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THE HARD TASKS OF KELEUSTĒS IN ANCIENT GREEK TRIREMES

ABSTRACT

The rank of keleustēs in ancient Greek triremes is of great interest as it does not appear to be restricted to maintaining the rhythm of rowing through loud commands. Even if the above role represented hard work with many difficulties during naval battles, tasks such as chanting prayers to the Gods before battle or the provision of bread, wine and meat to rowers also came under his authority.

KEYWORDS: KELEUSTĒS, COMMANDS, ORDERS, ROWING RHYTHM.

The term *keleustēs* (κελευστής[1] plur. *keleustai*) derives from the ancient Greek verb *keleuo* «κελεύω», which means bespeak, enjoin, to give the command to rowers to keep the rowing rhythm (Stamatakos 1999, Ioannidou 2014).

The verb κελεύω has been found in the Homeric epics in the general sense of bespeak, command (e.g. servants, soldiers, etc.). In the marine environment we see it as an imperative for various naval operations (such as setting the sails, embarkation of the crew) and not with the meaning of words and phrases recited to achieve a rate of rowing (Hom. Il. 2. 151, Od., 2. 422-423, 9. 560). The term *keleustēs* is subsequent to the Homeric epics. As regards to the first depiction whereby it is clearly distinguished the attitude and position of *keleustēs*, we could say that it comes from an

1 The ancient term exist today in Hellenic Navy corresponding to Petty Officer.

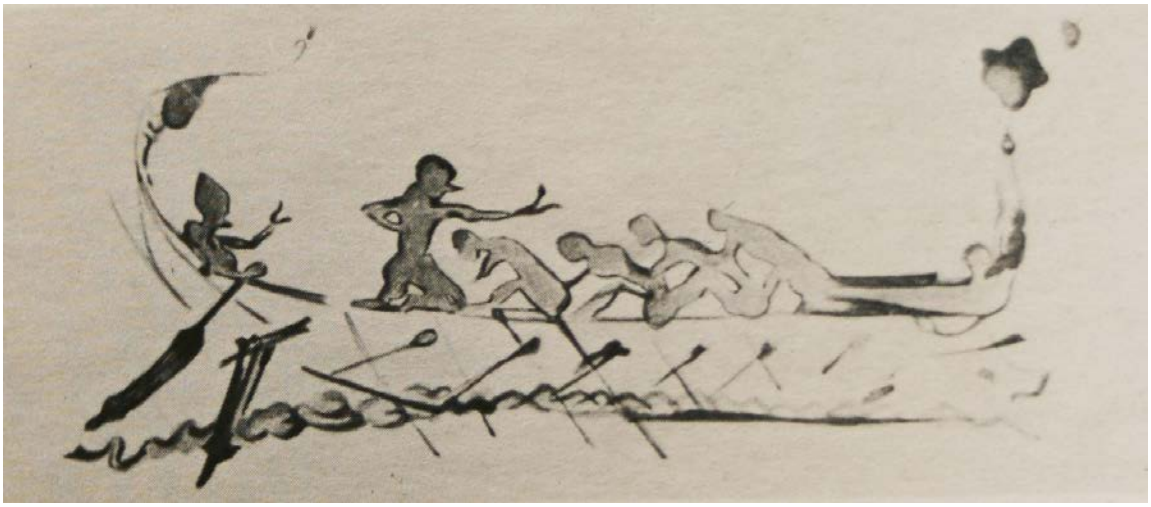

Plate 1. Aryballos of Corinthian style (550 BC). National Archaeological Museum, No. 281.

Plate 2. Bronze model boat with passengers, 6th century B.C., Archaeological Museum of Isthmian, 39 IM 2090. Photo: C.E. Ioannidou.

aryballos[2] of the 6th BC century (plate 1).

To maintain 170 rowers, a level of oarsmanship was necessary and, among other things, the *keleustēs* had to be a person worthy of respect and had to possess skills to inspire the crew. This was made clear by Xenophon, who separate the capable *keleustēs* from the incapable one. In the first case the voyage would take place in the designated time and relatively pleasantly, as the crew endured their labours willingly and with pride. In the second case the voyage would be undertaken in twice the time with unpleasant feelings, particularly among the *keleustēs* and the crew (Xen. Oec. XXI 3-4).

In ancient texts there is an impression that commands were not limited to simple dictates but were given following a rhythm or were sung like songs (Luc. Catapl. 641-642, 19). This could be achieved if a word or a short phrase followed the same tone and was repeated at a specific time. Such commands are well known in Aristophane's Frogs (209-269).

Often there was another crew member, the piper (*auletēs* αυλητής*)*, or *triiravlēs* (τριηραύλης, τριήρης + αὐλέω), who accompanied the *keleustēs* with melodies on his pipe (Ioannidou 2014).

«…αὐλητάς αὐλοῦντας ἄγουσα και κελευστὰς κελεύοντας, ὧν (αν) ἕκαστος ἀνεκάλει τριήρη μίαν» (Polyaenus, Strat. 5.2.5).

[…carrying pipers playing music and keleustai who had given orders, each of which invited a trireme].

Sometimes the position of keleustēs could be filled by a person who was already a known artist of his time. For example, the famous actor of Greek tragedies Callippides, rode on the brilliant trireme of Alcibiades, at the time when the Athenian general made the Athenians rulers at Hellespont after the successful Battle of Cyzicus 410 BC, and was returning to Athens. Callippides, with his songs, gave the commands to the oars-

2 A small flask with wide base and narrow neck. It was used to contain perfume or oil. It was elegant and decorated with paintings.

men while the *auletēs* Chrysogonos, who was also a celebrated victor in the piper competition at Delphi, played on a flute the trieric air (Ath.12, 535d, Plut. Alc. 32).

One of the oldest depictions of a piper on a ship comes from a bronze model boat with passengers, from the 6th century. B.C., located in the Museum of Isthmia (plate 2).

As is well known, slaves were often used in triremes too. Thucydides (Thuc7.13.2) noted that desertion by a slave serving in the trireme was a possibility and that it was the duty of the slave's master to prevent it. Plenty of names in inscriptions testify that slaves were members of crews on triremes as rowers or as the personal servants of the officers and marines, carrying out duties on the same or on a different trireme to their masters (Graham 1998, 98-102). Among these slaves were also pipers. We have interesting information that Phormio, a slave of Dio of Phrearrii, was a trireme piper, a "triiravlēs" (Dem. De cor. 129-130).

THE ISSUE OF COMMUNICATION WITHIN THE SHIP

Whether the *keleustēs* had to be "sweet-voiced" or not is not known. Although from the ancient texts its quite easy to assume that a loud and clear voice would have been a basic requirement.

From the writings of Diodorus Siculus we derive the information that before the battle of Salamis in Cyprus (306 BC), when both warring ships completed their formations, they prayed to the gods through the *keleustai* (Diod. Sic. 20,50,6), while the crew participated by joining its voice to theirs. The words in the ancient text of Diodorus: *καθάπερ ἦν ἔθος* (ie as customary), leads us to the thought that it was common for keleustai to chant prayers to the Gods before a battle, it is not known, however, when chronologically this started.

The chant of the *keleustēs* is also praised in a Greek novel of early Christian times, Daphnis and Chloe. Despite the fact that the specific description concerns a fishing vessel and not a warship, Longus describes vividly a scene where the vessel was crossing the sea and the voice of the *keleustēs* singing nautical songs was heard with so much pleasure, while the rest of the crew, like a chorus, sang out in unison to the time of his voice. However, before this romantic description, Longus makes it clear that the weather conditions were very favourable for a crew to hear the *keleustēs* clearly:

«Ἄνεμος μὲν οὐκ ἦν, γαλήνη δὲ ἦν»

[There was no wind but a dead calm] (Longus, Daphnis and Chloe, 3, 21, 2).

In difficult situations the task of *keleustēs* would become harder, as he had to give orders, for example, during a noisy naval battle. The noise created by the impact of the wooden ships, the cries of the wounded, the enemy's commands or the loud insults[3] of warriors would all stifle the commands. This could compromise the ideal picture of the *keleustēs* as he would be forced to issue his orders with screams rather than in a song:

«...καὶ τὸν κτύπον μέγαν ἀπὸ πολλῶν νεῶν ξυμπιπτουσῶν ἔκπληξίν τε ἅμα καὶ ἀποστέρησιν τῆς ἀκοῆς ὧν οἱ κελευσταὶ φθέγγοιντο παρέχειν. 7.70.7πολλὴ γὰρ δὴ ἡ παρακέλευσις καὶ βοὴ ἀφ' ἑκατέρων τοῖς κελευσταῖς κατά τε τὴν τέχνην καὶ πρὸς τὴν αὐτίκα φιλονικίαν ἐγίγνετο», (Thuc. 7.70).

[…while the huge din caused by the number of ships crashing together not only spread terror, but made the orders of the boatswains inaudible. The boatswains on either side in the discharge of their duty and in the heat of the conflict shouted incessantly orders and appeals to their men;].

If, in these critical moments, he could not achieve his task then disorder in the fleet would follow as the rowers would be unable to hear or even understand who was giving orders and the ships would be more difficult for the crew to handle (Thuc. 2.84).

On the other hand, in cases where rowing near the enemy was to be done in secret, such as, for

3 It was customary before or during a battle for combatants to exchange insults, in writing or orally. C.E. Ioannidou, 2017.

example, during the night, the oarsmen turned the oars lightly and the *keleustēs* held the rhythm by tapping stones instead of by using their voice.

«...λίθων τε ψόφῳ τῶν κελευστῶν ἀντὶ φωνῆς χρωμένων καὶ παραγωγῇ τῶν κωπῶν» (Xen. Hell. 5.1, 8-9).

[In place of the usual cry the boatswains timed the rowers by a clink of stones, and silently the oars slid].

.. There are also two interesting accounts of a keleustēs' total silence in Arrian's texts:

The first one as a consequence of calm rowing before the battle:

«...τὰ μὲν πρῶτα ἀτρέμα τῇ εἰρεσίᾳ ἐπὶ μιᾶς νεὼς ἐξέπλεον ἄνευ κελευστῶν τὰς κώπας παραφέροντες. ὡς δὲ ἐπέστρεφον ἤδη ἐπὶ τοὺς Κυπρίους καὶ ἐγγὺς τοῦ καθορᾶσθαι ἦσαν, τότε δὴ ξὺν βοῇ τε πολλῇ καὶ ἐγκελευσμῷ ἐς ἀλλήλους καὶ ἅμα τῇ εἰρεσίᾳ ξυντόνῳ ἐπεφέροντο».

"At first they rowed out slowly and quietly in single file, moving forward the handles of their oars without any signal from the men who give the time to the rowers; but when they were already tacking against the Cyprians, and were near enough to be seen, then indeed with a loud shout and encouragement to each other, and at the same time with impetuous rowing, they commenced the attack" (Arr. Anab. 2.21).

The second one as a result of a loud environment and of great surprise near the region of the confluence of the rivers Hydaspes and Acesines:

«...ἵνα δὲ ξυμβάλλουσιν οἱ ποταμοὶ οὗτοι, στενότατος εἷς ποταμὸς ἐκ τοῖν δυοῖν γίγνεται καὶ τὸ ῥεῦμα αὐτῷ ὀξὺ ἐπὶ τῇ στενότητι καὶ δῖναι ἄτοποι ὑποστρέφοντος τοῦ ῥοῦ, καὶ τὸ ὕδωρ κυμαίνεταί τε καὶ καχλάζει ἐπὶ μέγα, ὡς καὶ πόρρω ἔτι ὄντων ἐξακούεσθαι τὸν κτύπον τοῦ κύματος. καὶ ἦν μὲν προεξηγγελμένα ταῦτα Ἀλεξάνδρῳ ἐκ τῶν ἐγχωρίων καὶ ἐξ Ἀλεξάνδρου τῇ στρατιᾷ· ὅμως δὲ ἐπειδὴ ἐπέλαζεν αὐτῷ ταῖς ξυμβολαῖς ὁ στρατός, ἐς τοσόνδε ὁ ἀπὸ τοῦ ῥοῦ κτύπος κατεῖχεν, ὥστε ἐπέστησαν τὰς εἰρεσίας οἱ ναῦται, οὐκ ἐκ παραγγέλματος, ἀλλὰ τῶν τε κελευστῶν ὑπὸ θαύματος ἐκσιωπησάντων καὶ αὐτοὶ μετέωροι πρὸς τὸν κτύπον γενόμενοι».

"…one very narrow river is formed out of the two; and on account of its narrowness the current is swift. "There are also prodigious eddies in the whirling stream, and the water rises in waves and plashes exceedingly, so that the noise of the swell of waters is distinctly heard by people while they are still far off. These things had previously been reported to Alexander by the natives, and he had told his soldiers; and yet, when his army approached the junction of the rivers, the noise made by the stream produced so great an impression upon them that the sailors stopped rowing, not from any word of command, but because the very *keleustai* who gave the time to the rowers became silent from astonishment and stood aghast at the noise" (Arr. Anab. 6,4).

So, it comes to our attention that in good weather conditions the voice of the *keleustēs* and the sound of the pipe will be more than enough to be heard by all the oarsmen. Could that be true?

When considering the trials carried out in the trireme *Olympias* we can be lead to some conclusions. During the first two years of the trials (1987-1988), the *keleustēs* found it difficult to be heard throughout the ship, even when using a powered megaphone (Coates 1990, 17).

"*The rowing master, acting under the captain, commanded and coached the crew with the help of a hand-held powered megaphone. He chose his position in the ship according to the direction of the wind so as to be as audible as possible to all sections of the oarcrew. Whenever it was thought helpful, the oarcrew chanted 'O-Op' to mark the catch and finish of strokes and so to bring the stroke together*" (Coates 1990, 16).

In the following year the communication between the *keleustēs* and oarsmen was restored thanks to a microphone installed with six speakers. Adding a piper was equally important as the high-frequency sound of the flute could be heard throughout the ship. The location of piper was next to the sail, following the indications of the ancient texts, and allowed the *keleustēs* to concentrate

solely on the guidance, while the oarsmen simultaneously followed the rhythm of known melodies (Rankov 2014, 134-135. Christopoulos 1996, 151).

"*The complement of an ancient trireme including a piper auletēs and it is quite possible that this pipe performed much the same function as the bosun's call in latter day naval ships as a means of broadcasting standardized orders. For much of the time during the second phase of these trials a piper indicated the timing of the stroke (the 'cadence'), and that helped greatly in keeping the oarcrew pulling together*" (Coates 1990, 17).

Despite all of the above, it was quite difficult to find a way of giving the rhythm only by voice. Even if the position of the *keleustēs* was standing in the middle of the ship, "μέσον δ᾽ ἐν αὐτοῖς στήσαντες τὸν κελευστήν" (Polyb. 1, 29), the necessity of the auletēs seems imperative as well as the presence of a second keleustēs. However, do we have the presence of a second keleustēs in ancient triremes? According to most ancient inscriptions, as for example IG I3 1032 (List of crews of Athenian triremes ca 410-400BC), there were no more than one *keleustēs* or *auletēs* in each trireme.

Regarding to Olympias trials, techniques for directing the oarsmen without electronic speakers are still being investigated (Rankov 2012, 3). Among others, a simple thought crossed our mind. Did people in ancient and classical times have better hearing than people today? This leaves an unanswered question in such a matter and space for further research.

OTHER TASKS

The keleustēs was the coach of the crew and responsible for their discipline. However, more than that he also had the responsibility for the proper provision of bread, wine and meat to the rowers and he gave orders to the marines (Suda, term *κελευστής*, Arr. Parth. 61). Among other sources, an inscription from Delfi (IG VII-IX) CID 1.7. circa 425 BC) brings to light the above mentioned:

κελευστὴς ἕκαστος
των δημοσίο¯ν| ἑρετ¯ων. σῖ-
τον παρεχόντων τε¯ι πρό¯-
τει μάζαν, κρέα, οἶνον ὁ-
πόσ[ον] βό¯λονται, καὶ τᾶ̃[λ]-
λα ἁρμόδια·

Last but not least, his important role appears not only in the management of the warship. In a passage from the Xenophon we learn that the *Keleustēs,* with the rest of the *hyperesia* (naval service), are those who give the city its power:

«…καὶ γὰρ οἱ κυβερνῆται καὶ οἱ κελευσταὶ καὶ οἱ πεντηκόνταρχοι καὶ οἱ πρῳρᾶται καὶ οἱ ναυπηγοί, οὗτοί εἰσιν οἱ τὴν δύναμιν περιτιθέντες τῇ πόλει πολὺ μᾶλλον ἢ οἱ ὁπλῖται καὶ οἱ γενναῖοι καὶ οἱ χρηστοί» (Xen. Ath. pol. 1.2. (included auletes: IG II2, 1951, 94-105, GOS 266-8).

[The steersman, the keleustai, the lieutenant, the look-out-man at the prow, the ship carpenters - these are the people who encompass the city with power far more than her heavy infantry and men of noble birth].

BIBLIOGRAPHY

Basch, L. 1987
Le muse imaginaire de la marine antique, Athens, Institute Hellenique pour la Préservation de la Tradition Nautique.

Christopoulos, *M*. 1996
"Kéleuste, Aulète, trieraulète, son musical et manoeuvres des bateaux", *Tropis IV*, 4st International Symposium on Ship Construction in Antiquity, Hellenic Institute for the Preservation of Nautical Tradition, pp. 145-158.

