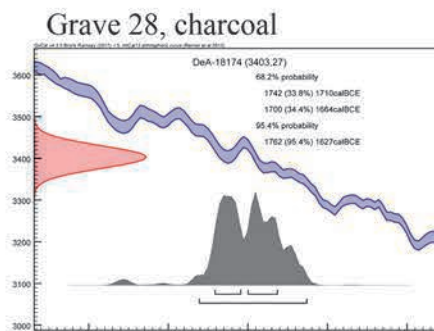
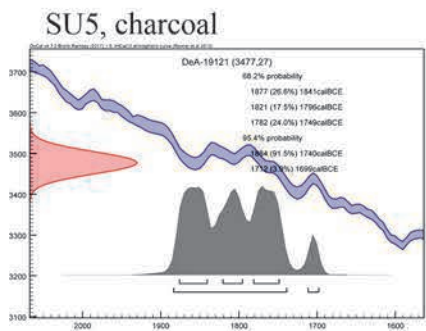
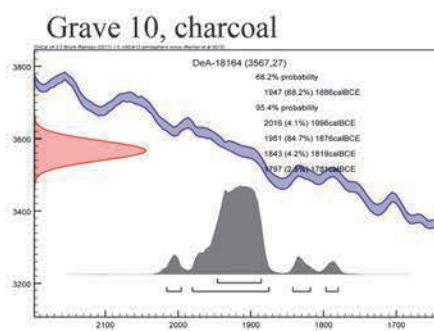
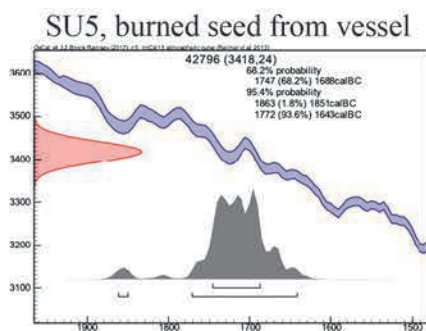
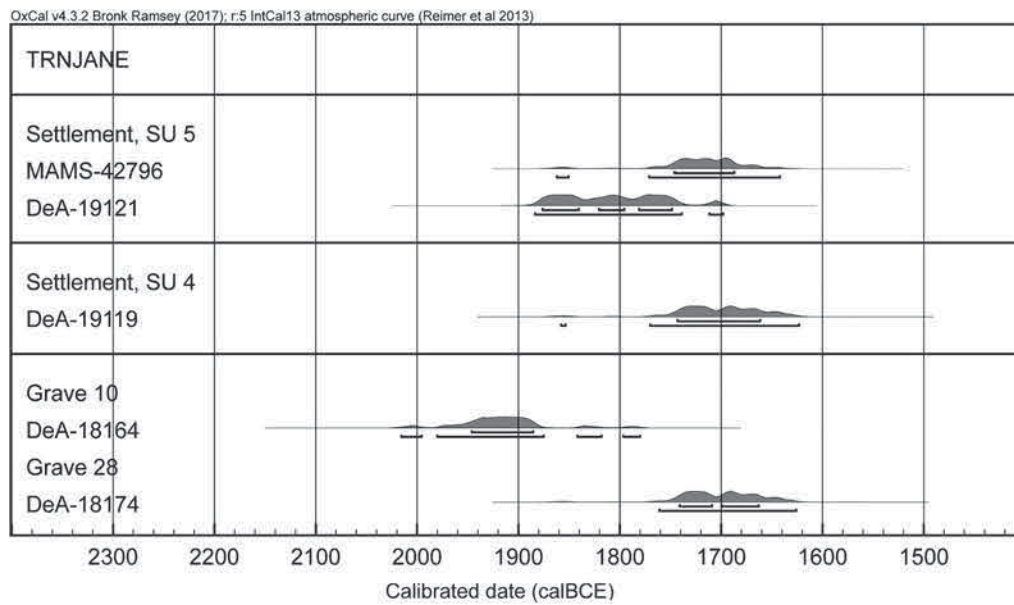


Fig. 9. Radiocarbon dates from the Trnjane settlement and necropolis

Сл. 9. Радиокарбон датуми из насеља и са некрополе Трњане

Two sewing needles from the settlement area complete the spectrum of bronze artefacts from Trnjane. One of them was destroyed during physical-chemical analyses in the Institute for Mining and Metallurgy, in Bor.<sup>105</sup> The second one is preserved and provides evidence of cloth making in the Bronze Age settlement. In his excavation diary, B. Jovanović highlighted that the sewing needle was found on a small part of the preserved house floor, together with one Vatin type beaker, one huge grinding stone and a concentration of pottery. In his studies on Bronze Age pins from the central Balkans, R. Vasić associated the needle from Trnjane to his “Gruppe I der Nähnadel, characterised by the oval shaped head.”<sup>106</sup>

### Chronology

The limited number of characteristic and chronologically significant metal objects led to different chronological assessments of the finds from Trnjane in previous studies. The dating of Trnjane into the Late Bronze Age or a time between the 13<sup>th</sup> and 11<sup>th</sup> century BC by the principal investigator of the first excavations, B. Jovanović, relied on the alleged connections with the Paraćin culture in the middle Morava Valley and on the fact that necropolises with urn graves are indicative of the Urnfield Period or the Late Bronze Age in Central Europe.<sup>107</sup> The relationship between the Paraćin culture and the Urnfield period has drawn attention ever since the discovery of cremation cemeteries in the Morava Valley.<sup>108</sup> The chronological precedence of the Paraćin culture in relation to the start of the Urnfield period in Central Europe served, in most of the papers, as an argument to disclaim the penetration of the Urnfield culture, indicating migration from the north to the central Balkans.<sup>109</sup> In this context, it is important to underline that until now the absolute dates for sites of the Paraćin culture in the Morava Valley are also lacking. Thus, the chronological classification of the Paraćin culture itself remains uncertain, although most authors adhere to its division into two phases, as proposed by M. Garašanin<sup>110</sup>. According to this author, the older phase with less ornamented pottery corresponds with the end of the Middle Bronze Age (Bz C), while the appearance of channelled pottery characterises a Late Bronze Age phase (Bz D).