Coates, J.F. et al., 1990
The Trireme Trials, 1988, Oxford, Oxbow Books.

Gardiner R. and J. S. Morrison eds. 1995.
The Age of the Galley: Mediterranean Oared Vessels Since Pre-Classical Times. Conway's History

of the Ship, Naval Institute Press, London.

Graham, A.J. 1998
"Thucydides 7.13.2 and the Crews of Athenian Triremes: An Addendum", *Transactions of the American Philological Association (1974-),* Johns Hopkins University Press, Vol 128, pp. 89-114.

Julii Pollucis, *Onomasticon: Graece & Latine*, Amstelaedami, Ex officina Wetsteniana, 1706.

Ioannidou, Ch. E. 2014
Dictionary of Ancient Greek Naval Terms [in Greek] *Λεξικό Αρχαίων Ελληνικών Ναυτικών Όρων*, Athens: Historical Quest.

Ioannidou, Ch. E. 2016
Trireme Tactic and Operational Environment in Ancient Greece [in Greek] ΤΡΙΗΡΗΣ Τα*κτική και Επιχειρησιακό Περιβάλλον στην Αρχαία Ελλάδα*, Athens: Naval History Department/Hellenic Navy.

Ioannidou, Ch. E. 2017
"Negative verbal symbols in ancient Greek warfare", (Joanna Popielska-Grzybowska & Jadwiga Iwaszczuk (eds.) *Thinking Symbols* Interdisciplinary Studies, Acta Archaeologica Pultuskiensia, vol. VI, Publisher: Wydawnictwo Akademii Humanistycznej im. Aleksandra Gieysztora, pp.135-139.

Liddel H.G. & R. Scott, 1985
A Greek-English Lexicon, rev. by H. Stuart Jones, Oxford.

Morrison J.S. 1984
"Hyperesia in Naval Contexts in the Fifth and Fourth Centuries BC", *The Journal of Hellenic Studies*, vol. 104, pp. 48-59.

Rankov, B. 2014
Trireme Olympias [in Greek] «Η τριήρης Ολυμπιάς», Ναυς, Πλοία και ναυπηγική στον ελληνικό κόσμο, Κώστας Δαμιανίδης (ed), Athens, Polaris.

Rankov, B. 2012
Trireme Olympias The Final Report, Sea Trials 1992–4, Conference Papers 1998, Oxford, Oxbow Books,

Stamatakos, J. 1999
Dictionary of Ancient Greek Language [in Greek], *Λεξικόν της Αρχαίας Ελληνικής Γλώσσης*, Athens: Vivliopromitheftiki.

REZIME
TEŠKI ZADACI KELEUSTĒS-A U GRČKIM TRIJERAMA

KLJUČNE REČI: *KELEUSTĒS,* NAREDBE, RITAM VESLANJA, ANTIČKA GRČKA.

Položaj *keleustes*-a u antičkim grčkim trijerama budi veliko interesovanje, budući da im nije jedini zadatak bio da održe ritam veslanja davanjem glasnih komandi. Iako im je pomenuta uloga bila teška tokom pomorskih bitaka, zadaci kao što je izgovaranje molitvi bogovima pre bitke ili deljenje hleba, vina i mesa veslačima takođe su bili deo njihove nadležnosti.

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THE NECROPOLIS ALONG THE NORTH-WESTERN CORNER OF THE LEGIONARY FORTRESS IN VIMINACIUM

ABSTRACT

During more recent archaeological research in the area of the legionary fort of the Legio VII Claudia in Viminacium, a part of the defensive ditch along the north-western part of the camp was also explored. Several archaeological units were discovered in this area, among others, a smaller necropolis with skeletal burials as well. This necropolis consists of 36 graves, mostly with brick and tegulae constructions, and also several freely buried individuals. On the basis of the stratigraphy and the few find of coins, this necropolis was dated to the second half of the 4th century. It is interesting to note that the most numerous graves at the necropolis are those of new-borns and children, with only a few adult individuals registered.

KEYWORDS: NECROPOLIS, GRAVES, LATE ANTIQUITY, VIMINACIUM, LEGIONARY FORT, DEFENSIVE DITCH.

Archaeological excavations of the military fort at *Viminacium*, on a small scale and with long interruptions, have been performed from the end of the 19th century, and after an intermission of several decades, continued in 2002, when the northern gate of the fortress (*porta praetoria*) was mostly discovered.[1] Continuous research, performed since 2016, was focused on the north-western part of the fort, up until 2020 (fig. 1). For the most part, works were performed on the discovered ramparts and towers, as well as the defensive ditch, stretching along the outer side of the ramparts, and the inner part of the fortress was comprehended only with a smaller part.[2] During these excavations, the research of the northern gate was finished, and the western gate (*porta principalis sinistra*) was also discovered, with towers, passages and drainage channels, and also a smaller part of the *viae principalis*, as well as

1 On the history of previous research, cf. Mrđić 2009: 9–16.

2 Results of the research of the north-western part of the fort were published in journals of the Institute of Archaeology: Nikolić et al. 2019: 125–134; Nikolić et al. 2020: 143–155; Bogdanović et al. 2020: 157–170.

Fig. 1 North-western part of the military camp, shot from the drone (photo documentation of the Institute of Archaeology)

the communication that stretched from the street, i.e. the gate, to the west – the city. Parts of the western and northern rampart were also discovered, as well as the north-western corner tower and lateral towers on the ramparts. Aside from the channel within the gates, several more drainage channels were researched, through which the waste waters from the fort went to the ditch. On the basis of the stratigraphy, manner of building and numerous archaeological findings, two basic phases of the construction of the fortress were established – an older one, dated to the last decades of the 1st century, and a more recent one, dated to the 2nd century.

As already mentioned, a defensive ditch was also discovered, which was bridged with a massive wall made of large limestone blocks, near the north-western corner of the fort. After the ditch was backfilled, that is to say, after the end of its use for defensive purposes (after the third quarter of the 3rd century), several buildings of economic character, and also five circular ovens, were built over the ditch, in the area to the north and to the south of the communication. Various phases of building and reconstructions can be noted on those objects, which lasted through the entire 4th and into the beginning of the 5th century.

During the research of the ramparts and the ditch, a Late Roman necropolis was also discovered, which was mostly dug in along the outer side of the western rampart and along the edges of the ditch.

***

Within the necropolis on the *castrum*, 36 graves have been researched, in which 37 individuals were buried.[3] Those were skeletal burials of deceased individuals, mostly children. The burials were mostly performed in tombs made of bricks and tegulae, with a considerably smaller number of freely buried individuals. The grave constructions were damaged to varying degrees, and the bones of the skeletons were mostly poorly preserved and most commonly demolished. No regularities were noted in the orientation or distribution of the graves.

3 There were no skeletal remains in one grave, but there were three individuals buried in another.

When observing the distribution of the graves, it is necessary to take into consideration the uneven degree of the research of the ditch. This goes for both the different research level of the ditch along the western rampart, compared to the part along the northern rampart, as well as the uneven research level of the ditch along the western rampart. Along the western rampart of the fortress, the ditch was researched to a length of ca 200 m, where it was 16.50–17.20 m wide, and up to 5.80 m deep. The eastern edge of the ditch was at a distance ca 1.40 m from the more recent rampart of the fortress. The ditch was not dug through the area where the communication was, but ca 5 m to the north and south of it.[4] It was precisely in the area to the north and to the south of the communication that the ditch was excavated completely to a length of ca 60 m, and a smaller segment of the ditch was researched to the bottom near the north-western corner of the fortress as well. The remaining, largest part of the ditch, was excavated to various depths, and it should be noted that to the south of the communication, in one segment, its western edge has not yet been discovered.

Along the northern rampart of the fort, the ditch was researched to a considerably smaller extent in the section from the corner tower to the northern gate, compared to the section on the western side. Even though the rampart was discovered to a length of 180 m, the southern side and the bottom of the ditch have been researched to a length of less than 20 m, while only the southern edge has (mostly) been researched in the remaining part.

With the exception of one grave (G-20),[5] located along the northern rampart of the more recent fortress, the graves were mostly distributed along the western rampart (fig. 2).

Most of the graves (26) along the western rampart were located between the rampart and the ditch, at a distance of 1.25 m from the face of the rampart. The northernmost grave was dug in along the eastern end of a massive wall, which was bridging the ditch near the north-western corner, in the vicinity of the corner tower. Further to the south, graves were distributed individually, or in groups, at different distances. Six graves were discovered in the infill of the ditch, with only one of them in its central part, and this was also the grave that was dug in deepest in this necropolis. Above the western side of the ditch, three graves were discovered, one of them dug in to the west of the edge of the ditch, that is to say, outside the edges of the ditch. All graves on the western side were located to the north of the communication that led from the fortress to the city. The reason for that could potentially be the poor research level of the western side of the ditch in the southern trenches.

The largest number of graves (29) has constructions in the shape of rectangular tombs made of bricks and tegulae of different dimensions,[6] that are laid sideways. The outer sides of the tombs were occasionally reinforced/fastened with smaller fragments of tegulae and bricks or small pieces of schist or limestone. Most of the constructions had a floor in the form of horizontally laid whole or fragmented bricks and tegulae, while putting schist at the bottom of graves represents an exception. In several cases, the deceased were laid directly onto the ground, i.e., the construction had no floor. The covers of the tombs were usually formed of horizontally placed bricks and tegulae, more rarely in the form of a double pitched roof, and in only one case, a fragment of a limestone block was used as a part of the cover. Aside from these constructions, seven freely dug graves were also registered. Graves from this necropolis have different orientations and no regular pattern was noted in their distribution. It can be noted that there are no cases of one grave damaging another, they are often clustered and they were all dug into

4 A small part of the ditch, at a length of ca 5 m, is located under the modern road.

5 Aside from this grave, the poorly preserved skeletal remains of two more individuals, a new-born and a child in the first months of life, were registered along the northern rampart, whose graves have not been documented yet.

6 Dimensions of the bricks are between 38 x 29 x 4 cm (smallest) and 42 x 31 x 4 cm (largest), while the dimensions of tegulae vary between 48 x 36 x 3 cm (smallest) and 56 x 42 x 5 cm (largest).

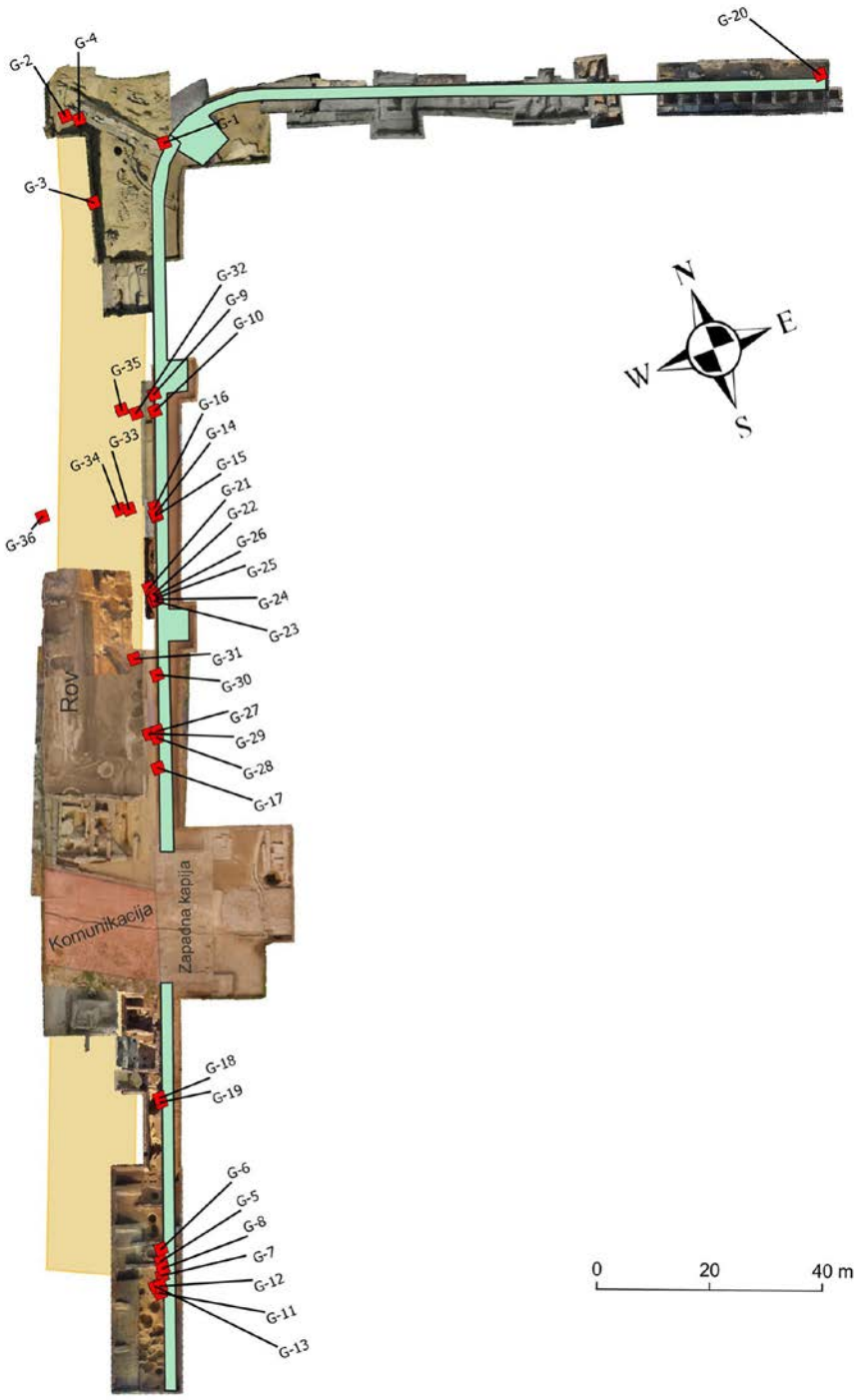

Fig. 2 Distribution of the graves along the rampart and within the camp (Ž. Jovanović, I. Marjanović)

a more recent Late Roman horizon.

As was mentioned in the introduction, 36 graves were discovered and processed in a catalogue, in which 37 individuals were buried.[7] There were no skeletal remains in one grave (G-3), and there were three individuals buried in another (G-

7 Data on the sex and age of individuals was taken from anthropological reports of Dr Ilija Mikić and Dr Nataša Šarkić. We would like to take this occasion to thank Dr Ilija Mikić for additional help and useful information.

33). Almost half are graves with new-borns buried in them (18 graves), six have babies in the first months – up to six months of age buried in them, and eight graves contain children of different ages (Table 1).

Adults were found in only five graves, among which there are three female individuals, one aged ca 20, and another being the oldest person buried in this necropolis, aged ca 45; it was not possible to determine the age of the third female individual. The only male individual buried in this necropolis was aged between 20 and 25, and one individual remains with undetermined sex.

A number of graves were partially demolished, possibly also raided and, consequently, aside from the damage to the constructions themselves, the skeletal remains were also disturbed. Also, we should bear in mind the poor preservation level of the skeletal remains in most graves. Even though the position of certain skeletons cannot be determined with precision, or at all, because of the damage or poor preservation level, it was determined that most individuals were buried in a supine position, with arms extended along the side of the body or, more rarely, with hands placed on the pelvis/stomach.

An extremely small number of grave goods can be noted at the researched necropolis; most graves had no goods discovered, even those that were not damaged or raided. Of the total number of graves (36), only 5 graves had any goods (13.89%), with 8 find discovered in them (fig. 3/1-5). In a grave of a baby aged up to six months (G-2), four beads were found – one made of bone and three made of glass, as well as a thin bronze hoop (bracelet) with a pendant – bell. There was one find in each of three graves: in a grave of a new-born (G-11) a part of a bronze bracelet was found, and in the grave of a child that was between one and two years old (G-12) there was a bronze coin of Valentinian (364–365). On the right hand of a girl aged between seven and eleven years old (G-23), there was a bronze ring. Two pieces of poorly preserved coins from the 4th century (one of which was dated to the sixth decade of the 4th century) and one polyhedral bead of green glass represented the goods from the grave of a girl aged ca 20 (G-29).

All the examples of coins are dated to the 4th century; one is insufficiently legible, one is roughly dated to the sixth decade of the century, while one is a bronze coin of Valentinian (364–365). Although few in numbers, the find of coins chronologically determine this necropolis to the second half of the 4th century, which coincides with the dating obtained on the basis of the stratigraphy, as well as other find, most prominently ceramic

AGE	NUMBER	PERCENTAGE OF TOTAL
New-borns	18	48.65%
Babies in the first months of life (up to 6 months)	6	16.22%
Children aged 1-2	2	5.41%
Children aged 3-4	1	2.70%
Children aged 5-9	1	2.70%
Children aged 7-13	3	8.11%
Children of undetermined age	1	2.70%
Adult individuals	5	13.51%

Table 1

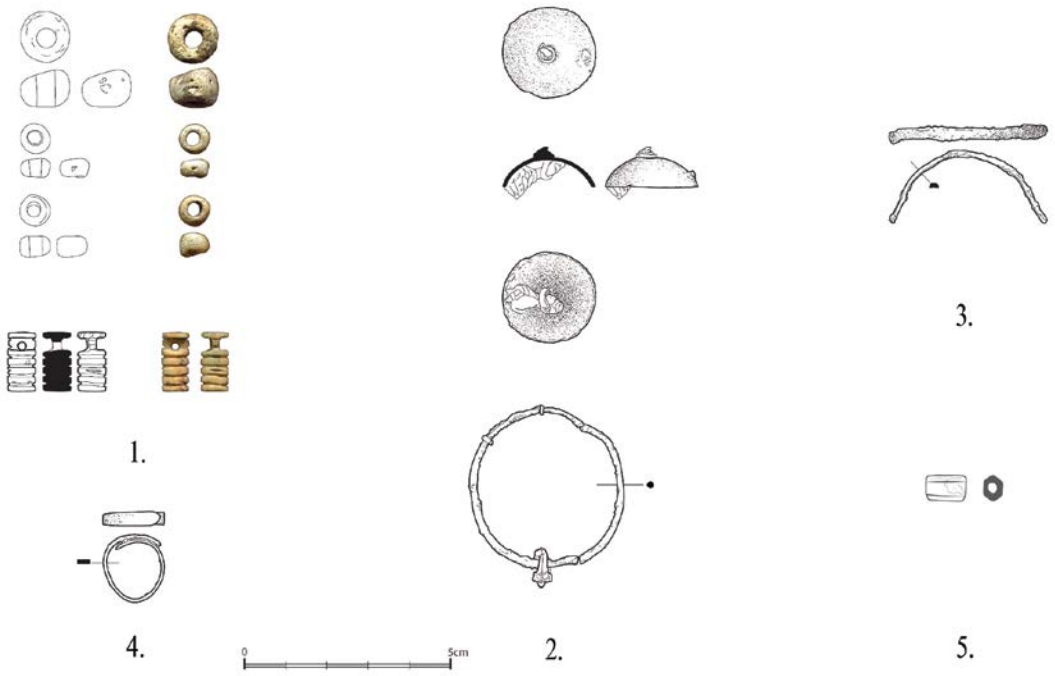

Fig. 3 Findings from the graves: 1. four beads – one made of bone and three made of glass; 2. bronze hoop (bracelet) with a pendant – bell; 3. part of a bronze bracelet; 4. bronze ring; 5. polyhedral glass bead (drawn by A. Subotić)

vessels and lamps, discovered in the layers into which the graves were dug. The remaining few find from graves are, unfortunately, not chronologically sensitive.

In the Roman period, beads were most commonly an integral part of bracelets or necklaces, and they were made from diverse materials, in various shapes and sizes. Most types of beads are not chronologically sensitive, and they occur in the wider territory of the Empire in the period from the 1st to the 4th century, hence, they are usually dated on the basis of the context (Riha, 1990: 77). This was also the case with the types discovered in graves from this necropolis. Ring-shaped and spherical beads, as well as elongated beads with a hexagonal cross-section are common on Roman sites throughout the Empire. They were most commonly made of glass, and more rarely from other materials – stone, ceramics, bronze or bone. Polyhedral beads with a hexagonal cross-section are especially common in the Late Antiquity period (Guido, 1978: 96-97; Riha, 1990: 85, 89). An exception is the bone bead, in the form of a smaller pendant, in a cylindrical shape, with horizontal ribs and a perforation on one of the narrower sides. No suitable analogies have been found for this find.

During the Roman period, bells were made of metals, most commonly iron or bronze, and they appear in various dimensions. They had multiple functions, depending on their size and the context in which they were found (Eckardt and Williams, 2018: 180). The discovered example of the bell on the bracelet is shallow, and hemispherical in shape. There is a perforation at the top, through which a wire was threaded, with a hanging loop, by which the bell is fastened to a thinner bronze bracelet/hoop. The bell is made of bronze, and there is an iron clapper inside, fused to the waist of the bell by corrosion. Hemispherical bells of smaller dimensions occur as early as the Flavian period, but they were used up until the 3rd and the 4th century, hence, it can be said that this type, with its numerous variations, is not chronologically sensitive (Eckardt and Williams, 2018: 185).

The bracelet on which the bell hung is in the shape of a thinner hoop made of bronze wire, with a circular cross-section.

One of the typical find which were used in the Roman period as objects with a protective-apotropaic character, were precisely bells. They were usually examples of smaller dimensions, and they are often found in funerary contexts and in combination with other prophylactic objects (Dasen, 2003: 287; Eckardt and Williams, 2018: 197). Bells were most commonly fastened to a thinner hoop and placed on the wrist, or they represented a part of a necklace, along with other objects with a magical-apotropaic character. Their ringing sound served the purpose of chasing away the evil spirits and demons and, thus, protect the deceased. Such a use of bells has been confirmed on numerous Roman sites, among others, at the necropolis of Više Grobalja in *Viminacium* (those were child burials, seven skeletal burials) (Dasen, 2003: 287; Milovanović, 2016: 113–114). Aside from the bells, child graves often contained other objects that had the task, through symbolism or a specific ringing sound, of chasing away the evil forces and protecting the deceased. They are found individually, or more commonly in groups and strung onto a necklace or a bracelet, and they are classified together under the Latin term *crepundia* (*crepare* – to rattle) (Milovanović, 2016: 107, 109; Данковић, Миловановић, Марјановић, 2018: 72).

The bronze ring from grave G-23 belongs to the type with a band-shaped hoop with a rectangular cross-section, with overlapping open rounded ends. This type is not chronologically sensitive, because it occurs in contexts from the 1st up to the 4th century (Riha, 1990: 47).

The discovered fragment of a bracelet in grave G-11 was made from a bronze band with a rectangular cross-section and, unfortunately, there are no elements that could indicate a closer typological or chronological determination for this example.

Compared to the number of researched graves, the findings from the necropolis at the *castrum* are few. This could be because the graves of the newborns – the most numerous type in this necropolis – were treated differently from the graves of older children in the Roman and Late Roman period. Namely, the graves of stillborn children or those that died shortly after birth were usually without finds, which changed for those at the age of six months, when grave goods are most common, and their contents more diverse (Dasen, 2003: 288). Aside from this, we should not eliminate the possibility that certain graves had been raided, or that poorer ranks of the population were buried in this area.

In one case (G-17, see footnote 11), neatly placed animal bones of different types of animals were discovered on the cover of the grave. This is a unique case of grave goods in the form of animal bones in the researched necropolis. It is possible that in this case those animal bones were placed as some sort of grave goods (or perhaps it was another ritual?), since the composition, i.e., the presence of animal types does not indicate the possibility of them being an offering of a meal for the deceased, nor the remains of a funerary meal of the living.

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The researched necropolis along the north-western corner of the military fortress confirms the previous assumption that the ditch along the ramparts no longer had a defensive role in the Late Roman period. It is certain that burials were performed here during the second half of the 4th century, when buildings with an economic character also existed in the ditch, in the vicinity of the communication that led from the western gate of the fort to the city, in the same period. It can be noted that no grave damaged another, that they were often grouped or located on the same level, and also that they were dug into the same cultural horizon. This indicates the use of the necropolis over a limited period. Notable is the big difference in the number and arrangement of graves in front of the western rampart of the military fortress in comparison with the area in front of the northern

rampart. One of the reasons for the big difference is certainly the different level of excavations of the area in front of the ramparts. In addition, it is noticeable that most of the graves in front of the western rampart are located in a narrow space between the rampart and the eastern edge of the defensive ditch, not wider than 1.80 m. Based on the small number of graves discovered in the narrow space between the edge of the ditch and the northern rampart, we can assume that the northern part of necropolis was considerably smaller. It can be assumed that the skeletal remains discovered along the northern rampart were an exception, while the area to the west of the western rampart was used as a necropolis in Late Antiquity. It is evident that the area of the legionary fortress, and most prominently the defensive ditch along the fortress, did not have the same function in Late Antiquity. Therefore, we should not be surprised by the fact that this area, even though it was located in the immediate vicinity of the city (intramuros?), was repurposed and used for burials. We do not know if this necropolis extended beyond, to the west, but this can be assumed on the basis of a grave discovered to the west of the edge of the ditch (G-36).

The question is whether the burials in this necropolis could be brought into connection, in a way, with other graves researched in the nearer vicinity as well. Namely, at a distance of ca 140 m to the north-west of this necropolis, in the area of the amphitheatre, a necropolis was researched, created in the Late Roman period, after this building stopped being used for spectacles. Sixty-seven graves were discovered in it,[8] both freely buried, and also buried in various constructions made of bricks. A large number of them were also children.[9] Four graves of adult individuals, in constructions made of bricks, were also dated to the Late Roman period – the second half of the 4th century, and they were discovered to the southeast of the amphitheatre. It has not been established if these graves represented the western border that stretched further to the east or if they were individual burials (Nikolić, Stojić 2018: 19–27).

The disproportionate presence of child burials, compared to the total number of deceased, aside from the high mortality rate of new-borns and children in this period of crisis, also remains unsolved. The discovery of this necropolis opened numerous questions, that only future research activities will be able to provide answers to. Considering the fact that no further excavations of the ditch are foreseen in the near future, nor those of the area to the west – the city, the aim of this paper is to show the results obtained through archaeological research that could serve as a basis for further research of the fortress, as well as a further interpretation of the skeletal remains. It is expected that more detailed anthropological and physical-chemical analyses of the skeletal remains would discover the cause of the high mortality rate of the new-borns buried in this necropolis, but also provide an insight into various aspects of the life of the population of *Viminacium* in the Late Roman period, such as its age structure, health status and nutrition.

8 Several graves were destroyed during the work of mechanical excavators.

9 Results of this research have not been published.

CATALOGUE

Grave G-1 (*76.80*)

Grave with a construction made of tegulae, oriented along a north-west/south-east axis. The construction, with dimensions of 0.60 x 0.30 m, consists of four tegulae laid sideways. The cover is also made of tegulae, while the bottom consists of a layer of yellow clayish soil. The southern side of the construction is damaged.

This was a grave of a new-born, placed on the back, in a stretched position, with the left arm extended along the body. The skeleton is mostly damaged, with the right side missing, and most of the bones dislocated. The preserved length of the skeleton is 0.40 m.

There were no goods in the grave.

Grave G-2 (*76.21*)

Grave with a construction made of bricks, oriented along a west-east axis, with a slight deviation of the western side towards the north. The construction, with dimensions of 0.80 x 0.41 m, is formed by sideways laid bricks – one whole and a half on the longitudinal and one brick on each of the lateral sides, with longitudinal sides being reinforced with smaller fragments of bricks and schist. The bottom of the grave was paved with one whole and one half of a second brick. The cover consists of two whole and one half of a brick.

It is a grave of a child that was up to six months old, laid on the back. The fragmented skull, turned to the right, was preserved *in situ*, while most of the bones had been dislocated, hence, a more precise position of the deceased cannot be determined. The preserved length of the skeleton is 0.55 m.

Four beads – one made of bone and three made of glass – were found on the chest of the deceased, along the left humerus, and along the eastern edge of the grave, near the left lower leg of the deceased, there was a thin bronze hoop with a pendant – a bell.

Grave G-3 (*75.96/ 75.88*)

Grave with a construction made of bricks and tegulae, oriented along a west-east axis. The construction, with dimensions of 1.08 x 0.40 x 0.40 m, is formed by two sideways laid tegulae along the longitudinal sides, and one tegula on each of the lateral sides, with longitudinal sides being reinforced with smaller fragments of bricks and schist. One half of a brick was placed as a head rest on the eastern side of the grave. The bottom consists of two whole and one fragmented brick, while the cover consists of four damaged tegulae, which partially collapsed into the grave.

There were no skeletal remains and no grave goods in the grave.

Grave G-4 (*76.31*)

Grave with a construction made of tegulae fragments, oriented along a north-west/south-east axis. The construction, with dimensions of 0.55 x 0.35/0.25 x 0.17 m, is formed by fragmented tegulae laid sideways. The bottom of the grave was also made of tegulae fragments, while the cover is one broken tegula.

It is a grave of a new-born, laid on the back, with an extended right arm, and the left one slightly bent at the elbow. The preserved length of the skeleton is 0.40 m.

There were no goods in the grave.

Grave G-5 *(78.07)*

Grave with a construction made of bricks, oriented along a west-east axis, with a slight deviation of the western part towards the north. The construction, with dimension of 0.48 x 0.23 m, is formed by bricks laid sideways – two on the longer side, in the south, and one on the lateral, western side. The floor of the grave consists of two whole bricks. The cover has not been discovered, and the northern and eastern part of the construction had been damaged.

It is a grave of a new-born. Considering the fact that only the skull was preserved *in situ*, it was not possible to determine the position of the deceased. There were no goods in the grave.

Grave G-6 *(78.02)*

Grave with a brick construction, oriented along a south-west/north-east axis. The construction, with dimensions of 0.60 x 0.28 m, is formed by sideways laid bricks – on the longitudinal sides, there was one brick placed lengthwise, and on the lateral sides, one placed across the width, among which there were pieces of schist and bricks inserted. The floor of the grave is formed by two whole bricks, while the cover was made of one brick and one fragment of a limestone block.

It is a grave of a new-born, placed on the back. The skull, ribs and right arm were preserved *in situ*, while the other bones had been dislocated. The preserved length of the skeleton is 28 cm. There were no goods in the grave.

Grave G-7 *(77.97)*
Grave of a freely buried deceased individual, oriented along a north-east/south-west axis.
It is a grave of a child, laid on the back. Only the skull, several ribs, a part of the right arm and the right leg were preserved *in situ*, while the other bones had been dislocated. The preserved length of the skeleton is 0.37 m.
There were no goods in the grave.

Grave G-8 *(77.93)*
Grave of a freely buried deceased individual, oriented along a south-north axis, with a minor deviation of the southern part towards the east.
It is a grave of a new-born, laid on the back, in a stretched position, with crossed legs. The ribs, arms, pelvis and legs were the parts of the skeleton preserved *in situ*, while the skull was dislocated during the excavations. The preserved length of the skeleton is 0.34 m.
There were no goods in the grave.

Grave G-9 (*77.37*)
Grave with a construction made of bricks and tegulae, approximately oriented along a south-west/north-east axis. The construction, with dimensions of 0.55 x 0.28 x 0.20 m, is formed by fragments of bricks and tegulae laid sideways. The cover consists of two fragmented tegulae, while the floor is one larger fragment of a tegula.
It is a grave of a new-born. Of all the bones, only the long bones of the right (?) leg and one half of the pelvis were preserved *in situ*, while the other bones had been dislocated and concentrated in the southern half of the grave. The preserved length of the skeleton is 0.20 m.
There were no goods in the grave.

Grave G-10 (*77.43*)

Grave with a construction made of tegulae, approximately oriented along a north-east/south-west axis. The construction, with dimensions of 0.55 x 0.42 m, is formed by fragmented tegulae laid sideways, which have been preserved only on the northern and the southern side. The cover of the grave is one whole tegula, over which a fragment of another tegula was placed, while the floor consists of a layer of earth.

It is a grave of a new-born. Of all the bones, only fragments of the calotte of the skull were preserved *in situ* on the northern side of the grave, and a smaller number of bones was discovered dislocated.

There were no goods in the grave.

Grave G-11 *(77.85)*

Grave with a construction made of bricks and tegulae, approximately oriented along a west-east axis, with a deviation of the western part towards the north. The construction, with dimensions of 0.60 x 0.27 x 0.10 m, is formed by tegulae fragments laid sideways. The floor of the grave consists of four fragments of horizontally laid bricks.

It is a grave of a new-born. Of all the bones, the skull, ribs, right and left hand, left side of the pelvis and left femur were preserved *in situ*, and a small number of bones was discovered during the emptying of the grave as well. The preserved length of the skeleton is 36 cm.

A fragment of a bronze bracelet was discovered in the area of the chest.

Grave G-12 (*77.39*)

Grave with a construction made of bricks and tegulae, approximately oriented along a north-south axis, with a deviation of the northern part towards the east. The construction, with dimensions of 0.85 x 0.25 x 0.20 m, is formed by bricks laid sideways on the longitudinal sides, while the construction of the narrower sides has not been discovered. The cover consists of two tegulae and one fragmented brick, and the floor is made of three fragmented bricks.

It is a grave of a child aged 1-2, laid on the back, in a stretched position, with hands placed on the stomach. Bones are well preserved, and the length of the skeleton is 0.60 m.

A bronze coin (Valentinian) was discovered along the left side of the pelvis.

Grave G-13 *(77.37)*

Grave with a construction made of bricks and tegulae, approximately oriented along a north-west/south-east axis. Only the floor was preserved from the construction, consisting of one brick (38 x 29 x 4 cm), on which the body of the deceased was laid. In the layer above the deceased, a fragmented tegula was discovered, as well as brick fragments, which were not placed regularly horizontally, but which could have represented the cover of the grave.

It is a grave of a new-born, laid on the back, in a stretched position, with hands beside the body. Bones are well preserved, and the length of the skeleton is 0.45 m.

There were no goods in the grave.

Grave G-14 *(77.45)*

Grave of a freely buried individual. The orientation of the grave could not be determined, because the bones were not articulated.

It is a demolished grave of a child in the first months of life, whose remains were concentrated on a surface with dimensions of 0.20 x 0.25 m.

There were no goods in the grave.

Grave G-15 *(77.47)*

Grave of a freely buried individual, approximately oriented along a north-east/south-west axis.