Contrary to B. Jovanović, the investigators of the necropolis of Magura, near Zaječar, D. Sreјović and M. Lazić, argued for a much older dating of urn necropolises and their associated settlements in north-eastern Serbia.<sup>111</sup> Based on a typological comparison, they

pointed out the resemblance with Early and Middle Bronze Age material from surrounding regions and dated Magura and Trnjane between 1700 and 1300 BC, assuming the long lasting use and occupation of the cemeteries.<sup>112</sup> Particularly important in this argumentation is the chronological assessment of the Vatin culture in Vojvodina and the central Balkans, since many of the ceramic vessels from both Magura and Trnjane have their best analogies among material attributed to this culture. The absolute dates for the Vatin culture are available from several sites along the Danube and Morava, including some of the key settlements with a stratigraphical sequence, like Ljuljaci in central Serbia or Feudvar in Vojvodina.<sup>113</sup> As pointed out by several studies dealing with this absolute and relative chronology of the Vatin culture, the time span of this manifestation is between 2000 and 1500 BC, with most dates concentrating between 1900 and 1600 BC.<sup>114</sup> This would correspond with the dates that Sreјović and Lazić anticipated for the start of the cemeteries in Trnjane and Magura (ca. 1700 BC), yet the arguments for the estimated end of the necropolises around 1300 BC remains somewhat unclear.

The radiocarbon dates obtained in the new investigations in Trnjane provide the first absolute dates for Bronze Age cemeteries in north-eastern Serbia. The samples from the settlement and from urn graves set out a period between 1900 and 1600 BC as the most probable dating (Fig. 9). Two animal bones from SU4 and SU5 in Trench 7 and two bigger charcoal pieces found in the urns of graves 28 and 10<sup>115</sup> were sampled and eventually analysed in the Istoptech Lab in Debrecen. Additionally, one burned seed found in the wall of a characteristic bowl (Pl. II/9) was extracted and dated in the Curt-Engelhorn Centre, in Mannheim. This is a particularly important date since seeds

<sup>105</sup> Капуран, Булатовић, Јовановић 2014, 208.

<sup>106</sup> Vasić 2003, 130.

<sup>107</sup> Jovanović 1999.

<sup>108</sup> Гарашанин 1958, 299.

<sup>109</sup> Гарашанин 1958, 308.

<sup>110</sup> Garašanin 1983.

<sup>111</sup> Срејовић, Лазић 1997.

<sup>112</sup> Срејовић, Лазић 1997; Lazić 2004; Lazić 2016.

<sup>113</sup> Богдановић 1986; Görsdorf 1992; Hänsel, Medović 1992.

<sup>114</sup> Forenbaher 1993; Gogältan 1999; Gogältan 2004; Ljuština 2012.

<sup>115</sup> Cremation remains from the urns were not available for radiocarbon dating.

generally represent a short life, a more reliable sample. The fact that the seed was found within the wall of a characteristic pottery type associated with the so-called Vatin pottery (bowls with a triangular, wing shaped extension on the rim, see. Pl. II/1–9) underlines the importance of this sample and provides an undisputed chronological anchor.

Regarding the sampled charcoal pieces from the urn contents, it is assumed that they originate from a pyre. With the possibility that the charcoal sample results are biased by the old wood effect, the dates from the necropolis should be accepted with caution. The overlapping of the dates signifies, however, that the deviation between the animal bones, charcoal and burned seed, if any, is not substantial. The animal bone from SU4 (Lab. Nr: DeA 19119), burned seed from the bowl (Lab. Nr: MAMS 42796) and charcoal from grave 28 (Lab Nr: DeA 18174) are almost completely matching and, therefore, give a strong indication of contemporary settlement occupation and burial activities in the second half of the 18<sup>th</sup> and early 17<sup>th</sup> centuries BC (fig. 9). Consequently, the same dating is assumed for the bronze knife, found in the urn of grave 28 together with cremated bones and remains of the pyre. The charcoal sample from grave 10 (Lab. Nr. DeA 18164) provided an absolute date between 1950 and 1900 BC. If this result is not significantly affected by the old wood effect, grave 10 could represent an older phase of the burial ground that was used for at least 200 years (the difference between grave 10 and grave 28). The stratigraphical position of the relatively large stone construction of grave 10 with the cremated remains of an adult individual supports the assumption about a possible earlier date (Fig. 4a). Situated in the central part and not disturbed by other constructions, grave 10 may be interpreted as one of the first and, thus, one of the oldest graves in this part of the necropolis, with subsequent, younger burial monuments built around. The partial tangency of the date from grave 10 and the bone sample from SU5 (Lab Nr. De A 10121) in the settlement area is another hint that activities at the Trnjane site took place already in the late 20<sup>th</sup> and early 19<sup>th</sup> centuries BC.

The results of the typo-chronological analyses of the archaeological material and particularly the radiocarbon dates from the settlement and necropolis clearly refute any assertion regarding a Late Bronze Age date for Trnjane and the alleged connection with the Urnfield period, as presumed by B. Jovanović. Even the proposed older date of Trnjane by D. Srejšević and

M. Lazić appears to be too young, since the available radiocarbon dates do not indicate any kind of activity at the site after 1600 BC. This hypothesis needs to be verified by further dates from settlements and necropolises from other sites in the surrounding area, which are also currently being processed by radiocarbon dating (Hajdučka Česma,<sup>116</sup> Magura and Ružana).

### Summary

The significantly older than previously assumed dating of Trnjane prompts a re-evaluation of the perception of Bronze Age sites in north-eastern Serbia and their relationship with the neighbouring regions. The congruence between the dates from Trnjane and available dates for the Vatin culture clearly suggests a level of contemporaneity. The assignment of Trnjane and other similar necropolises in north-eastern Serbia to an autochthonous phenomena defined as the Gamzi-grad culture<sup>117</sup> is partly justifiable in terms of the specific burial custom (urns and circular stone constructions), but the current amount of presented material appears insufficient for a substantial regional assessment. Our current knowledge regarding the level of organisation and mutual relationship between single Bronze Age communities and their burial grounds in north-eastern Serbia is too fragmented and far from providing the complete picture about the inner dynamics and development of this particular society.