It is a demolished grave of a child aged up to six months, whose remains were concentrated on a surface with dimensions of 0.25 x 0.25 m. The bones of the skull, ribs, vertebrae and bones of the left forearm were preserved *in situ*, while the other bones had been dislocated or missing.

There were no goods in the grave.

Grave G-16 *(77.35)*

Grave with a construction made of bricks and tegulae, approximately oriented along a north-east/south-west axis. The construction, with dimensions of 0.50 x 0.30 x 0.20 m, is formed by fragmented bricks and tegulae laid sideways. The longer sides of the tomb consist of two fragmented bricks/tegulae each, while the lateral, southern side, consists of one fragmented brick. The floor of the grave consists of two fragmented, horizontally laid tegulae. The cover of the grave is missing, as well as the northern side of the tomb.

It is a grave of a new-born, laid on the back, with arms beside the body; one leg was bent at the knee, the lower leg is higher than the rest of the body, and the femur is placed vertically (probably as a consequence of animal activity). The preserved length of the skeleton is 40 cm.

There were no goods in the grave.

* In the northern part, there was a large animal bone (scapula) across the grave, and another animal bone next to the feet of the deceased.

Grave G-17 *(79.23/79.15)*

Grave with a construction made of bricks and tegulae, oriented along a north-east/south-west axis. The construction consists of a cover and bottom, while the sides of the grave construction do not exist. The cover, with dimensions of 1.10/1.20 x 0.30/0.50 m, consists of a brick, large fragmented tegula and large fragments of tegulae and bricks, irregularly laid into two to four rows. Under the first layer of the cover, on the northern side of the grave, several different animal bones were discovered.[10] The bottom, with dimensions of 0.80 x

10 The bones discovered comprehended those of cattle, sheep and dog, as well as a bone of a fish from the sturgeon family. A fragment of a human bone was also discovered

0.28 m, consists of two horizontally placed bricks. It is a grave of a child aged between two and four, buried in a stretched position, with hands placed on the pelvis. The skeleton is well preserved, although the calotte of the skull is fragmented, and certain bones are missing. The preserved length of the skeleton is 0.72 m.
There were no goods in the grave.

Grave G-18 *(78.58)*

Grave with a construction made of bricks, oriented along a north-west/south-east axis. The construction, with dimensions of 0.40 x 0.30 x 15 m, is formed by a tomb made of sideways laid bricks, out of which only one fragmented brick was saved on each of the lateral sides, as well as one on the western front edge.
It is a grave of a new-born, buried in a stretched position. Only part of the skull, and bones of the arms have been preserved *in situ* (the preserved length is 0.25 m), while a smaller number of bones had been dislocated.
There were no goods in the grave.

Grave G-19 *(78.36)*

Grave with a construction made of bricks and tegulae, oriented along a north-south axis, with a deviation of the northern part towards the east. The construction, with dimensions of 0.70 x 0.45 m, is formed by a tomb with sideways laid bricks, out of which only one fragmented brick was preserved on each of the shorter, lateral sides. The cover of the grave consists of two bricks placed aslant, one of them with a stamp: LEGVIICL-RENO/TEMPCONCORDVC.[11] Over them, frag-

among the animal remains, which could be linked to the buried individual. We would like to thank Dr. Sonja Vuković, from the Faculty of Philosophy in Belgrade, for the analysis of the archaeozoological remains.

11 The solution for this stamp would be: *Leg(io) VII Cl(audia) RENO (vata/vatum) TEMP (erante/ore) CONCOR(di) DUC(is)*. Up until now, 31 finds of bricks with this stamp have been discovered, all in the area of *Viminacium*; they are linked to the reorganisation of the legion and the restoration of the fort during the First Tetrarchy (von Premerštajn, Vulić 1903: 55, n. 78; Mirković, 2015: 122; oral information by Lj. Jevtović). Considering the

ments of bricks and a larger piece of green stone were irregularly placed. The bottom of the grave consists of a horizontally placed fragmented tegula with dimensions of 0.50 x 0.20 m.
It is a grave of a new-born, buried in a stretched position. Only part of the skull, and bones of the legs have been preserved *in situ*, while a smaller number of bones had been dislocated. The preserved length of the skeleton is 0.43 m.
There were no goods in the grave.

Grave G-20 *(77.09)*
Grave of a freely buried individual, oriented along a east-west axis, with a deviation of the eastern part towards the south.
It was a partially demolished grave of a male individual, aged 20-25. The deceased was laid on the back, and on the basis of the preserved part of the skeleton, it can be assumed that he was buried in a stretched position. His head was laid on the right cheek, and turned towards the north. Of all the bones, a part of the skull, ribs, part of the pelvis, left forearm with the hand and a part of the left femur were preserved *in situ*. The preserved length of the skeleton is 1.05 m.
There were no goods in the grave.

Grave G-21 *(77.90)*
Grave with a construction made of bricks and tegulae, oriented along an east-west axis, with a deviation of the western part towards the north. The construction, with dimensions of 0.60 x 0.35 x 0.20 m, is formed by a tomb with sideways laid fragmented tegulae. The bottom consists of one whole and one fragmented horizontally placed brick. The cover and the southern, lateral side of the construction, are missing.
It is a grave of a new-born, buried in a stretched position, on the back, with hands on the stomach. Most of the skeleton was preserved *in situ*, while the bones of the chest had been dislocated, and certain bones of the hands and feet are missing. The preserved length of the skeleton is 0.50 m.
There were no goods in the grave.

fact that the brick was most probably in secondary use, it cannot be used for dating.
We would like to thank our colleague Lj. Jevtović for the useful information and help in the interpretation of the stamp.

Grave G-22 *(77.85)*

Grave with a construction made of bricks and tegulae, oriented along a north-east/south-west axis, with a deviation of the north-eastern part towards the west. The construction, with dimensions of 1.35 x 0.45 x 0.37 m, is formed by a tomb made of, sideways, longitudinally laid bricks. The shorter sides of the tomb, the northern and the southern one, are missing. The cover of the construction consists of two whole tegulae, with several fragments of bricks and tegulae over it, unevenly placed. The grave did not have a floor, the deceased was placed directly onto a layer of earth instead.

It is a grave of an adult individual, female, buried in a stretched position, on her back, with hands on the stomach and legs slightly bent at the knees, leaning towards the right side of the grave. Most of the skeleton was discovered *in situ*, and the bones were well preserved. The preserved length of the skeleton is 1.30 m.

There were no goods in the grave.

Grave G-23 *(77.92)*

Grave with a construction made of tegulae, oriented along a west-east axis, with a deviation of the western part towards the north. The construction, with dimensions of 0.85 x 0.40 x 0.35 m, is formed by a cover of whole and fragmented tegulae, placed in the form of a double pitched roof. The construction was damaged in the western part, where a part of the cover is missing, hence, the length of the entire grave would have been approximately 1.30 m. The shorter sides have not been discovered, and nor has the bottom of the construction – the deceased was laid directly onto the earth, dug into a layer of dark yellowish, almost sterile soil.

It is a grave of a female child, aged between 7 and 11, buried in a stretched position, on the back, with hands crossed on the chest. The bones are very well preserved, and the skeleton is almost entirely articulated. The preserved length of the skeleton is 1.13 m.

A bronze ring was discovered on the right hand of the deceased.

Grave G-24 *(77.60)*

Grave of a freely buried individual, oriented along a south-west/north-east axis, with a deviation of the north-western part towards the north.

It was a partially damaged grave of a new-born. The deceased was buried in a layer of dark yellowish, almost completely sterile clay soil. The skeleton is poorly preserved – most of the bones had been dislocated, and on the basis of the bones discovered *in situ* (fragments of the skull, ribs, and long bones of the legs), it can be assumed that the deceased was in a stretched position, on the back. The preserved length of the skeleton is 0.40 m.

There were no goods in the grave.

Grave G-25 *(77.49)*

Grave of a freely buried individual, oriented along a north-south axis, with a deviation of the northern part towards the east.

It was a partially damaged grave of a new-born, buried in a stretched position. The deceased was buried in a layer of dark yellow virgin soil. The skeleton is poorly preserved, with a large number of bones dislocated. The preserved length of the skeleton is 0.35 m.

There were no goods in the grave.

Grave G-26 *(77.88)*

Grave with a construction made of tegulae, oriented along a north-west/south-east axis, with a deviation of the north-western part towards the south. The construction, with dimensions of 0.30 x 0.20 x 0.20 m, is formed by two fragmented sideways laid tegulae, representing the lateral sides. The grave most probably had a cover in the form of a horizontally placed fragmented tegula, which was removed before the unit was recognised as being a grave. The shorter sides have not been discovered, and neither was the bottom of the construction – the deceased was laid directly onto the earth.

It was a partially damaged grave of a new-born. On the basis of the bones that remained articulated (some of the bones of the chest, bones of the left arm, and long bones of the legs), it can

be assumed that the deceased was in a stretched position, on the back. The preserved length of the skeleton is 0.27 m.
There were no goods in the grave.

Grave G-27 *(78.15)*
Grave with a construction made of tegulae, approximately oriented along a north-east/south-west axis. The construction, with dimensions of 0.58 x 0.43 x 0.36 m, is formed of two tegulae in the form of a double gabled roof, with lateral sides of fragmented sideways laid tegulae and the bottom consisting of one horizontally placed tegula. The outer sides of the grave were fortified by fragments of tegulae and smaller pieces of schist. On one of the tegulae from the cover, a damaged stamp LEG[...] can be discerned.
It is a grave of a child in the first months of life, buried in a stretched position, on the back, with hands on the pelvis. Of all the bones, certain long bones of the extremities, as well as a part of the pelvis, were preserved *in situ*, while most of the remaining bones had been dislocated. The preserved length of the skeleton is 40 cm.
There were no goods in the grave.

Grave G-28 *(78.15)*
Grave with a construction made of bricks and tegulae, approximately oriented along a north-east/south-west axis. The construction, with dimensions of 0.70 x 0.33 x 0.30 m, is formed by a cover made of two tegulae (in the form of a double pitched roof), lateral sides made of fragmented sideways laid tegulae and bottom made of one horizontally laid tegula. The outer sides of the grave were supported by fragments of tegulae.
It is a grave of a child aged up to six months. The bones of the deceased are dislocated, hence, the position cannot be determined. In the central part of the grave, there was a larger concentration of bones on a surface with dimensions of 0.25 x 0.10 m.
There were no goods in the grave.

Grave G-29 *(77.50)*

Grave with a construction made of bricks and tegulae, approximately oriented along a north-west/south-east axis. The construction, with dimensions of 1.70 x 0.54 x 0.40 m, is formed by a tomb made of whole and fragmented sideways laid tegulae, with a bottom made of horizontally laid tegulae and bricks. The western lateral side is supported by a fragment of a tegula, while the eastern side is missing – the grave is leaning onto the virgin soil under the ramparts. The cover consists of horizontally laid tegulae and one brick, and a part of the cover is missing in the eastern half of the grave.

It was a tomb of a female individual, aged ca 20, laid on her back, with the right arm over the pelvis, and the left arm stretched along the body. Most of the skeleton was preserved *in situ*, and the bones are in good condition, except for a part of the pelvis and a part of the right arm and hand, which had been dislocated, possibly due to animal activity. The preserved length of the skeleton is 1.56 m.

Two pieces of poorly preserved coins from the 4th century were discovered in the grave (one of which was dated to the sixth decade of the 4th century), as well as a polyhedral bead made of green glass.

Grave G-30 *(77.45)*

Grave with a construction made of bricks, approximately oriented along a south-west/north-east axis. The construction, with dimensions of 0.84 x 0.31 m, is formed by a tomb made of whole and fragmented sideways laid bricks, with a bottom made of one larger piece of green schist. The cover consists of two horizontally laid bricks.

It is a grave of a child in the first months of life, buried in a stretched position, on the back, with hands on the stomach. The fragmented skull, long bones of the legs and the left hand were preserved *in situ*, while most of the chest, right hand, pelvis and the right femur are missing. The preserved length of the skeleton is 46 cm.

There were no goods in the grave.

Grave G-31 *(77.06)*

Grave with a construction made of tegulae, approximately oriented along a north-west/south-east axis; the western side of the grave is partially demolished. The construction, with dimensions of 1.83 x 0.49 x 0.35 m, is formed by a tomb made of sideways laid tegulae; the eastern side is made of two tegulae that form a sharp angle. The sides of the tomb were fortified on the outside, and in places, with smaller pieces or limestone and fragments of tegulae. The cover was formed by horizontally laid tegulae, of which only one was preserved in the eastern part, while several more fragments of the cover collapsed into the inner part of the grave. The bottom consists of two whole and several fragmented horizontally laid tegulae.

It is a grave of an adult, of undetermined sex, buried in a stretched position, on the back. The right half of the pelvis, long bones of both legs, as well as both feet, were preserved *in situ*. More dislocated bones were discovered in the western part and the infill of the grave. The length of the surface covered with bones is 1.40 m, and the preserved length of the skeleton is 0.96 m.

There were no goods in the grave.

Grave G-32 (*76.57*)

Grave with a construction made of bricks and tegulae, oriented along a north-west/south-east axis. The construction, with dimensions of 0.60 x 0.28 m, is formed by sideways laid whole and fragmented tegulae, while the bottom was made of fragments of tegulae. The partially demolished construction was covered with a whole brick, which collapsed into the grave, so the bones of the skeleton were mostly smashed.

It is a grave of a new-born. The skeleton is poorly preserved, hence, it was not possible to determine the position of the deceased.

There were no goods in the grave.

Grave G-33 (*76.50/76.47/76.38*)

Grave with a construction made of tegulae, oriented along a north-west/south-east axis. The construction, with dimensions of 1.30 x 0.42/0.28 m, is formed by a tomb made of sideways laid whole and fragmented tegulae. The cover is formed by three transversely placed tegulae, while the bottom has not been discovered.

It is a grave of a child, in which three individuals were buried. One individual, aged between 5 and 9, was laid on the back, the second, aged between 8 and 13, was laid on the side, with the head turned towards the south; the third individual was female, aged between 7 and 11, and, on the basis of the position, we can assume that she was also laid on the back. The bones of all three individuals are well preserved.

There were no goods in the grave.

Grave G-34 (*76.34/76.23*)

Grave with a construction made of tegulae, oriented along a north-west/south-east axis. The construction, with dimensions of 0.86 x 0.37 m, is formed by a tomb made of sideways laid tegulae; on the southern longitudinal and eastern lateral side, the tegulae have not been preserved. The cover is formed by two horizontally laid tegulae (the length of the cover is 1.10 m, and the width 0.42 m). The bottom of the grave is formed by two larger horizontally laid fragments of tegulae.

It is a grave of a child in the first year of life. The bones of the skeleton had been dislocated – only a part of the skull, left arm and several ribs were preserved *in situ*, hence, it was not possible to determine the position of the deceased.

There were no goods in the grave.

Grave G-35 (*75.90*)

Grave of a freely buried individual, oriented along a west-east axis, with a slight deviation of the western part towards south. The grave had a cover with dimensions of 1.55 x 0.53 m, formed by four transversely laid tegulae.

It is a grave of a female individual, aged ca 45

years. The deceased was laid in a stretched position, on the back, with hands on the stomach/pelvis. The skeleton is well preserved, with a length of 1.40 m

There were no goods in the grave.

Grave G-36 (*77.10*)

Grave with a construction made of bricks and tegulae, oriented along a west-east axis. The construction, with dimensions of 0.55 x 0.40 m, is formed by a tomb made of sideways laid bricks and tegulae; the shorter, eastern side of the construction is missing. The cover is formed by larger fragments of horizontally laid tegulae, and the bottom consists of a horizontally laid brick and fragments of bricks and tegulae.

It is a grave of a new-born. The bones of the skeleton had been dislocated – only parts of the skull, several ribs and bones of both arms were preserved *in situ*, while other bones had been dislocated.

There were no goods in the grave.

BIBLIOGRAPHY

Bogdanović, I., Jevtović, Lj., Golubović, S. 2020

Legijski logor u Viminacijumu: arheološka istraživanja severnog bedema u 2018. godini, u: S. Vitezović, M. Radišić, Đ. Obradović (ur.) *Arheologija u Srbiji. Projekti Arheološkog instituta u 2018. godini*, 157-172.

Данковић, И. Миловановић**, Б.** Марјановић**, М. 2018**

Од девојчице до matronae: животни ток жена на Лимесу, у: Кораћ, М., Поп-Лазић, С. (ур.) *Римски лимес и градови на тлу Србије;* Београд: Српска академија наука и уметности, 72-80.

(**Danković, I., Milovanović, B., Marjanović, M.** Od devojčice do matronae: životni tok žena na Limesu, u: Korać M., Pop-Lazić S. (ur.), *Rimski limes i gradovi na tlu Srbije*, Beograd: Srpska akademija nauka i umetnosti, 72-80).

Dasen, V. 2003
Les amulettes d'enfants dans le monde gréco-romain, *Latomus* 62, 2: 275–289.

Eckardt, H. and Williams, S. 2018
The Sound of Magic? Bells in Roman Britain, *Britannia*, Volume 49: 179-210.

Guido, M. 1978
The Glass Beads of the Prehistoric and Roman Periods in Britain and Ireland, Thames and Hudson Ltd: London.

Milovanović, B. 2016
Inhumacija djece na nekropoli Više grobalja antičkog Viminacija, *Vjesnik Arheološkog muzeja u Zagrebu* 3, XLIX: 95–122.

Mirković, M. 2015
Rimljani na Đerdapu*. Istorija i natpisi*, Zaječar: Narodni muzej Zaječar, Muzej Krajine Negotin.

Mrđić, N. 2009
Topografija i urbanizacija Viminacijuma. Magistarska teza, Filozofski fakultet, Univerzitet u Beogradu, Beograd 2009.

Nikolić, S. and Stojić, G. 2018
A Review of several graves between the city and the military camp, *Archaeology and Science*, Vol. 14: 19-27.

Nikolić *et al*. 2019
Nikolić, S., Stojić, G., Marjanović, M., Bogdanović, I., Jevtović, Lj. 2019. Istraživanja na lokalitetu Čair – castrum (Viminacijum) 2017. godine, u: I. Bugarski, N. Gavrilović Vitas, V. Filipović (ur.) *Arheologija u Srbiji. Projekti Arheološkog instituta u 2017. godini*, Beograd 2019, 125–134.

Nikolić, S., Stojić, G., Marjanović, M. 2020
Legijski logor u Viminacijumu: arheološka istraživanja zapadnog dela bedema u 2018. godini, u: S. Vitezović, M. Radišić, Đ. Obradović (ur.) *Arheologija u Srbiji*. *Projekti Arheološkog instituta u 2018. godini*: Beograd 2020, 143-155.

Riha, E. 1990
Der römische Schmuck aus Augst und Kaiseraugst. Band 10, Augst: Römermuseum Augst.

Von Premerstein, A., Vulić, N. 1903
Antike Denkmäler in Serbien und Macedonien. *Jahreshefte des Österreichischen Archäologischen Institutes in Wien* VI, Bbl: 1-60.

REZIME
NEKROPOLA UZ SEVEROZAPADNI UGAO VOJNOG LOGORA NA VIMINACIJUMU

KLJUČNE REČI: NEKROPOLA, GROB, KASNA ANTIKA, VIMINACIUM, LEGIJSKI LOGOR, ODBRAMBENI ROV.

Arheološka iskopavanja vojnog logora na Viminacijumu, vršena su od kraja 19. veka, a nakon nekoliko decenija pauze, nastavljena su 2002. godine. Kontinuirana istraživanja započeta 2016. godine, do 2020. godine bila su usmerena na severozapadni deo utvrđenja, pretežno bedema, kula, zapadne kapije i odbrambenog rova. Utvrđene su dve osnovne faze izgradnje logora -starija, datovana u poslednje decenije I veka i mlađa, opredeljena u II vek.

Uz bedeme je otkriven i odbrambeni rov, koji je, nakon prestanka njegove odbrambene funkcije (posle treće četvrtine III veka), dobio drugačiju namenu. U njemu su izgrađeni objekati ekonomskog karaktera, kao i pet kružnih peći, koji su

korišćeni kroz ceo IV i početak V veka.

Pored pomenutih celina, otkrivena je i kasnoantička nekropola, koja je najvećim delom bila ukopana duž spoljne strane zapadnog bedema i uz ivice rova. U okviru ove nekropole istraženo je 36 grobova, u kojima je bilo sahranjeno 37 individua. U pitanju su skeletno sahranjeni pokojnici, među kojima su najbrojnija novorođenčad i deca, dok odraslim individuama pripada svega pet grobova. Sahrane su uglavnom vršene u kovčezima od opeka i tegula, dok je slobodno ukopanih pokojnika bilo znatno manje. Grobne konstrukcije su, u većoj ili manjoj meri oštećene, a kosti skeleta uglavnom loše sačuvane i najčešće devastirane. U orijentaciji i rasporedu grobova nisu uočene pravilnosti, često su grupisani ili se nalaze na istom nivou, ali ni jedan grob ne oštećuje drugi. Većina sahrana je bez nalaza, dok je u svega pet grobova nađeno osam predmeta. Velika razlika u broju grobova uz zapadni bedem logora u odnosu na one otkrivene uz severni bedem, samo donekle može da predstavlja različit stepen istraženosti. Činjenica je da je uz severni bedem, odnosno između bedema i rova, otkriven samo jedan grob i devastirani ostaci još dve individue, dok je duž zapadnog bedema, najveći broj grobova bio skoncentrisan upravo na tom uskom prostoru. Može se pretpostaviti da su skeletni ostaci otkriveni uz severni bedem bili izuzetak, dok je prostor zapadno od zapadnog bedema u kasnoj antici korišćen kao nekropola. S obzirom da legijski logor, a pre svega odbrambeni rov, u kasnoj antici više nemaju istu funkciju, ne treba da iznenađuje činjenica da je ovaj prostor, iako se nalazi u neposrednoj blizini grada (*intramuros*?) iskorišćen za sahranjivanje. Nije nam poznato da li se ova nekropola prostirala dalje ka zapadu, ali se to može pretpostaviti na osnovu groba otktivenog zapadno od ivice rova (G-36).

Postavlja se pitanje, da li bi se sahranjivanje na ovoj nekropoli, na neki način, moglo dovesi u vezu i sa grobovima istraženim na prostoru amfiteatra, gde je otkriveno 67 grobova, među kojima je veliki broj pripadao deci. Pored njih, jugoistočno od amfiteatra, otkrivena su još četiri groba odraslih osoba, koji su, takođe, datovani u kasnoantički period-drugu polovinu IV veka.

Nesrazmerna zastupljenost dečjih sahrana, u odnosu na ukupan broj pokojnika, pored velike smrtnost novorođenčadi i dece u ovom kriznom periodu, ostaje nerazjašnjena. Cilj ovog rada je da prikaže rezultate dobijene arheološkim ispitivanjima, koji bi mogli da posluže kao osnova za dalja istraživanja logora. Očekuje se da detaljnije antropološke analize skeletnih ostataka otkriju uzrok visoke smrtnosti novorođenčadi sahranjenih na ovoj nekropoli, ali i da pruže uvid u različite aspekte života stanovništva Viminacijuma u kasnoantičkom periodu, kao što su starosna struktura, zdravstveni status i ishrana.

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DOES HISTORY REPEAT ITSELF? THE DETERMINATION OF WOOD SPECIES USED FOR THE CONSTRUCTION OF THE VIMINACIUM AMPHITHEATRE

ABSTRACT

The wooden amphitheatre of Viminacium is mainly made of beech timber. Hornbeam, ash, maple, oak and coniferous wood were also used for the construction. It is considered that beech was underrated in Roman times and mostly used as firewood, however, recent anthracological research in the region has revealed that it was also used in shipbuilding. A great variety of tree species was available in Rome in large quantities. However, the high demand for timber in Rome led to the rapid depletion of the woodlands surrounding the capital and in much of the Apennines. As the empire expanded, timber cutting continued and expanded abroad, leading to timber being transported over long distances within and between the Roman provinces. Oak has always had enormous value, not only in Roman times but also throughout history. It was considered a high-quality construction timber. According to a forest regulation document of the Military Frontier from the 18th century, the use of oak for the construction of public buildings was prohibited by Austrian imperial authorities. The regulation indicates, on the one hand, that the selective felling of oak trees led to a change in the structure of the remaining forests in the region and to an increase in the depletion of the forest and, on the other hand, oak, due to its weight, was prone to causing damage to the buildings. As these buildings had to be made of quality wood, everything except the roof needed to be built of "white wood", i.e. beech, ash, or hornbeam.

KEYWORDS: VIMINACIUM, ROMAN PERIOD, AMPHITHEATRE, WOODEN CONSTRUCTION, ANTHRACOLOGY.

INTRODUCTION

Viminacium is located on the southern border of the Pannonian plain, in today's Serbia, at the confluence of the Mlava and Danube rivers (Fig. 1). It was situated in the province of Moesia, Moesia Superior, later Moesia Prima. Initially, it was a military camp, where the legion VII Claudia was stationed from the second half of the 1st century AD (Bogdanović and Nikolić, 2017). Next to the camp, a city developed and became the capital of the province. The Viminacium amphitheatre was situated near the legionary fortress. Based on archaeological data, it can be assumed that the amphitheatre was built at the beginning of the 2nd century AD, during the reign of the emperor Trajan. It was used until the end of the 3rd or early 4th century AD.

It has been possible to distinguish the primary wooden structure that was later replaced by a stone and wooden amphitheatre. The wooden amphitheatre of Viminacium represents that of a typical construction of an Imperial military type and typologically it belongs to Golvin's simplest type of amphitheatre (Golvin, 1988). The Viminacium wooden amphitheatre had at least 11 tiers of seats and could accommodate a maximum of 6,000 spectators (Bogdanović and Nikolić, 2017). Archaeologists assume that the length of the orig-

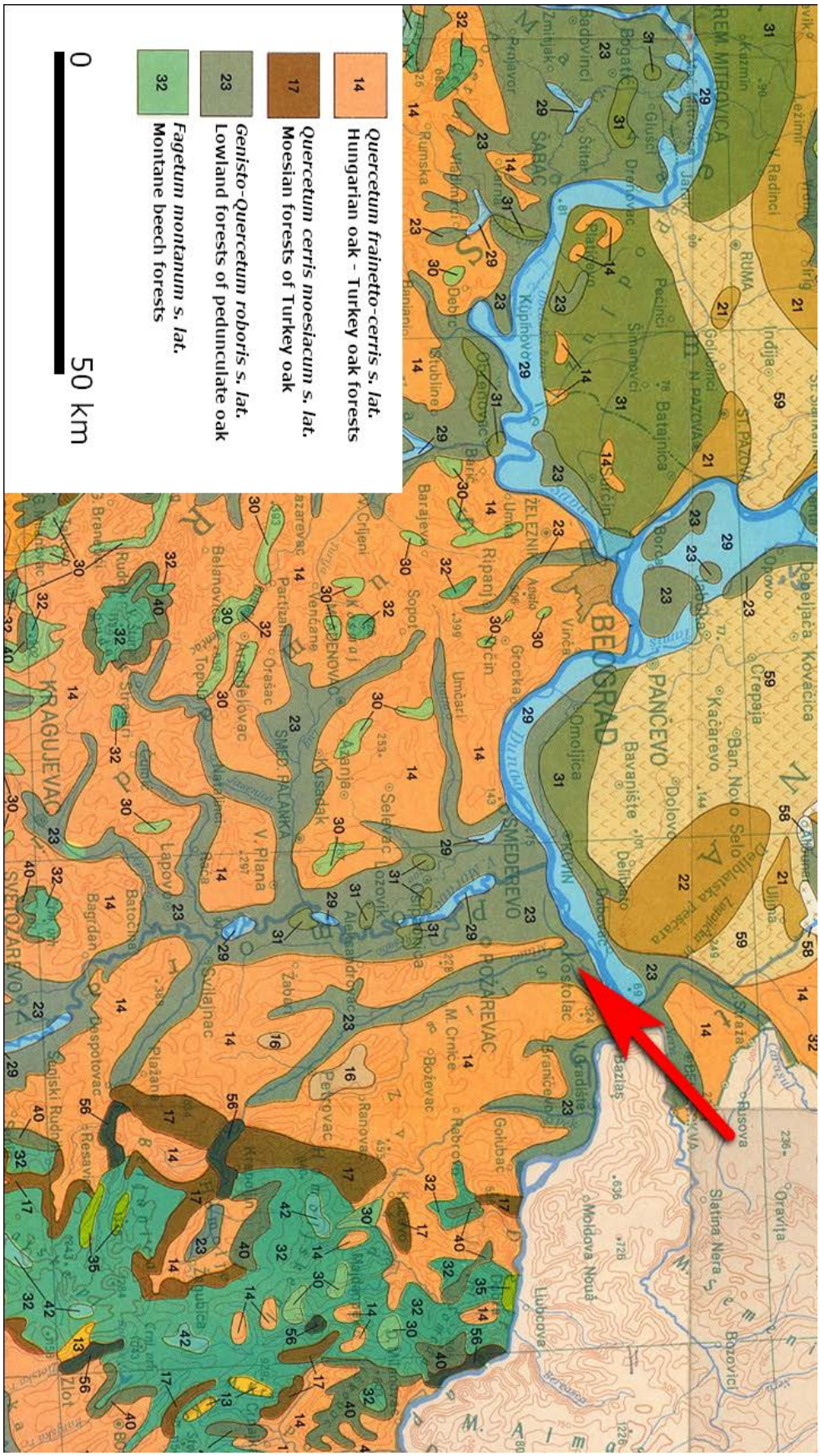

Fig. 1. Map of natural potential vegetation of the wide area of Viminacium (Fukarek and Jovanović, 1983). The red arrow indicates the location of Viminacium.

inal timber amphitheatre was approximately 82 m and the width was c. 70 m. The structural evidence for this primary structure includes post-holes and beam-slots detected at both ends of the long axis of the building and in the north-eastern part of the excavated surface (Bogdanović and Nikolić, 2017). Also, some pits with traces of timber construction, which were identified within the southern and south-western parts, belong to the wooden building. It is estimated that the seating framework consisted of wooden seats that were mounted on a wooden framework that was supported by wooden beams. Archaeologists have concluded that the full width of the *cavea* measured approximately 11 m. The whole complex structure was built on the principle of simple components representing trestles.

MATERIAL AND METHODS

Wood is preserved over a long period only in very humid or very dry locations, at very low temperatures, in contact with metal, or in the form of charcoal (Bernabei *et al*., 2019). The latter prevails in Serbian archaeology. Uncharred wood may also occur in historical layers, mainly in Middle Age pits.

Seventeen samples of soil containing plant material needed for macro botanical analyses were collected from pits and postholes during the excavation of the amphitheatre, mostly during the 2011 campaign (Table 1). Manual flotation of the samples (0.5–6 litres of substratum per sample) was carried out in the Museum of Vojvodina, Novi Sad. The plant material, consisting mainly of carbonized wood, was dried slowly for several days in a dry, dark place to be analysed later using low power (7x–45x) microscopes. The identification of charred and uncharred wood was assisted by wood anatomy keys, both online and printed versions (Schoch *et al*., 2004; Schweingruber, 1990). Five samples contained a considerable number of taxa of crops, weeds, and ruderals, but an insignificant amount of charred and uncharred items (Medović, 2014). It is considered that they had been moved, postdepositionally, from their original location.

RESULTS

Overview of the Charcoal Assemblages

A total of 311 charred fragments (308,099 mg) were examined and 12 different taxa were identified, two to a species level and five to a genus level. A total of 11 uncharred wood fragments (29796 mg) were singled out and identified to the pinoid clade of Pinaceae (conifers with resin canals). The most dominant species in the assemblage is beech; its wood accounts for more than 2/3 of the charred wood assemblage weight (see Table 1). The finds of hornbeam, maple, and ash exceed 1 percent by weight, respectively. However, seven detected taxa are below this limit. Among these, the most prominent are willow/poplar, oak, elm, and coniferous wood. Beechwood was found in 3/4 of all samples, hornbeam, and ash in every second sample, and oak fragments in every third sample.

Fragments successfully identified to at least the family level varied in size from 2 mm to 40 mm in the transverse dimension. In most archaeological wood charcoal assemblages, <2 mm fragments rarely have enough anatomical features preserved to permit botanical identification (Kabukcu, 2018).

Based on qualitative ring curvature estimation criteria (Marguerie and Hunot, 2007), on most charred wood fragments weakly curved rings (the rings seem ‘‘straight’’ and the rays parallel) and moderately curved rings could be observed. This suggests the use of large pieces of wood such as trunks or large branches. Also, few fragments of branches could be observed: 6 *Fagus* cf. *moesiaca* (2–3 cm radius), 3 *Carpinus betulus* (1.5–2 cm radius), and 1 *Acer* (3 cm radius). Small branches and twigs could not be observed.

Table 1. Charred and uncharred wood finds from the Viminacium amphitheatre.

Sample number		1	2	3	6	7	8	9	10	11	12	13	14	15	16	18	19	20	17			
Charred wood		Sq. I/4	Postholes, southwest-south	Room 2	Sq. J/4	Sq. C/6, pit 47, west gate	Sq. IJ/3-4	Sq. J/I 4, pit 24.	Sq. ?, pit ?	Sq. IJ/4, pit 14, posthole 34	Sq. I/4, pit 26	Sq. I/4, pit 16	Sq. IH/4	Sq. I/4, pit 17.	Sq. HI/4, posthole 47/48	Sq. D/5-C/5, pit 48, west gate	Room 1	Sq. I/4, pit 30; Sq. I/3, pit 30	**Sum (mg)**	**mg in %**	**Frequency in %**	
Fagus cf. moesiaca		38313			18081	5	31552	7887	36499	9365	31002	1436	21903	4209	674			19254	**220180**	**71.46**	**76.47**	Beech, probably Moesian
Carpinus beulutus					17444		14226	680	1148	1790	5740		439	288	337			2347	**9911**	**3.22**	**47.06**	Hornbeam
Acer								89		5	251		9011	68	1304			498	**5070**	**1.65**	**47.06**	Maple
Fraxinus excelsior/angustifolia							204		1839									2500	**2600**	**0.81**	**5.88**	Common/narrow-leaved Ash
Salix/Populus								496				118			21			2189	**2347**	**0.76**	**17.65**	Willow/Poplar
Quercus							500		137					1207					**2462**	**0.80**	**29.41**	Oak
Ulmus									76									549	**625**	**0.20**	**11.76**	Elm
Prnus/Picea/Larix/Pseudotsuga							2911											180	**471**	**0.15**	**11.76**	Coniferous wood with resin canals
Pomoideae																			**166**	**0.05**	**5.88**	Pomaceous fruits
Decotyledon wood: Diffuse porous wood													166					149	**149**	**0.05**	**5.88**	Decotyledon wood: Diffuse porous wood
Conifereae																			**34**	**0.01**	**5.88**	Coniferous wood
cf. *Cytisus*									34									12795	**54627**	**17.73**	**52.94**	Probably Brooms
Undintfied wood fragments (<2mm)		11535	7380	10400	5169	2972	2928	1366	182													Undintfied wood fragments (<2mm)
Sum (mg)	**38313**	**46057**	**16512**	**49116**	**10518**	**43952**	**1554**	**26361**	**8600**	**3702**	**182**							43382	**308099**	**100**		**Sum**
Number of other finds (seeds and fruits)		10	14	102				33	3	14								2	**179**		**47.06**	
Uncharred wood																						
Pinus/Picea/Larix/Pseudotsuga			17127	5707													6962		**29796**		**17.65**	Coniferous wood with resin canals

Forests of north-eastern Serbia

A climatogenic forest typical for Serbia is a Hungarian oak and Turkey oak forest (*Quercetum frainetto-cerris* Rud. 49 s. l.) (Vukin and Rakonjac, 2013). It is considered to be its coeno-ecological synonym (Fig. 1).