Considering the alleged association between the Trnjane site and the Paraćin culture, the new dates largely contradict this connection, assuming that the dating of the Paraćin sites in the Morava Valley between 1500 and 1200 BC is accurate. The youngest dates from Trnjane and from neighbouring sites of Ružana<sup>118</sup> and Hajdučka Česma all do not exceed the end of the period of the late 17<sup>th</sup> century BC. Consequently, there are two possibilities. Either there was no interaction between the Paraćin culture and north-eastern Serbia, because of chronological disparity, which is, however, hard to accept due to the resemblance of certain specific pottery elements, or the chronological position of the Paraćin group needs to be thoroughly revisited. Furthermore, the present

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<sup>116</sup> The first radiocarbon dates from the urn graves in Hajdučka Česma suggest a comparable time between the late 20<sup>th</sup> and early 18<sup>th</sup> centuries BC.

<sup>117</sup> Lazić 2004.

<sup>118</sup> Bulatović, Gavranović, Kapuran 2020.



chronology of Bronze Age groups in the central Balkans during the second millennium (Belegiš I, Paraćin and Brnjica)<sup>119</sup> seems disputable; at least when it comes to the presumed simultaneity of the named phenomena, all characterised by an exclusive cremation rite but with distinct differences in the form of the grave construction and urn shapes/decorations.

The new results from Trnjane and upcoming data from Hajdučka Česma and Čoka Njica have confirmed the existence of contemporary settlements, involved in copper smelting, and associated cemeteries with urn graves and circular stone monuments from the period between the late 20<sup>th</sup> and late 17<sup>th</sup> centuries BC. As pointed out already by D. Garašanin in 1958, it seems apparent that the exclusive cremation and arrangement of burial grounds as urn cemeteries were, among certain societies in the central Balkans, established long before the start of the Urnfield period in Central Europe. As new dates from the Trnjane and Hajdučka Česma suggest, the prevalence of burial rites and communal urn cemeteries for all age groups and with no significant stratification, started in north-eastern Serbia during the final stage of the Early Bronze Age, i.e. centuries before what has, thus far, been estimated. In the context of the new absolute dates, it is important to note the necropolis of Ranutovac, near Vranje, in southern Serbia, with comparable stone circular constructions, but with scattered cremation remains covered with sets of smaller vessels.<sup>120</sup> Both the radiocarbon results and the pottery spectrum from Ranutovac indicate the Early Bronze Age or the period between 2100 and 1800 BC as the most probable period of use.<sup>121</sup> Further analogies in the form of similar grave architec-

ture, cemetery organisation and exclusive cremations are known even further to the south, in the Early Bronze Age site of Kriartision on the Halkidiki Peninsula.<sup>122</sup> With the new dates from Trnjane and Hajdučka Česma, the cremation cemetery in Ranutovac<sup>123</sup> appears not to be so isolated among finds from the central Balkans. The modified burials custom with the deposition of cremation remains in urns instead of scattering like in Ranutovac, seems to have been established in north-eastern Serbia in the 19<sup>th</sup> century BC.

The new absolute dates from Trnjane are not less important in the contexts of the attested smelting activities of sulfidic copper ores in the settlement layer. The dating between the 18<sup>th</sup> and early 17<sup>th</sup> centuries BC corresponds with the beginning of more intensive metallurgical activities in the Alpine region from the 18<sup>th</sup> century BC onwards.<sup>124</sup> Earlier metallurgical activities in connection with copper smelting and the production of raw material for bronze alloy have been observed only in a few sites, such as Milland, in Italy.<sup>125</sup> Therefore, the planned research in the coming years will also focus on a detailed archaeometallurgical examination of the slag and metallurgical remains found in Trnjane and in the neighbouring sites of Ružana and Čoka Njica. These results will be considered in relation to existing and forthcoming analytic dates of artefacts and ingots from the wider area of the central and western Balkans, with the aim to reveal the exchange and distribution of the produced copper metal.

Together, the new results will help to elucidate the role of Bronze Age communities from north-eastern Serbia in the overall communication networks during the first half of the second millennia BC.

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<sup>119</sup> Vasić 2013, 175.

<sup>120</sup> Bulatović, Bizjak, Vitezović 2016, 75–76.

<sup>121</sup> Bulatović, Gori, Vander Linden 2020.

<sup>122</sup> Asouhidou 2011, 383.

<sup>123</sup> Bulatović 2014, 66.

<sup>124</sup> Pernicka, Lutz, Stöllner 2016, 2.

<sup>125</sup> Artioli et al. 2015.

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## НАСЕЉЕ И НЕКРОПОЛА ИЗ БРОНЗАНОГ ДОБА У ТРЊАНУ КОД БОРА – РЕВИЗИЈА СТАРИХ РЕЗУЛТАТА И РЕЗУЛТАТИ НОВИХ ИСТРАЖИВАЊА

*Кључне речи.* – бронзано доба, Источна Србија, некропола спаљених покојника, металургија бакра

Локалитет Трњане код Бора откривен је 1984. године, а прва систематска истраживања насеља и некрополе започета су 1985. и трајала су до 1989. године. Археолошка ископавања спроводена су у оквиру пројекта „Истраживање старог рударства и металургије у широј зони тимочког еруптивног басена” који је реализован сарадњом Музеја рударства и металургије у Бору и Археолошког института у Београду. Истраживања на Трњану била су у иницијалној фази фокусирана на насеље, првенствено због великих количина шљаке што се налазила на површини као и у археолошким слојевима, а касније су се оријентисала на суседну некрополу са спаљеним покојницима. Након паузе од три деценије истраживања су настављена 2017. године, и то у оквиру новог пројекта „Бронзано доба у североисточној Србији – металургија, насеља и некрополе”, у којем сада, осим претходно наведених институција, учествује и Институт за оријенталну и европску археологију из Беча. Након извршене геофизичке проспекције 2018. године настављена су систематска истраживања насеља, а добијени су и апсолутни датуми за два гроба са некрополе и из три узорка са насеља.