Today, however, beech forests are the most widespread forests in Serbia and cover 29.3% of the total forest area (Banković and Ranković, 2009). Three beech species grow in Serbia: Moesian beech (*Fagus moesiaca* (Domin, Maly) Czeczott), European beech (*Fagus sylvatica* L.) and Oriental beech (*Fagus orientalis* Lipsky) (Cvjetićanin, 2003).

Wood anatomy does not permit a distinction between the different species of *Fagus*. Moesian beech is the most widespread tree species in Serbia, with the widest altitudinal range (40–1,800 masl) (Cvjetićanin, 2003). Therefore, we assume that the charred wood of beech in charcoal assemblages from Viminacium amphitheatre belongs to Moesian beech.

It has been estimated that at the beginning of the 19th century, 80 percent of Serbian territory was covered in forest. The French poet and politician Alphonse Marie Louis de Lamartine, who in 1833 (De Lamartine, 1843) travelled through central Serbia for six days, remarked on an "ocean" of "virgin forests" with "magnificent and perpetual umbrages with no other spectacle than the endless colonnades of enormous and lofty trunks of beech, the waves of foliage swayed by the winds, [and] the avenues of hills and mountains in the uniform garb of their secular oaks".

Bertrandon de la Broquiere, a councillor to the ruler of Burgundy in the 15th century, commented on the Central Balkans as a "well-inhabited country", with many villages and good food and wine. This reflected the large colonisation that had transformed the Mačva plain, the Morava Valley, and the right bank of the Middle Danube into a densely populated region (Halpern, 1999).

The cyclical expansion and decrease of forests in the region of today's Serbia are directly related to the increase and decrease of the population through the centuries. In times of prosperity, the forests were heavily cut as a direct result of recolonisation and increased demand for agricultural land. In a few extreme cases, war has helped forests by allowing ecosystems to recover free from human pressure, e.g. The Hundred Years' War between England and France in the 14th century (Food and Agriculture Organization of the United Nations, 1995), or the Great Migrations of the Serbs – two large migrations from various territories under the rule of the Ottoman Empire to regions under the rule of the Habsburg Monarchy in the 17th and the 18th centuries. In Serbia, Hungarian oak, and Turkey oak forests are the most vulnerable to anthropogenic changes (Stojanović, 2007).

Andrew Archibald Paton, a consul-general in Serbia, travelled, during the years 1843 and 1844, through the countryside of Serbia. He left some interesting remarks on soil quality and its relationship to forests in the surrounding area of Viminacium (Paton, 1845): "The soil at Posharevatz (Požarevac) is remarkably rich, the greasy humus being from fifteen to twenty-five feet thick, and consequently able to nourish the noblest forest trees. In the Banat, which is the granary of the Austrian empire, trees grow well for fifteen, twenty, or twenty-five years, and then die away. The cause of this is, that the earth, although rich, is only from three to six feet thick, with sand or cold clay below; thus as soon as the roots descend to the substrate, in which they find no nourishment, rottenness appears on the top of the branches, and gradually descends". This is not the only source that indicates the poor quality of trees in the Pannonian Plain along the Danube. The statistical report of the Imperial Austrian Army from 1807 states (Demian, 1807): "The local forests are near Gardinovci, Kovilj, and Kać, in which oak and elm are the predominant species of wood, but they are of poor quality, as most of the trunks are gnarled and rotten and therefore only suitable for firewood".

Timber economy in the Roman Age

A great variety of tree species was available in Rome in large quantities: ebony (*Diospyros* spp.), cedar (*Cedrus* spp.), box (*Buxus sempervirens* L.), terebinth (*Pistacia terebinthus* L.), holm oak (*Quercus ilex* L.), and many others. Patrician houses commonly contained a wide choice of wood (Bernabei et al., 2019). For the construction of buildings, silver fir (*Abies alba*) was the preferred tree species (Bernabei et al., 2019; Moser et al., 2013). The Romans had an extensive knowledge of the technological properties of wood. Vitruvius, in his treatise on architecture (De Architectura, II, chap. 9–10), indicates the characteristics that make silver fir particularly valuable: its light wood and a large, regular stem. Archaeological finds in Pompeii, Herculaneum, and Oplontis (Moser et al., 2018, 2013, 2011) confirm this. The favourite timber for building was coniferous wood, particularly silver fir. Oakwood is heavier than silver fir and has a less regular stem, especially in the case of trees from the Apennines. However, oak is stronger, harder, and much more durable than fir. These characteristics made oak less suitable for providing long roof beams or roof trusses but perfect for all kinds of foundations in contact with the ground (Bernabei et al., 2019).

Unsustainable wood harvesting can lead to forest degradation, deforestation, wood shortage, and a loss of forest ecosystem services, such as soil protection and water regulation (Janssen et al., 2017). In Pliny's time (1st century AD), some of Algeria's forests rich in sandarac trees (*Tetraclinis articulata*), a wood particularly appreciated by the Romans, had already been fully exploited so that its timber supply shifted to Morocco (Bernabei et al., 2019). Emperor Hadrian created an imperial forest by fencing off the cedar of Lebanon woodland and marking its perimeter with inscribed boundary stones, to protect the woods (Shackley, 2004). In a sustainable system, the wood harvest is lower or equal to the production of wood within a certain area and time frame. In the case study of

the ancient town of Sagalassos (South-west Anatolia, Turkey) during the Roman Imperial period, it could be concluded that its community was intensively using the surrounding forests (Janssen et al., 2017). According to palynological data, a steady forested area was sustained, suggesting an intensive but non-depleting use. This can only suggest that after a period of deforestation there must have been regulations for wood felling in later Roman periods, at least from 2nd century.

DISCUSSION

Regulations of wood felling in early modern history

After the Treaty of Karlowitz in 1699, the Habsburg Monarchy gained control of territories between the Drava, Sava, and the Danube rivers, which were very rich in alluvial, flood plain forests. It was an area with an extremely low population and a low level of cultivation and amount of agricultural land (Radošević, 2019). During the following few centuries, the forests had time to recover themselves. However, the increasing population led to a rapid depletion of wood in the Croatian part of the Military Frontier (Cik, 2016).

Trees grow very slowly and are consumed very quickly. The selective felling of certain species of trees can lead to a change in the structure of the remaining forests. An oak tree needs 150–200 and beech 120 years to mature. Austrian imperial authorities were fully aware of this problem. For an improved hold on and control of these forest resources, the Habsburg administration brought forth various regulations and imperial decrees. According to a forest regulation document for the Military Frontier in today's Croatia, from the 18th century, the use of oak for the construction of public buildings was prohibited (Cik, 2016):

"Until now, it was customary that all imperial buildings, schools, and churches were built only of oak wood, which is why, on the one hand, the forest was shrinking, and on the other hand, such material, due to its weight, damaged the buildings. As these buildings must be made of quality wood, everything except the roof must be built of white wood, i.e. beech, ash, and hornbeam. By no means should oak be used for the lower part of buildings, except those erected on wet and damp terrain, but the mentioned types of wood." *Waldordnung (Schumske Uredbe Za Cesarsku Kraljevsku kraicsnicsku Schumu, Slavnoske, Varasdinske i Banalske Kraine) Wilhelm Ludwig Gustav von Wartensleben, Generalmajor, in Wien 24. 4. 1787.*

Beechwood use

In Pompeii, beech was largely used as firewood (Veal and Thompson, 2008). Despite being considered good firewood in Roman times, the growing number of beechwood finds in recent years proves its use as an important building material in various timber structures. Its advantage over other timber, e.g. oak, is its large, regular stem and the fact that it is lighter than oak.

Beech trees can grow to be 300 years old or more, although trees between 100 and 140 years old are typically felled. They can reach a height of 30 to 35 metres. The colour of Beechwood varies from nearly white to reddish. It is resistant to abrasion but susceptible to attack by fungi and needs to be protected if used outdoors. With about 250 known uses for its wood, beech is the most diversely used tree species in Europe (von Wühlisch, 2003). While it is mainly used for furniture, it is also excellent for flooring and staircases. It is used as a fuel due to its relatively high energy content. Despite its hardness, Beechwood can be worked easily, although because of its prolonged drying process, there is considerable degradation due to its relatively high shrinkage rate. It is subject to movement more than other woods and is very sensitive to moisture. Beechwood easily steam-bends, a process through which it acquires a reddish-brown colour. Beechwood has a very wide range of uses and is used for relatively low and tall

constructions, for stairs, etc. Beechwood has been favoured for plane stocks from Roman times to the modern era (Ulrich, 2007). The durability of beech under variable conditions is relatively small, while its durability underwater and on dry land is high.

Dendroarchaeological investigation of Roman ship wrecks in Croatia has revealed that they were built of multiple tree species (Huguet *et al*., 2012; Liphschitz *et al*., 2017; Liphschitz and Gluščević, 2015), with the keel most often made of common beech (*Fagus sylvatica*). Theophrastus (Hist. Pl. 5.8.3) recognised beech as one of the most notable and useful trees of Italy's Latium; he noted that timbers of beech would be most suitable for the keels of ships but also household furniture, such as bedsteads (5.6.4).

Researchers at Herculaneum (Moser *et al*., 2018) argue that the low percentage of beech timber discovered there is in keeping with its technological properties: its tendency to break and bend makes it somewhat unsuitable for timber production. On the other hand, they speculate that one of the criteria followed in selecting the taxa for building purposes seems to be the availability of the trees in the neighbouring forests. However, the nearest beech forests, if we exclude the beech forests in today's Romania, or the Vršac mountains in Banat, were ca. 50 km from Viminacioum by air (Fig. 1). Finds at Herculaneum suggest that *Fagus sylvatica* L. was used for poles and planks (Moser et al., 2018). This is not surprising, given the tendency for straight growth and beech's height. Moreover, these timbers can be easily cut with a saw and are thus very useful for the production of planks.

Hornbeam

After beech, hornbeam wood is the second most numerous in the assemblage from the Viminacium amphitheatre. The White Beech or Hornbeam (*Carpinus betulus* L.) belongs to another botanical family and has quite different properties than beech. In Serbia, common hornbeam occurs as an admixed tree species in forest types that are defined in the complex of common oak forests, in forest types of the Hungarian oak and Turkish oak belt, the sessile oak belt, and up to the forest types in the beech belt (Banković and Ranković, 2009).

Hornbeam wood, compared to oak and beech wood, is of poorer quality and less utilised. It has a twisted trunk and smooth bark. However, due to the higher utilisation of wood and to the reduction of the growing stock of valuable coniferous and broadleaf species, the use of hornbeam wood will be increasingly greater, i.e. this tree species is going to have an increasingly greater significance in the future (Karadžić, 2011). In Serbia, forests of hornbeam, generally, present a forestry problem. Its dominant coppice origin, aggressiveness, and invasion into the sites of other, more valuable, tree species (common oak, sessile oak, Hungarian oak, beech, etc.) lead to a complete stifling of the latter (Banković and Ranković, 2009).

Ash

In Serbia, there are four native species in the genus *Fraxinus*: flowering ash (*F. ornus* L.), common ash (*F. excelsior* L.), narrow-leaved ash (*F. angustifolia* Vahl.), and Balkan ash (*F. pallisae* Willmott) (Cvjetićanin et al., 2014). They form pure and mixed forests (mainly with common oak), which are conditioned by additional moisture or high levels of underground water. Common ash and narrow-leaved ash are very closely related and have such a similar appearance that they are sometimes difficult to distinguish, especially when they are growing in mixed stands. There are reports of hybridisation in areas where they occur together, e.g. in the Balkans (Boshier and Oxford Forestry Institute, 2005).

In Serbia, *F. angustifolia* Vahl. is distributed in the region of Pannonia and in river valleys, where it has probably been preserved thanks to the effect of the water bodies (Cvjetićanin et al., 2014). Common ash does not grow in the Pannonian Basin (Boshier and Oxford Forestry Institute, 2005).

Common ash and, to a lesser extent, nar-

Fig. 2. Mlava river just before its confluence with the Danube river. (Photo: A. Medović)

row-leaved ash produce good quality timber, which is suitable for use for furniture and flooring (Boshier and Oxford Forestry Institute, 2005). *F. excelsior* L. is an important timber species, with attractive pale (white or pinkish white) wood that is strong, durable, resilient and easily bent, making it particularly suitable for furniture and house interiors. The strength and elasticity of the wood enable it to carry weight, bear tension and absorb shock better than any other European wood. Before the extensive use of steel, it was used for joists and beams, and many things now made of metal were originally made from ash, such as spears, ploughs, harrows, and rakes, as well as carriages, cart axles, the rims of cartwheels, and frames for boats and cars. The best timber for all these purposes comes from rapidly-grown trees on fertile sites. Timber with 4 to 16 rings of 25 mm is likely to be suitable for most purposes.

Experiences from a carpentry workshop

In terms of durability, wood is divided into groups: very durable wood (oak), durable wood (ash), and not durable wood (beech, maple, hornbeam). The greatest durability is shown by the wood prepared in a dry room, in low temperature without the presence of air. A tree that is constantly submerged in water also shows great durability. The lowest degree of durability is shown by wood used in the surface layer of the soil. Ashwood is very elastic, while beech and oak wood has a medium elasticity. The plasticity of wood increases from maple wood towards ash and beech wood. Beech, oak, maple, and ash wood have a stronger gloss than hornbeam. False heartwood (a wood defect caused by fungi) is common in beech, maple, ash, and hornbeam.

The occurrence of charred branches (1.5–3 cm diameter) in the charred wood assemblage at the Viminacium amphitheatre may be interpreted as wood dowels or pegs. Ancient carpenters used wooden pegs instead of nails, and doweling has been used for centuries by carpenters who needed to strengthen their joints. There are a large number of joints in the trestle structures of the Viminacium amphitheatre. A good example of the joining of wooden parts without nails is a wooden mining

tool made of beech wood from the 13th –14th century that was found at the archaeological site of Prilovi, Rudnik, in Serbia (Đorđević, 2011).

Transport of timber

Timber was transported over long distances within and between Roman provinces. There is evidence of the trade of high-quality timber, e.g. *Picea abies* (L.) Karst. (Moser et al., 2013), *Quercus* (Bernabei et al., 2019), but the Romans mainly used local resources (Čufar et al., 2014; Moser et al., 2013).

A dense network of waterway trade routes was intensively used to connect the Roman Empire (Bernabei et al., 2019). A flat-bottomed barge, at least 16 m long, was found in the Ljubljanica river, Slovenia (Čufar et al., 2014), which was probably used for transporting heavy cargo on the Ljubljanica river between the Roman settlements of Nauportus and Emona during the first decades AD. The bottom and side planks of the barge were made of beech wood (*Fagus sylvatica*). Use of beech wood, which has good mechanical properties but very low resistance against decay organisms.

It can be assumed that beech was chosen to construct the barge due to the massive availability of this species in the local forests in the area and the lack of oak (Čufar et al., 2014). Due to the great demand for timber during the Roman period, the available oak was probably not enough to meet all the needs. Other species, such as beech, were therefore used instead.

The beech timber came, most likely, from the Serbian part of the Carpathian Mountains, e.g. Homolje mountains (962 masl). The timber was transported by road or rafted and floated downstream on the rivers Mlava (Fig. 2) or Pek up to Viminacium, with the dimension and weight of the beech planks suggesting river rather than land transport. The other area from where beech trees could have been felled are the mountains next to the Iron Gates of the Danube.

CONCLUSION

Access to sufficient supplies of wood was a vital part of strategic readiness in ancient times. Some situations required wood with specific characteristics. Such specialised requirements stimulated, in the case of ancient Rome, exports of high-quality construction timber from Central Europe to Rome. Forest resources were overused to supply, for example, timber for construction, e.g. military ships, houses, and energy. The cyclical expansion and decrease of forests in the region of today's Serbia are directly related to the increase and decrease of the population through the centuries. In times of prosperity, the forests were heavily cut as a direct result of the recolonisation and increased demand for agricultural land. In a few extreme cases, war has helped forests by allowing ecosystems to recover free from human pressure.

The choice of supposedly less valuable construction timber for the Viminacium amphitheatre raises more questions than answers. Was oak scarce in the area at that time, and/or was it destined for Rome? Did the imperial officials in the provinces and the army, therefore, have to cover their needs with supposedly less valuable wood for construction, as was the case in the Slavonian Military Frontier in the 18th century? Or, were the selection criteria of lighter wood and longer timber crucial for the choice of building materials for construction?

The fact that the Viminacium amphitheatre typologically belongs to Golvin's simplest type of amphitheatre indicates that a second-best construction timber was chosen for its construction, while on the other hand, a large, complex structure that was built on the principle of the trestles indicates that lighter and longer timber had to be used for its construction. Beechwood meets both these conditions.

BIBLIOGRAPHY

Banković, S., Ranković, N. (Eds.) 2009
The national forest inventory of the Republic of Serbia: the growing stock of the Republic of Serbia. Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia-Forest Directorate Belgrade, Belgrade.

Bernabei, M., Bontadi, J., Rea, R., Büntgen, U., Tegel, W. 2019
Dendrochronological evidence for long-distance timber trading in the Roman Empire. *PLoS ONE* 14, e0224077. https://doi.org/10.1371/journal.pone.0224077

Bogdanović, I., Nikolić, S. 2017
In the Beginning There Was a Timber Construction ... The Wooden Amphitheatre of Viminacium, in: Mitthof, F., Schörner, G. (Eds.), *TYCHE Sonderband*. Presented at the Columna Traiani – Traianssäule Siegesmonument und Kriegsbericht in Bildern, Holzhausen, Wien, pp. 87–94.

Boshier, D. (Ed.) 2005
FRAXIGEN: Ash species in Europe: biological characteristics and practical guidelines for sustainable. Oxford Forestry Institute, Oxford.

Cik, N. 2016
Ekohistorija Đurđevca *i Virja u drugoj polovici 18. stoljeća*. Meridijani, Društvo za hrvatsku ekonomsku povijest i ekohistoriju, Ogranak Matice hrvatske u Đurđevcu, Samobor–Zagreb–Đurđevac.

Čufar, K., Merela, M., Erič, M. 2014
A Roman barge in the Ljubljanica river (Slovenia): wood identification, dendrochronological dating and wood preservation research. *Journal of Archaeological Science* 44, 128–135. https://doi.org/10.1016/j.jas.2014.01.024

Cvjetićanin, R., Šijačić-Nikolić, M., Milovanović, J., Perović, M., Novaković-Vuković, M. 2014
Regions of provenances of *Fraxinus angustifolia* Vahl. and *Fraxinus pallisae* Wilmott in Serbia. Шумарство *(*Šumarstvo*)* 3–4, 131–142.

de Lamartine, A. 1843
Voyage en Orient, 1832–1833. C. Gosselin, Paris.

Demian, J.A. 1807
Darstellung der Oesterreichischen Monarchie nach den neuesten statistischen Beziehungen: Statistische Beschreibung der Militär-Gränze; Bd. 2, welcher die Militär-Gränze in Slavonien und Ungern enthält. Wien.

Food and Agriculture Organization of the United Nations 1995
State of the world's forests. FAO, Rome.

Fukarek, P., Jovanović, B. (Eds.) 1983
Karta prirodne potencijalne vegetacije SFR Jugoslavije 1:1000000. Naučno veće vegetacijske karte Jugoslavije, Šumarski fakultet Univerziteta Kiril i Metodije u Skopju, Skopje.

Golvin, J. C. 1988
L'amphithéâtre romain : Essai sur la théorisation de sa forme et de ses fonctions. Diffusion de Boccard, Paris.

Halpern, J. 1999
The ecological transformation of a resettled area, pig herders to settled farmers in Central Serbia (Sumadija, Yugoslavia) during the 19th and 20th centuries, in: Greenfield, H.J., Bartosiewicz, L. (Eds.), *Transhumant Pastoralism in Southern Europe: Recent Perspectives from Archaeology, History, and Ethnology*. Archaeolingua, Budapest, pp. 79–95.

Huguet, C., Capelli, C., Guibal, F., Greck, S., Cenzon-Salvayre, C., Andrieu-Ponel, V., Dumas, V. 2012
L'épave de Pakoštane, Croatie (fin IVe -début Ve siècle apr. J.-C.). Résultats d'un projet de recherche franco-croate. *Archaeonautica* 17, 105–151.

https://doi.org/10.3406/nauti.2012.1255

Janssen, E., Poblome, J., Claeys, J., Kint, V., Degryse, P., Marinova, E., Muys, B. 2017
Fuel for debating ancient economies. Calculating wood consumption at urban scale in Roman Imperial times. *Journal of Archaeological Science: Reports* 11, 592–599. https://doi.org/10.1016/j.jasrep.2016.12.029

Kabukcu, C. 2018
Wood Charcoal Analysis in Archaeology, in: Pişkin, E., Marciniak, A., Bartkowiak, M. (Eds.), *Environmental Archaeology*. Springer International Publishing, Cham, pp. 133–154. https://doi.org/10.1007/978-3-319-75082-8_7

Liphschitz, N., Gluščević, S. 2015
The Zaton Boat 2 (Croatia). A Dendroarchaeological Investigation. *Skyllis* 15, 158–160.

Liphschitz, N., Radić Rossi, I., Pulak, C., Ruff, D. 2017
The Roman ship found at Trstenik (Gulf of Kaštela, Croatia). The determination of wood species. *Skyllis* 148–152.

Marguerie, D., Hunot, J.-Y. 2007
Charcoal analysis and dendrology: data from archaeological sites in north-western France. *Journal of Archaeological Science* 34, 1417–1433. https://doi.org/10.1016/j.jas.2006.10.032

Medović, A. 2014
Viminacium: Roman Agriculture on Serbian Soil? *Archaeology and Science* 9, 95–99.

Moser, D., Allevato, E., Clarke, J.R., Di Pasquale, G., Nelle, O. 2013
Archaeobotany at Oplontis: woody remains from the Roman Villa of Poppaea (Naples, Italy). *Vegetation History and Archaeobotany* 22, 397–408. https://doi.org/10.1007/s00334-012-0381-z

Moser, D., Nelle, O., Di Pasquale, G. 2018
Timber economy in the Roman Age: charcoal data from the key site of Herculaneum (Naples, Italy). *Archaeological and Anthropological Sciences* 10, 905–921. https://doi.org/10.1007/s12520-016-0406-0

Moser, D., Nelle, O., Di Pasquale, G. 2011
The Romans, the wood and the forest: state of the art and new data from the Vesuvius area (Naples, Italy), in: *SAGVNTVM Extra*. Presented at the 5th International Meeting of Charcoal Analysis: The charcoal as cultural and biological heritage, UNIVERSITAT DE VALÈNCIA Departament de Prehistòria i Arqueologia de la Facultat de Geografia i Història, Valencia, pp. 113–114.

Radošević, M. 2019
Šume i društvo Slavonske vojne krajine: primjer Brodske pukovnije u drugoj polovici 18. i početkom 19. stoljeća. *Scrinia Slavonica* 19, 93–128.

Schoch, W., Heller, I., Schweingruber, F., Kienast, F. 2004
Wood anatomy of central European Species. URL www.woodanatomy.ch (accessed 12.7.20).

Schweingruber, F.H. 1990
Mikroskopische Holzanatomie: Formenspektren mitteleuropäischer Stamm-und Zweighölzer zur Bestimmung von rezentem und subfossilem Material = Anatomie microscopique du bois = Microscopic wood anatomy, 3. Aufl. ed. Flück-Wirth, Teufen.

Shackley, M. 2004
Managing the Cedars of Lebanon: Botanical Gardens or Living Forests? *Current Issues in Tourism* 7, 417–425. https://doi.org/10.1080/13683500408667995

von Wühlisch, G. 2003
Technical Guidelines for genetic conservation and use for European beech (*Fagus sylvatica*). Bioversity International, Rome.

Vukin, M., Rakonjac, Lj. 2013
Comparative analysis of some bioecological characteristics of Hungarian oak and Turkey oak. *Archives of Biological Sciences* 65, 331–340. https://doi.org/10.2298/ABS1301331V

Карацић, Д. 2011
Најчешће паразитске и сапрофитске гљиве на грабу (*Carpinus betulus* L.) у Србији и њихова улога у пропадању стабала. Шумарство 1–2, 1–12.
(Karadžić, D. 2011. Najčešće parazitske i saprofitske gljive na grabu (*Carpinus betulus* L.) u Srbiji i njihova uloga u propadanju stabala. Šumarstvo 1–2, 1–12.)

Цвјетићанин, Р. 2003
Фитоценозе букве у Србији. Шумарство 1–2, 107–112.
(Cvjetićanin, R., 2003. Fitocenoze bukve u Srbiji. Šumarstvo 1–2, 107–112.)

Ђорђевић, З. 2011
Конзерваторски третман рударске алатке са Рудника. Зборник радова Музеја рудничко-таковског краја 6, 229–235.
(Đorđević, Z., 2011. Konzervatorski tretman rudarske alatke sa Rudnika. *Zbornik radova Muzeja rudničko-takovskog kraja* 6, 229–235).

REZIME
DA LI SE ISTORIJA PONAVLJA? ANALIZA DRVNE GRAĐE AMFITEATRA U VIMINACIJUMU

KLJUČNE REČI: VIMINACIJUM, RIMSKI PERIOD, AMFITEATAR, DRVENA, KONSTRUKCIJA, ANTRAKOLOGIJA.

Amfiteatar u Viminacijumu izgrađen je uglavnom od bukovog drveta. Osim toga, pri izgradnji je korišćena drvna građa od graba, jasena, javora, hrasta, ali i četinara. Smatra se da je bukovina u rimskom periodu bila potcenjena i da se uglavnom koristila kao drvo za ogrev. Nedavna antrakološka istraživanja u regionu otkrila su upotrebu bukovine u brodogradnji. U Rimu je bio dostupna širok spektar drvne građe. Međutim, velika potražnja za drvetom u Rimu dovela je do brzog iscrpljivanja šuma u okolini, a potom i na Apeninskom poluostrvu. Carstvo se širilo, a seča drveća je nastavljena širom carstva. Drvo se transportovalo na velikim razdaljinama, unutar i između rimskih provincija. Hrastovo drvo imalo je ogromnu vrednost ne samo u rimskom periodu, već i kroz čitavu istoriju. Hrastova građa je bila izuzetno cenjena. Prekomerna seča hrasta navela je austrijsku vlast vojne krajine da krajem 18. veka izda šumsku uredbu o zabrani upotrebe hrastove građe za izgradnju javnih zgrada. Uredba ukazuje, s jedne strane, da je selektivna seča hrastovih stabala dovela do promene u strukturi preostalih šuma u regionu i da je dovela do smanjenja šumskog fonda, a, s druge strane, hrastova građa je, zbog svoje težine, uticala na oštećenja izgrađenih objekata. U uredbi se navodi da nove građevine moraju da budu izrađene od kvalitetnog drveta, te da sve osim krovnih konstrukcija mora da bude izgrađeno od tzv. „belog drveta“, odnosno bukve, jasena i graba.

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COIN FINDS FROM THE EASTERN VIMINACIUM NECROPOLIS – THE SITE KOD KORABA

ABSTRACT

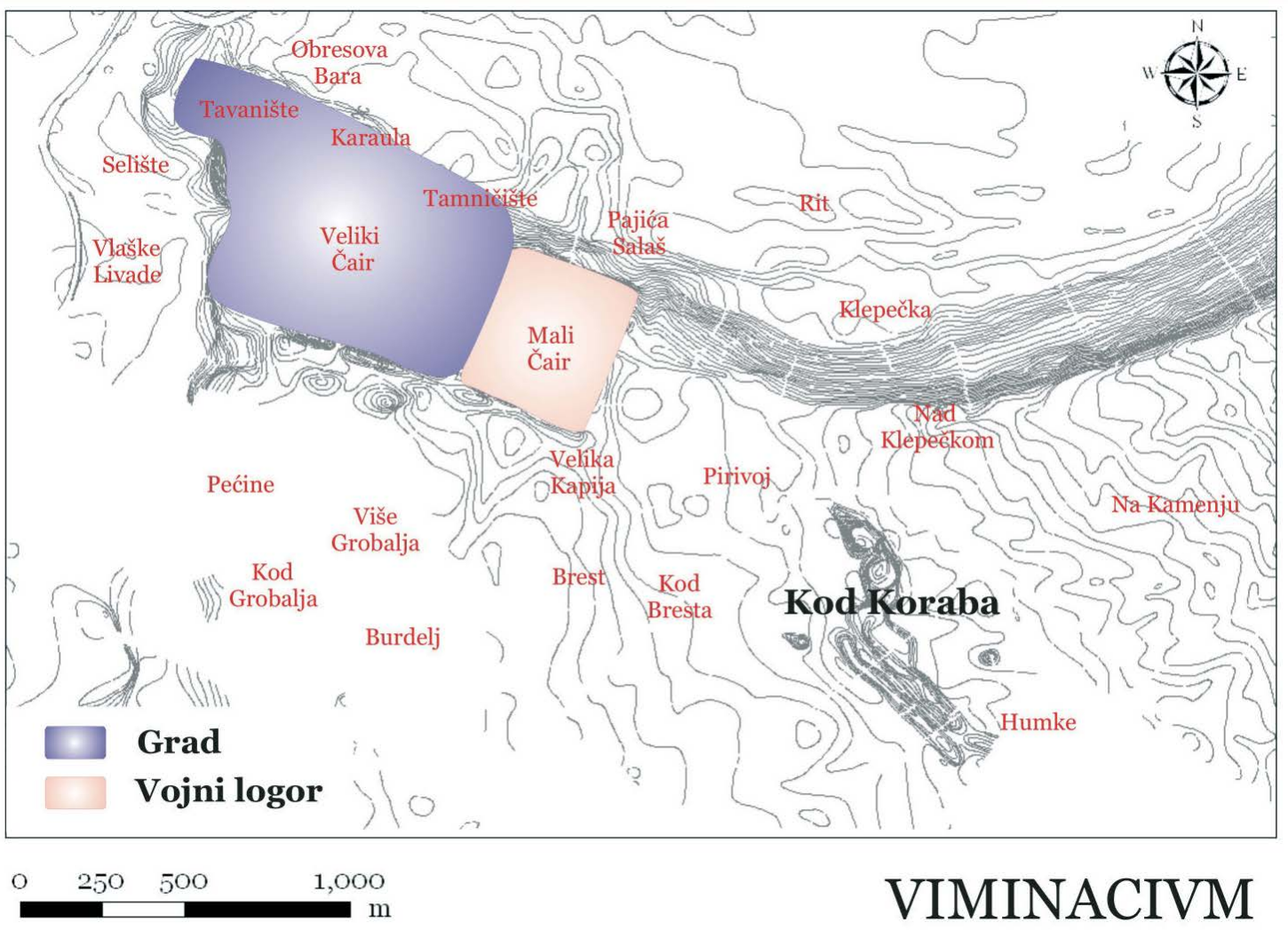
In the period from 2005 to 2007, due to the widening of the Drmno strip-mine that endangered the eastern Viminacium necropolis, rescue archaeological research was conducted at the site "Kod koraba". During the research, a total of 210 graves was excavated: 78 inhumations and 132 cremations, with 90 coins minted in the period between the 1st and the second half of the 4th century.

KEYWORDS: ROMAN EMPIRE, NECROPOLIS, VIMINACIUM, KOD KORABA, COINS.

After the southern Viminacium necropolis, the eastern one represents the second largest cemetery of this ancient metropolis. It consists of the sites of Pirivoj, Kod bresta, Brest and Kod koraba. This area is directly endangered by the activities at the Drmno strip-mine, some of its parts being completely destroyed. As a result of this, rescue archaeological research has been conducted ever since the end of the 1990s. This has been intensified since 2003 and continues to the present day. In the eastern Viminacium cemetery, the deceased were buried from the end of the 1st until the end of the 4th century, with some of the graves belonging to the beginning of the 5th century. The graves represent either cremations or inhumations (Mrđić 2009: 140).

From 2005 until 2007, during the rescue archaeological research of the site of Kod koraba, a total of 210 graves was excavated: 78 (37.15%) inhumations and 132 (62.85%) cremations (Map 1).[1] A total of 90 coins were found, of which 55 (61%) represent grave-goods, while 35 pieces (39%) were discovered within different necropolis layers. The detailed analyses of monetary finds from the southern Viminacium cemetery have already been published (Vojvoda i Mrđić 2015; Vojvoda i Mrđić 2017). The results of these analyses were obtained from an extremely large sample: 10,769 graves (7,839 inhumations and 2,930 cremations) and 3,552 coins from graves and 3,474 from layers. This is why these analyses represent an excellent starting point for all kinds of comparisons, both with other Viminacium cemeteries and also with other parallel cemeteries. The results gained from the southern necropolis indicate that these relationships are more or less equal: 50.60% coins originate from graves, while 49.40% origi-

1 Specific results of these excavations were published in several papers: preliminary results of the archaeological research conducted in 2006, *cf.* Голубовић 2008: 91–94; results of archaeological and geo-physical research, *cf.* Bogdanović 2009: 83–109; paleodemographic studies of the eastern necropolis, *cf.* Speal 2015: 167–186; dental-anthropological status of the population buried at the site of "Kod koraba", *cf.* Mikić, Lisul and Grga 2019: 140–147.