Некропола на Трњану представљала је средином осамдесетих година прошлог века неочекивано откриће, будући да је била прва у низу некрополе које су касније констатоване на подручју Бора и Зајечара. Некрополу је чинила већа група кружних камених конструкција (1,5–4 m у пречнику) у чијем се центру налазе урне са остацима спаљених покојника. На овој некрополи их је констатовано 43, а антрополошки су обрађени само они гробови у којима се налазила референтна количина антрополошких остатака. Покојнике су представљали сви узрасти, међу којима и једна трудна жена. Погребни прилози су изузетно ретки, а представљају их керамички пехари, пршљенци, керамичке лампе и један бронзани нож.

Обједињени резултати старих и ових истраживања насеља на локалитету Трњане указују на то да се издвајају пет стратиграфски различитих контекста, означених од SU1 до SU5. Надземне куће су с временом нестале, услед интензивне земљорадње и утицаја ерозије, те су само у две сонде из 1985. и 1987. године откривене зоне са очуваним подним лепом и кућним инвентаром. Такође, постоји могућност да су полуукопане стамбене објекте могли да представљају већи укопи који у испуни садрже већу количину керамике и лепа, као што је био случај у сонди 7/2018. Налазе материјалне културе чине керамика и камене алатке, док је због

киселости земље откривен изузетно мали број животињских костију. Керамичку продукцију представљају лонци, зделе, пехари, шоље и пирауноси. Посебну пажњу привлачи велики број пирауноса и лампи мањих димензија (раније идентификованих као кашике), као и пршљенака различитих облика. Керамичка продукција показује два стилско-типолошка карактера – један са утицајима Ватина и други са карактеристикама Параћинске културе. Од осталих налаза материјалне културе издвајамо бројне фрагментоване камене жрвњеве и растираче као и камене секире, а занимљива су и два налаза језгра од камена што су настала као нуспродукт обушења секира за уметање држаље. Предмети од бронзе изузетно су ретки, а представљају их две шиваће игле, један једноскли нож и, вероватно, још један предмет сличан ножу али прекривен корозијом.

Веома битне налазе у постојећим контекстима на локалитету Трњане представљају металичне шљаке (на некрополи је откривено укупно 18,1 kg, а на насељу 10,3 kg). Морфолошке карактеристике ових шљака указују на то да су настајале током три различите фазе топљења сулфидних руда, највероватније ковелита. Прву групу чине комади већих димензија и неправилног облика, са траговима угља, балончићима ваздуха и крупнијим зрнима бакра, који карактеришу прву фазу топљења сулфидних руда. Другу групу (уједно и другу фазу топљења) представљају шљаке мањих дебљина и у облику полулопте, а садрже мању количину балончића у структури и мање бакарних зрнаца у себи. Трећа врста шљака јесу оне што припадају финалном процесу добијања ингота и имају изузетно танку профилацију, при чему су равне, металичног сјаја и компактне структуре, тако да највише личе на обојено стакло. Претпостављамо да су могући извори руде бакра били удаљени највише 1–2 дана хода од локалитета Трњане, што би требало да потврде будућа рекогносцирања.

Културно-хронолошка одређења заједница које су живеле на простору Тимочке Крајине мењала су се током времена под утицајима како нових открића тако и аутора који су се овом проблематиком бавили. Тако су Б. Јовановић и И. Јанковић у првој интерпретацији некрополу Трњане одредили као *Тимочку џрују* и датовали је у период средњег бронзаног доба, а касније су променили мишљење и преместили је у касно бронзано доба, односно Параћинску културу. За разлику од њих, Д. Срејовић и М. Лазић су, према налазима са некрополе Магура и насеља на Бањској стени код Гамзиграда, целу културу назвали *тамзиградска џруја* и



определили је у средње и касно бронзано доба (1700–1300. пре н. е.). А. Булатовић и Ј. Станковски исту културу ипак опредељују као Тимочку групу, која је везана за фазу Бубањ – Хум IV развијеног бронзаног доба у Поморављу.

Наше је мишљење да је за идентификовање културног утицаја на развој група насеља и некропола у Тимочној Крајини кључни моменат био утицај Ватинске културе, чије се карактеристике јасно препознају на бројним налазима керамике не само на Трњану већ и на некрополи Хајдучка чесма и локалитетима Ружана 1 и 2 у Бањском Пољу код Бора.

Да би се добио прецизнији хронолошки оквир у коме се одвијао живот на локалитету Трњане, урађени су два апсолутна датума из гробова са некрополе као и апсолутни датуми из животињске кости, једне семенке сачуване у профилу керамичке посуде и гаражи из најстаријих културних слојева у насељу. Апсолутни датум из гроба 10 показује старост из 1950–1900. године пре н. е., док узорак из

гроба 28 (у коме се као прилог налазио бронзани нож) припада периоду 1762–1627. године пре н. е. Апсолутни датуми из различитих контекста у насељу указују на временски оквир који обухвата раздобље од друге половине 18. па све до раног 17. века пре н. е., што је готово идентичан датум са оним добијеним у гробу 28.

Представљени датуми указују на то да су насеље и некропола на локалитету Трњане, и поред тога што је одређена количина керамике имала сличности са параћинском културом, највероватније представљали једну варијанту ватинске културе која се развијала у залеђу Ђердапа у раздобљу између 19. и 17. века пре н. е. У приближно истом периоду забележена је повећана металуршка активност и у алпској регији и на територији северне Италије. Насеље на Трњану показује да су заједнице средњег бронзаног доба на простору североисточне Србије имале важну улогу у успостављању производње и дистрибуције бакра у југоисточној Европи с почетка II миленијума пре н. е.

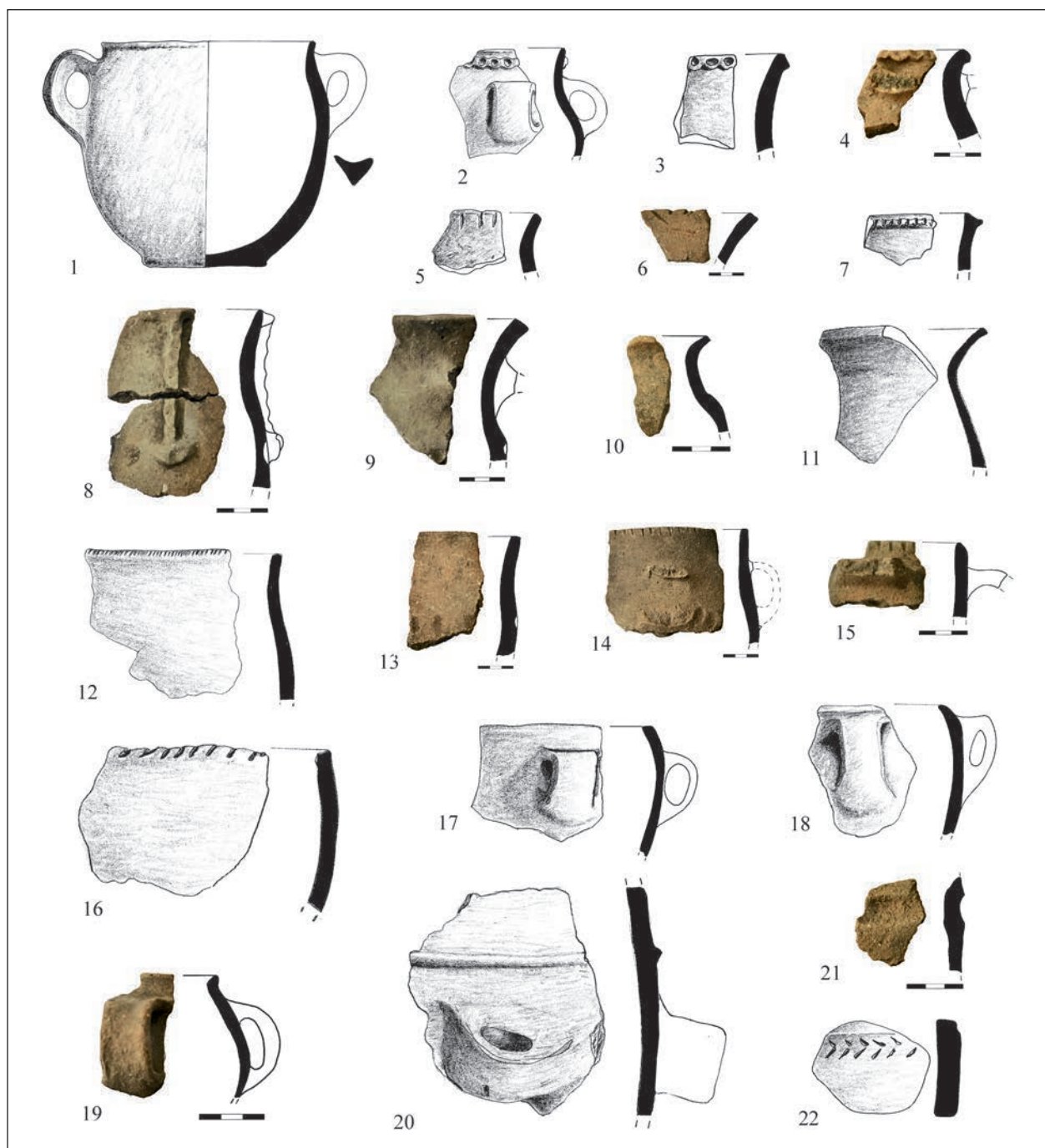


Plate I – 1) Tr. 1/2017, 3<sup>rd</sup> e.l.; 2) Tr. 3/2017, 1<sup>st</sup> e.l.; 3) Tr. 3/2017, 3<sup>rd</sup> e.l.; 4) Tr. 6/2018, S.U.2; 5) Tr. 1/2017 2<sup>nd</sup> e.l.; 6) Tr. 4/2018, S.U.2; 7) Tr. 3/2017, 1<sup>st</sup> e.l.; 8) Tr. 8/2018, S.U.4; 9) Tr. 6/2018, S.U.4; 10) Tr. 6/2018, S.U.2; 11) 1985–1987 excavations; 12) 1985–1987 excavations; 13) Tr. 8/2018, S.U.4; 14) Tr. 8/2018, S.U.4; 15) Tr. 4/2017, S.U.4; 16) 1985–1987 excavations; 17) 1985–1987 excavations; 18) 1985–1987 excavations; 19) Tr. 4/2018, S.U.1; 20) 1985–1987 excavations; 21) Tr. 2/2018, S.U.2; 22) Tr. 3/2017, 2<sup>nd</sup> e.l.

Табла I – 1) S. 1/2017, 3 o.s.; 2) S. 3/2017, 1 o.s.; 3) S. 3/2017, 3 o.s.; 4) S. 6/2018, S.J.2; 5) S. 1/2017 2 o.s.; 6) S. 4/2018, S.J.2; 7) S. 3/2017, 1 o.s.; 8) S. 8/2018, S.J.4; 9) S. 6/2018, S.J.4; 10) S. 6/2018, S.J. 2; 11) ископавања 1985–1987; 12) ископавања 1985–1987; 13) S. 8/2018, S.J.4; 14) S. 8/2018, S.J.4; 15) S. 4/2017, S.J.4; 16) ископавања 1985–1987; 17) ископавања 1985–1987; 18) ископавања 1985–1987; 19) S. 4/2018, S.J.1; 20) ископавања 1985–1987; 21) Tr. 2/2018, S.J.2; 22) S. 3/2017, 2 o.s.



Plate II – 1) Tr. 7/2108, S.U.5; 2) Tr. 3/2107, e.l.; 3) Tr. 4/2018, S.U.4; 4) Tr. 7/2018, S.U.4; 5) Tr. 3/2017, 3<sup>rd</sup> e.l.; 6) Tr. 4/2018, S.U.4; 7) Tr. 3/2017, 2<sup>nd</sup> e.l.; 8) Tr. 3/2017, 2<sup>nd</sup> e.l.; 9) Tr. 4/2018, S.U.5; 10) Tr. 4/2018, S.U.4; 11) Tr. 4/2018, S.U.4; 12) Tr. 4/2018, S.U.5; 13) Tr. 4/2018, S.U.4; 14) Tr. 4/2018, S.U.4; 15) Tr. 4/2018, S.U.4; 16) Tr. 4/2018, S.U.1; 17) Tr. 3/2017, 1<sup>st</sup> e.l.; 18) 1985–1987 excavations; 19) Tr. 3/2017, 3<sup>rd</sup> e.l.; 20) Tr. 7/2018, S.U.1; 21) Grave 33

Табла II – 1) S. 7/2108, S.J.5; 2) S. 3/2107, o.s.; 3) S. 4/2018, S.J.4; 4) S. 7/2018, S.J.4; 5) S. 3/2017, 3o.s.; 6) S. 4/2018, S.J.4; 7) S. 3/2017, 2 o.s.; 8) S. 3/2017, 2 o.s.; 9) S.4/2018, S.J.5; 10) S. 4/2018, S.J.4; 11) S. 4/2018, S.J.4; 12) S. 4/2018, S.J.5; 13) S. 4/2018, S.J.4; 14) S. 4/2018, S.J.4; 15) S. 4/2018, S.J.4; 16) S. 4/2018, S.J.1; 17) S. 3/2017, 1 o.s.; 18) ископавања 1985–1987; 19) S. 3/2017, 3 o.s.; 20) S. 7/2018, S.J. 1; 21) Гроб 33





Plate III – 1) Tr. 4/2018, S.U.2; 2) Tr. 3/2017, 3<sup>rd</sup> e.l.; 3) Tr. 1/2017, 2<sup>nd</sup> e.l.; 4) 1985–1987 excavations;  
 5) Tr. 6/2018, S.U.2; 6) Tr. 7/2108, S.U.4; 7) Tr. 3/2017, 1<sup>st</sup> e.l.; 8) 1985–1987 excavations; 9) Tr. 7/2108, S.U.4;  
 10) Tr. 6/2018, S.U.4; 11) 1985–1987 excavations; 12) Tr. 3/2017, 3<sup>rd</sup> e.l.; 13) Tr. 1/2017, 4<sup>th</sup> e.l.;  
 14) Tr. 7/2017, S.U.5

Табла III – 1) S. 4/2018, S.J.2; 2) S. 3/2017, 3 o.s.; 3) S. 1/2017, 2 o.s.; 4) ископавања 1985–1987;  
 5) S. 6/2018, S.J.2; 6) S. 7/2108, S.J.4; 7) S. 3/2017, 1 o.s.; 8) ископавања 1985–1987; 9) S. 7/2108, S.J.4;  
 10) S. 6/2018, S.J.4; 11) ископавања 1985–1987; 12) S. 3/2017, 3 o.s.; 13) S. 1/2017, 4 o.s.; 14) S. 7/2017, S.J.5

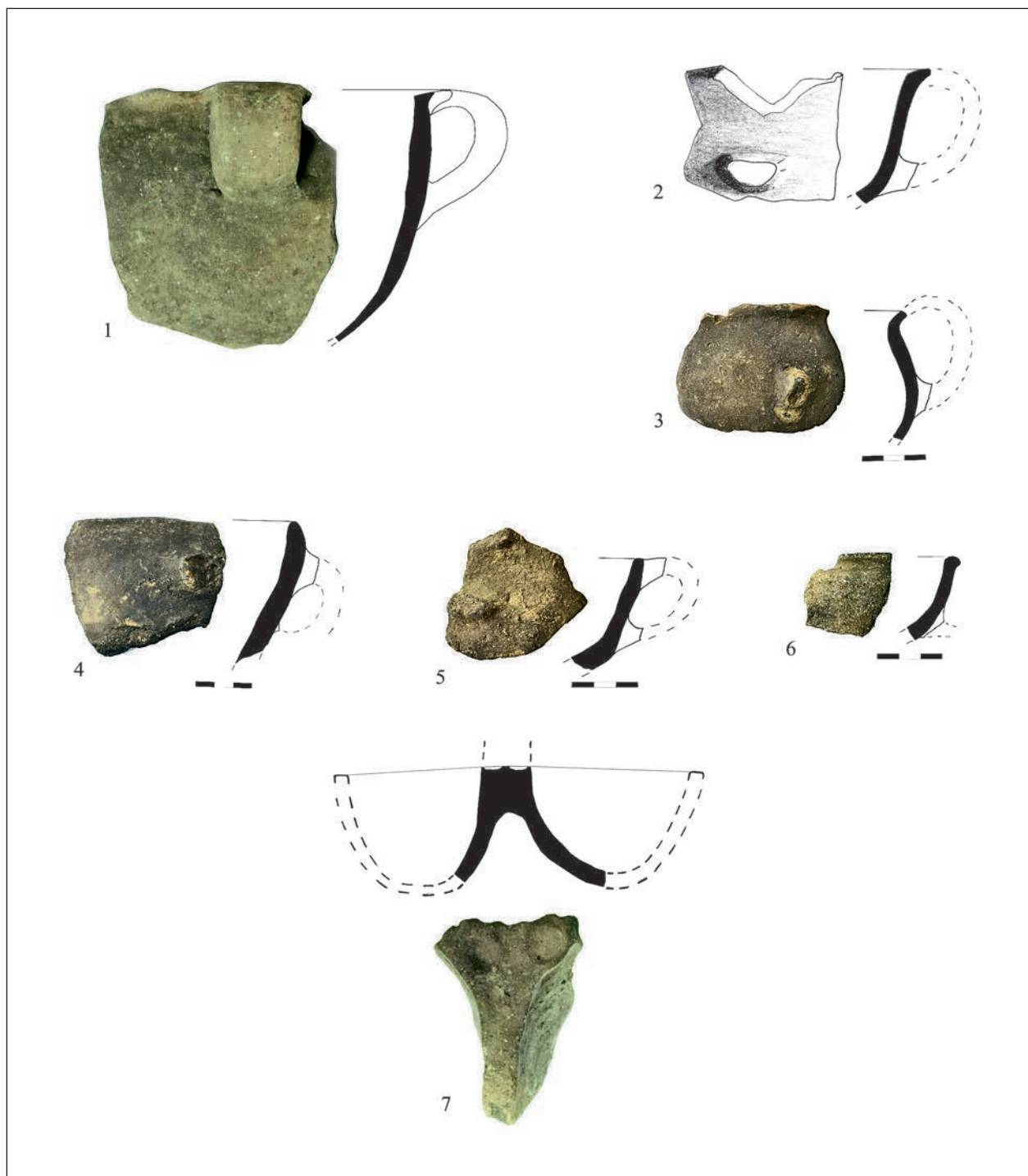


Plate IV – 1) 1985–1987 excavations; 2) Tr. 2/2017, 4/5<sup>th</sup> e.l.; 3) Tr. 7/2017, S.U.5; 4) Tr. 7/2017, S.U.5;  
5) Tr. 4/2018, S.U.4; 6) Tr.4/2018, S.U.2; 7) Tr. 7/2017, S.U.5

Табла IV – 1) ископавања 1985–1987; 2) S. 2/2017, 4/5 о.с.; 3) S. 7/2017, S.J.5; 4) S. 7/2017, S.J.5;  
5) S. 4/2018, S.J.4; 6) S.4/2018, S.J.2; 7) S. 7/2017, S.J.5



Plate V – 1) 1985–1987 excavations; 2) Tr. 4/2018, S.U.4; 3) Tr. 4/2018, S.U.4; 4) Tr. 4/2018, S.U.4;  
 5) Tr. 7/2018, S.U.4; 6) Tr. 7/2018, S.U.2; 7) Tr. 4/2018, S.U.2; 8) Tr. 3/2017, 2<sup>nd</sup> e.l.; 9) Tr. 3/2017, 3<sup>rd</sup> e.l.;  
 10) 1985–1987 excavations; 11) Tr. 7/2018, S.U.5; 12) Tr. 4/2018, S.U.4

Табла V – 1) ископавања 1985–1987; 2) S. 4/2018, S.J.4; 3) S. 4/2018, S.J.4; 4) S. 4/2018, S.J.4;  
 5) S. 7/2018, S.J.4; 6) S. 7/2018, S.J.2; 7) S. 4/2018, S.J.2; 8) S. 3/2017, 2 o.s.; 9) S. 3/2017, 3 o.s.;  
 10) ископавања 1985–1987; 11) S. 7/2018, S.J.5; 12) S. 4/2018, S.J.4

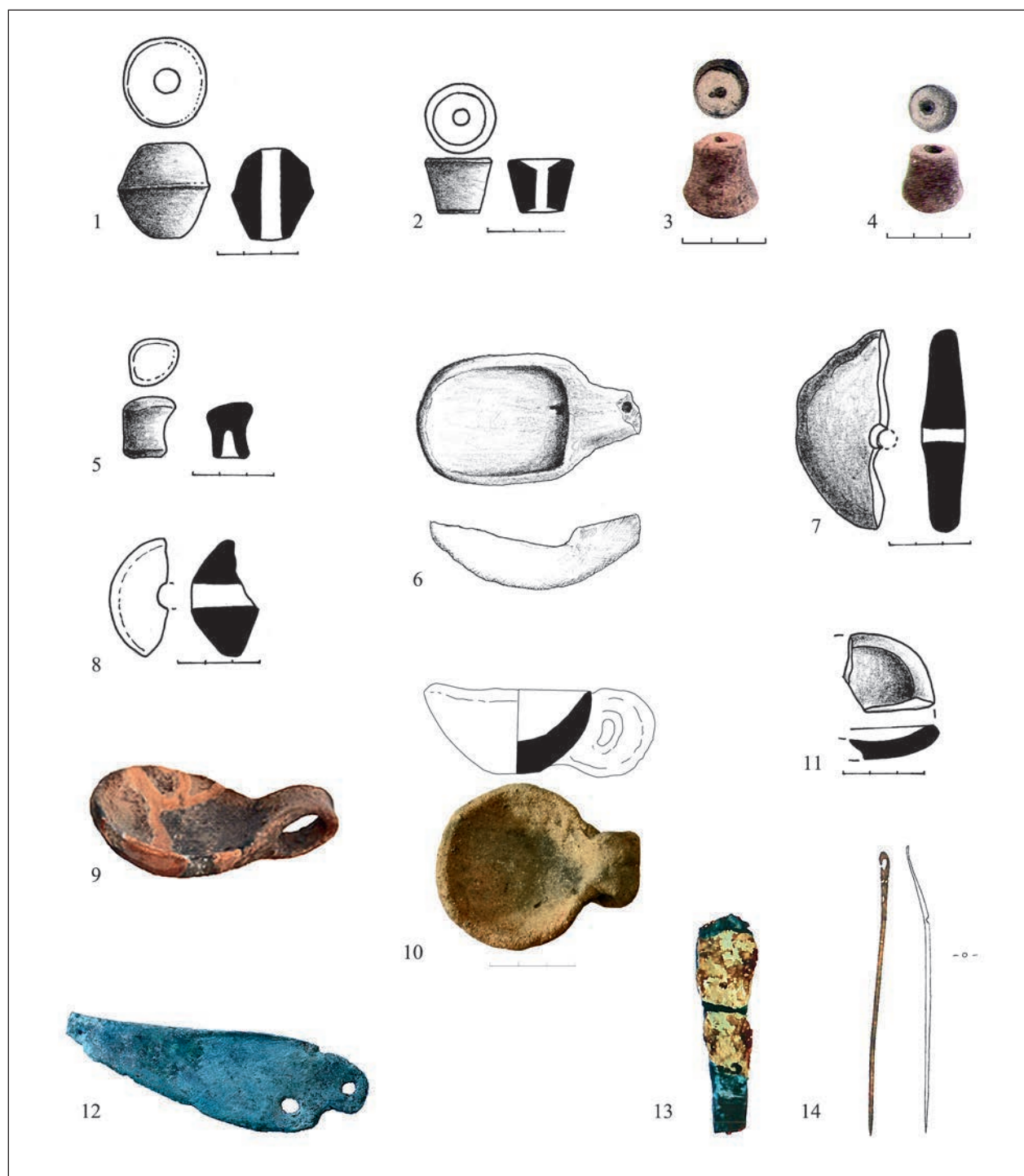


Plate VI – 1) Tr. 4/2018, S.U.2; 2) Tr. 4/2018, S.U.4; 3) Tr. 3/2017, 2<sup>nd</sup> e.l.; 4) Tr. 3/2017, 2<sup>nd</sup> e.l.; 5) Tr. 4/2018, S.U.4; 6) 1985–1987 necropolis; 7) Tr. 4/2018, S.U.4; 8) Tr. 4/2018, S.U.4; 9) 1985–1987 necropolis; 10) Tr. 6/2018, S.U.4; 11) 7/2018, S.U.4; 12) 1985–1987 Grave 28; 13) 1985–1987 excavations

Табла VI – 1) S. 4/2018, S.J.2; 2) S. 4/2018, S.J.4; 3) S. 3/2017, 2 o.s.; 4) S. 3/2017, 2 o.s.; 5) S. 4/2018, S.J.4; 6) ископавања 1985–1987; 7) S. 4/2018, S.J.4; 8) S. 4/2018, S.J.4; 9) ископавања 1985–1987; 10) S. 6/2018, S.J.4; 11) 7/2018, S.J.4; 12) ископавања 1985–1987 Гроб 28; 13) ископавања 1985–1987



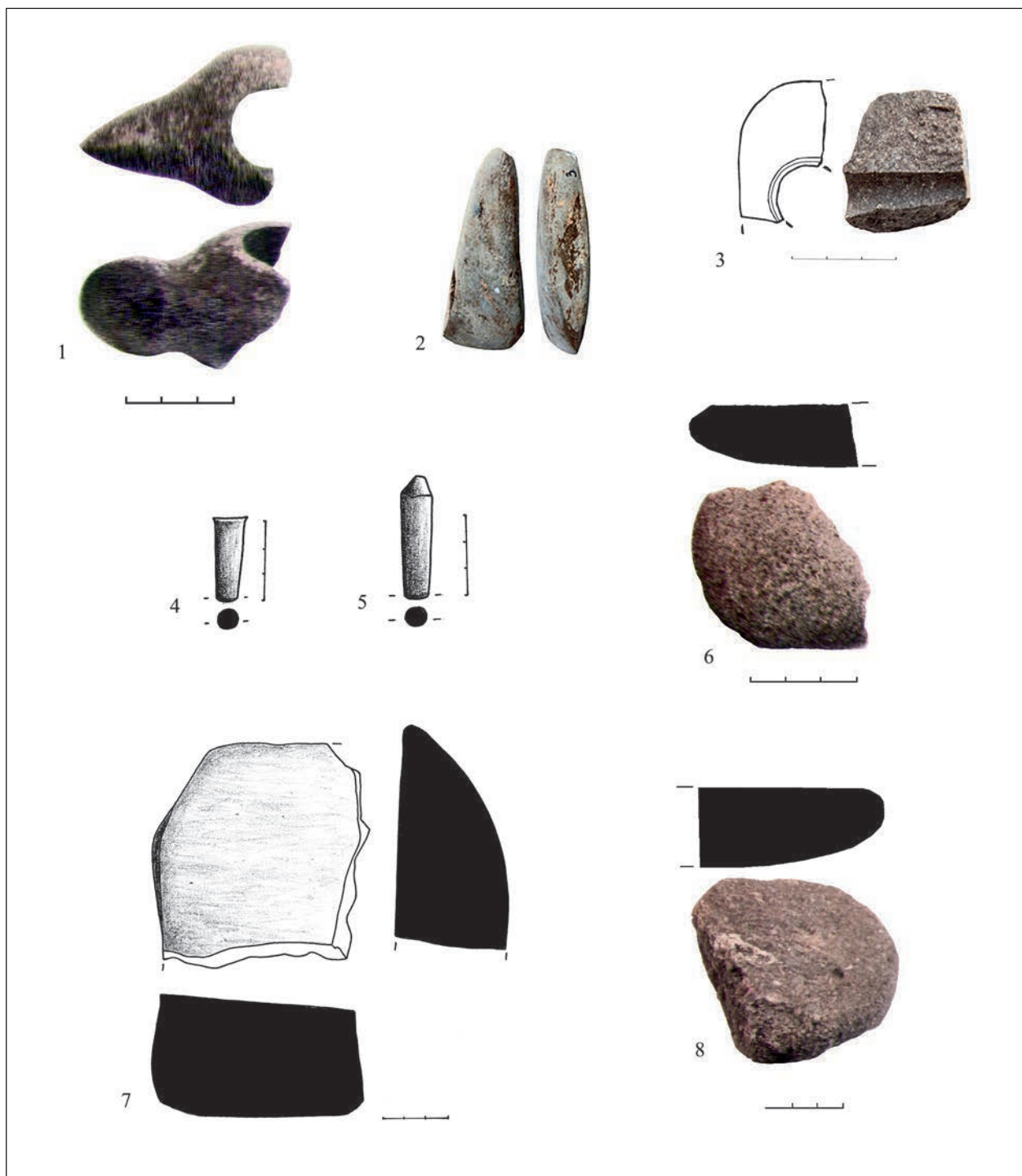


Plate VII – 1) Tr. 3/2017, 4<sup>th</sup> e.l.; 2) 1987–1989 Grave 33; 3) 1987–1989 Grave 29; 4) Tr. 6/2018, S.U.2/4; 5) Tr. 5/2018, S.U.2; 6) Tr. 3/2017, 1<sup>st</sup> e.l.; 7) Tr. 5/2018, S.U.2; 8) Tr. 3/2107, 2<sup>nd</sup> e.l.

Табла VII – 1) S. 3/2017, 4 о.с.; 2) ископавања 1987–1989 Гроб 33; 3) ископавања 1987–1989 Гроб 29; 4) S. 6/2018, S.J.2/4; 5) S. 5/2018, S.J.2; 6) S. 3/2017, 1 о.с.; 7) S. 5/2018, S.J.2; 8) S. 3/2107, 2 о.с.