Map 1 – Position of the site of "Kod koraba" in relation to the Roman city and legionary fort (after: Bogdanović 2009: 100, Prilog 1).

	Percentage of coins from graves	Percentage of coins from layers
Kod koraba	61	39
Southern necropolis Više grobalja and Pećine sites	50.60	49.40

Table 1 – Percentage of coin finds from graves and cemetery layers.

	Percentage of coins from inhumated graves	Percentage of coins from cremated graves
Kod koraba	34.50	65.50
Southern necropolis (Više grobalja and Pećine sites)	58.25	41.75

Table 2 – Percentage of coins from inhumated and cremated graves.

	Number of graves	Number of graves with coins	Percentage of graves with coins
Inhumations	78	17	21.80
Cremations	132	32	24.25
Total	**210**	**49**	**23.33**

Table 3 – Number and percentage of coins in graves at the Kod koraba site (the eastern necropolis).

nate from layers (Vojvoda i Mrđić 2015: 11, Table 2; Vojvoda i Mrđić 2017: 11, Table 2). Since, until now, no monetary finds from the eastern Viminacium cemetery have been investigated and the site of Kod koraba represents the initial step in this direction, this (Table 1) and other deviations cannot be interpreted with any real certainty. We presume that deviations occur due to great differences in the size of the sample, especially in the mutual relationship of the examined inhumations and cremations. On the other hand, it is possible that future analyses of monetary finds from the entire eastern necropolis may show different relationships.

At the Kod koraba necropolis, a total of 55 coins were unearthed. Of that number, 19 pieces (34.50%) were discovered in skeletal graves (inhumations) and 36 (65.50%) in cremations. In this case, a large deviation compared to the southern necropolis (Table 2) can be interpreted as a difference in the sample size, since at the Kod koraba site most of the burials included cremations and it only represents one part of the eastern cemetery in which cremations were mostly buried.[2]

If we observe the number of registered graves of both rites and the number of coins discovered within them, the analysis from the Kod koraba necropolis shows a low frequency of coins from cremated graves compared to the large number of these graves (Table 3). On the other hand, the total percentage of the presence of coins as gravegoods (23.33%) is close to the results (24.60%) from the southern Viminacium necropolis (Table 4) (Vojvoda i Mrđić 2017: 11–13). Both results are above the average compared to other ancient cemeteries that were examined in this way: *Brigetio* from 19.54 to 29.46% (in three cemeteries), making an average of 20.16% (Găzdac-Alföldy and

2 As was already confirmed with archaeological research, in one part of the eastern necropolis, at the site of Pirivoj, the majority of graves are inhumations. In the southern necropolis, the ratio of excavated inhumations and cremations is 72.80% to 27.20%, while at the site of Kod koraba this ratio is 37.15% to 62.85%.

	Number of graves	Number of graves with coins	Percentage of graves with coins
Inhumations	7,839	1,461	18.65
Cremations	2,930	1,188	40.55
Total	**10,769**	**2,649**	**24.60**

Table 4 – Number and percentage of coins in graves on the southern necropolis (the sites of Više grobalja and Pećine).

	Number of inhumated graves with coin finds	Number of coins in inhumations	Number of cremated graves with coin finds	Number of coins in cremations
One coin	15	15	29	29
Two coins	2	4	2	4
Three coins	/	/	1	3
Total	**17**	**19**	**32**	**36**

Table 5 – Number of coin finds in inhumations and cremations.

Găzdac 2009: 162, fig. I), Matrica 21.50% (Topál 1981: 95), *Novaesium* around 14%, *Gerulata* only 6%,[3] *Emona* 14.40% (Petru 1972; Plesničar-Gec 1972; Miškec 2012: 135), *Intercisa* 22.30% (Teichner 2011: 61), *Poetovio* 18.17% (Istenič 2000: 14–259), *Singidunum* 12.60% (Pop-Lazić 2002: 19–39).[4]

In the largest number of graves of both rites, a single coin was discovered as a grave-good. Two coins were discovered in each of two inhumations and two cremations, while three coins were discovered in only a single cremated grave (Table 5). The results obtained for a single coin from inhumations coincide with those from the southern necropolis and similar results were also obtained for three coins from a cremation. Other situations showed quite large deviations (Table 6).[5]

In cases with several coins within a single grave, the chronological span between the oldest and the youngest issues does not show great differences.[6] Two coins were discovered in grave G-27: one of Domitianus from the year 87 and a non-dated dupondius of Trajan (98–117). Therefore, a potential chronological span could be between 11 and 30 years (Cat. nos. 5, 11). Two coins were discovered in grave G-71: coins of Valentinianus I and Valens (Cat. nos. 54–55), both dated to the period from 364 to 367. In the cremated grave G1-90, two pieces of Caracalla were found, minted in the provincial mint of Stobi (Cat. nos. 40–41). Two coins come from the grave G1-109: of Marcus Aurelius as Caesar, issued during the reign of Antoninus Pius, between the years 140 and 144 (Cat. no. 32) and a non-defined dupondius, or an as, issued during the 2nd century (Cat. no. 36).

Compared to the results from the southern necropolis, larger deviations were noticed in the analysis of the position of coins regarding the de-

3 For *Novaesium* and *Gerulata, cf.* Topál 1981: 95, ref. 276.

4 Concerning the last three cemeteries, the percentages listed here should be accepted with caution, due to deficiencies and uncertainties in the documentation from old excavations, encountered by later researchers who published the cemeteries.

5 For the data about the southern necropolis, *cf.* Vojvoda i Mrđić 2015: 18, Table 5; Vojvoda i Mrđić 2017: 23, Table 6.

6 At the southern necropolis, in some of the graves, the chronological spans were from 100 to 150 years and in a single case even about 200 years, *cf.* Vojvoda i Mrđić 2015: 28–29.

	Southern necropolis inhumations	Kod koraba inhumations	Southern necropolis cremations	Kod koraba cremations
One coin	89%	88.20%	84.34%	90.60%
Two coins	7.13%	11.75%	12.55%	6.25%
Three coins	/	/	2.40%	3.10%

Table 6 – Percentage relationships of the number of coins in graves at the southern necropolis and the Kod koraba necropolis.

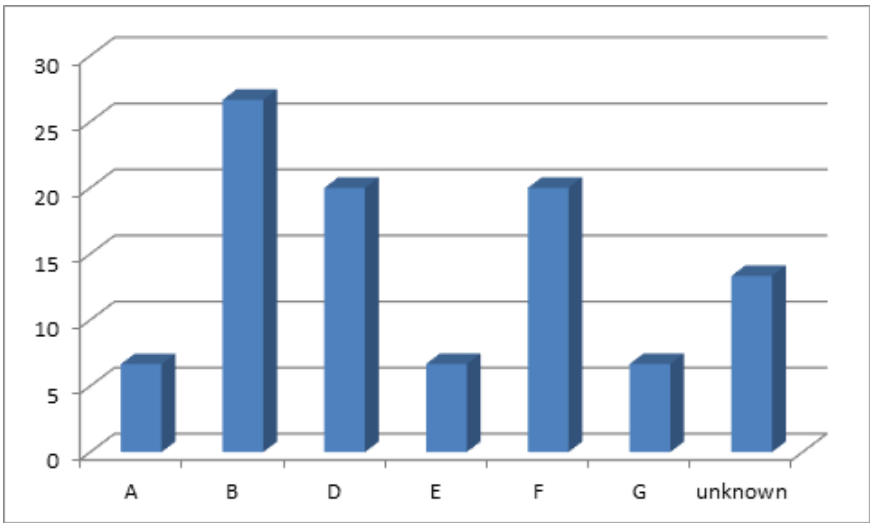
ceased in inhumations.[7] While observing graves with a single coin as a grave-good (Graph 1) at the Kod koraba necropolis, in the largest number of cases (26.66%), a coin was deposited in the mouth of the deceased (position B). At the same time, this position is the most common one at the southern necropolis, but in a much larger percentage (37%).[8] The biggest deviation at the Kod koraba necropolis is reflected in the very small percentage of coins discovered next to the head of the deceased (position A), with only 6.66%, while at the southern necropolis this position was as high as 27%. On the other hand, at the Kod koraba site, the positions D (on different torso parts) and F (on the pelvis) are much more frequently represented compared to the southern necropolis. For the time being, the differences mentioned here can be explained by the small sample size from the Kod koraba necropolis. A final picture will be obtained only after the study of graves from other sites of the eastern necropolis. Since two coins as grave-goods were discovered only in a single grave of an inhumated deceased (in positions A – D), it does not make sense to make comparisons with the situation at the southern necropolis.

The oldest coin discovered at the Kod koraba necropolis belongs to the undefined republican issues from the 2nd century BC, while the youngest one belongs to the series by Valentinianus I, between the years 364 and 375 (Tables 7–8). All of the pieces are made of bronze, except for two denarii (Cat. nos. 56, 59) and one antoninianus (Cat. no. 51). A larger number of 64 pieces belongs to the imperial series (72%), while the provincial issues include 25 pieces (28%). Compared to the southern necropolis, these results show deviations in favour of the provincial issues, since at the southern necropolis there were 82.33% imperial and 17.67% provincial issues (Vojvoda i Mrđić 2015: 10, Table 1; Vojvoda i Mrđić 2017: 10, Table 1).

Monetary finds from the Kod koraba necropolis confirm what was already stated several times, that it was evident that coin circulation of the Stobi, Nicaea and Viminacium mints was mutually conditioned, at least where the territory of *Moesia Superior* is concerned (Vojvoda and Crnobrnja 2018: 135). The Macedonian mint of Stobi supplied *Moesia Superior* with small bronze coins during the first two centuries, until it was closed during the reign of Caracalla. Ever since that time, until the provincial mint in Viminacium was established in 239, coinage from the Bithynian mint of Nicaea appears as a dominant provincial mint in *Moesia Superior*. Almost at the same time, during the reign of Elagabalus and especially Alexander Severus and Gordian III, considerable issues of autonomous coins were minted again in Macedonia (Koinon of Macedonia). Obviously, at that time, they were not largely included into the monetary circulation in the territory of Moesia, con-

7 While analysing the positions of coins within inhumated graves, we applied the methodology developed by Clarke and later also used by Cooke, *cf.* Clarke 1979: 158; Cooke 1998: 24–25. Clarke established eight positions of coins regarding the body of the deceased: A – on/close to the head; B – within the mouth hole; C – on/close to the right arm and in the right palm; D – on/close to the torso; E – on/close to the left arm and in the left palm; F – on/close to the pelvis; G – on/close to the right leg; H – on/close to the left leg. Since we encountered a number of cases in which coins were deposited between the knees or lower legs of the deceased and it was not possible to determine as either G or H, another position was added to this systematization: G/H – between the legs/feet.

8 For data about the position of coins regarding the deceased from the southern necropolis, *cf.* Vojvoda i Mrđić 2015: 24–25, fig. 1, Graph 7; Vojvoda i Mrđić 2017: 21–24, Graph 6.



Graph 1 – Position of coin finds regarding the deceased in inhumations at the Kod koraba necropolis, within graves with a single coin as a grave-good.

	Number of coins from inhumations and cremations	Number of coins from layers	**Total no.**	**%**
2nd BC		1	**1**	**1.10**
1st AD	8	2	**10**	**11.10**
2nd c.	28	7	**35**	**38.90**
3rd c.	15	13	**28**	**31.10**
1st – 3rd c.	2	1	**3**	**3.35**
4th c.	2	11	**13**	**14.45**
Total	**55**	**35**	**90**	**100**

Table 7 – Chronological structure of coin finds on the Kod koraba necropolis in centuries.

trary to the coinage from Nicaea (Borić-Brešković and Vojvoda 2017: 15–16). This phenomenon was conditioned by the lack of bronze coins of senatorial issues in circulation. The situation changed considerably in the period between 239 and 253, after the two Balkan mints were established (Viminacium and Dacia). The Viminacium mint, in particular, started to take a large percentage of the circulation in the territory of the western Balkan provinces (Vojvoda and Crnobrnja 2018: 133; Borić-Brešković and Vojvoda 2018: 74–75).

At the Kod koraba necropolis, starting with the issues of Septimius Severus (Cat. no. 40), coin finds clearly indicate a dominant participation of provincial minting in monetary circulation. All of the issues of Caracalla, Geta, Alexandar Severus, Gordian III, Trebonianus Gallus, Volusianus and Valerianus I (Cat. nos. 41–50, 66–76) belong exclusively to the provincial issues. After that, only a single antoninianus of Gallienus was noticed and all the way to Constantine I (321–322) there is a gap without monetary finds in this part of the eastern necropolis. Coins from the 4th century include 13 pieces (14.45%), issued between the

	piece(s)
Republic 2nd c. BC	1
Tiberius	1
Claudius	1
Julio-Claudian dynasty	2
Galba	1
Vespasian or Titus (?)	1
Domitian	4
Trajan	6
Hadrian	14
Antoninus Pius	8
Marcus Aurelius	3
2nd c.	5
Septimius Severus	3
Caracalla	3
Geta	1
Severus Alexander	7
Gordian III	6
Severus Alexander or Gordian III (?)	1
Trebonianus Gallus	1
Volusianus	1
Valerianus I	1
Gallienus	1
3rd c.	2
1st – 3rd c.	3
Constantine I	3
Constantius II	5
Sons of Constantine I (?)	1
Valentinianus I	2
Valens	1
4th c.	1
Total	**90**

Table 8 – Chronological structure of coin finds on the Kod koraba necropolis in series.

years 321 and 375, representing a slightly larger percentage compared to issues from the 1st century, which amount to 11.10% (Table 7). Although coinage from this period includes a large number of pieces, only a single grave (G-71; Cat. nos. 54–55) contained coins from the 4th century, while the remaining pieces were discovered within the necropolis layers (Cat. nos. 80–90).

Issues that are rarely found at Viminacium include: a republican denar (Cat. no. 56), an as of Galba (Cat. no. 3) and a folles of Helen (Cat. no. 82). Three new variants of reverse images issued in the Nicaea mint should also be highlighted (Cat. nos. 48, 72, 73). Until now, among the finds from this mint in the territory of Serbia, 33 types and 53 variants were registered, including the three new ones from the Kod koraba site (Црнобрња 1981: 5–23; Војвода 2011: 243–256; Војвода и Петровић 2011: 283–308; Војвода 2013: 155–196; Војвода и Бранковић 2016: 103–142; Vojvoda 2017: 131–150; Црнобрња и Васић Дерамановић 2017: 33–61).

Based on the analysis of monetary finds from the Kod koraba site, which represents one part of the eastern Viminacium necropolis, we can conclude that the necropolis was established at the end of the 1st century and intensively used during the 2nd and the first half of the 3rd centuries. Coin finds from 4th century indicate that the necropolis was expanding to the north. According to the archaeological research, it has been concluded that in the territory of the eastern necropolis there were empty spaces without graves up to 200 m wide (Mrđić 2009: 140). Only after all of the sites from the eastern necropolis have been published (Kod koraba, Pirivoj, Brest) will we be able to make certain conclusions regarding both monetary finds and other raised questions.[9]

CATALOGUE

The catalogue is arranged chronologically (first coins from the graves and then coins from layers) according to the reigns of the Roman emperors.

Coins are presented in photographic form and their numeration on the plates is synchronised with the catalogue numbers.

References:

RIC I–VIII – *The Roman Imperial Coinage*
Борић-Брешковић 1976
Nicaea reverse types after: Црнобрња 1981; Војвода 2011; Војвода и Петровић 2011;
Војвода 2013; Војвода и Бранковић 2016; Vojvoda 2017; Црнобрња и Васић Дерамановић 2017.
Stobi reverse types after: Борић-Брешковић 1992.

Abbreviations:
Cat. no. – catalogue number
Wt. – weight
Den. – denomination
S – sestertius
Dp – dupondius
D – denarius
Ant. – antoninianus
F – folles
Ref. – reference
Vim. Coll. – inventory number (C-number)
ex – exergue
l. – left
r. – right
stg. – standing
std. – seated
adv. – advancing
hld. – holding
laur. – laureate
rad. – radiate
cuir. – cuirassed
dr. – draped

9 A publication about the necropolis from the Kod koraba site is currently being prepared, *cf.* Golubović, Vojvoda i Redžić 2022.

Coins from graves

Cat. no.	Obverse	Reverse	Wt. (gr) Size (mm)	Den.	Position of find	Mint/Ref.	Reign/Date	Vim. Coll.
1	[...] CAESAR TI AVG F DIVI AVG Head bare r.	Illegible Worn	9.10 29.78	S	G1-30	Imperial Mint of Rome No ref.	Tiberius	86
2	TI CLA-VDIVS CAE-SAR AVG P M TR P IMP P P Head bare l.	LIBERTAS AVGVSTA S C Libertas stg. facing, head r., r. hld. pile-us, l. extend-ed.	10.35 29.90	As	G1-88	Imperial Mint of Rome RIC I, p. 130, no. 113	Claudius 50–54	288
3	SER [GAL-BA] IMP CAESAR AVG P M TR P Head bare r.	[PAX] AVGVSTI S C Pax stg. l., hld. cornuco-pia, r. torch with which she sets fire to a heap of arms on ground.	8.95 25.50	As	G1-68	Imperial Mint of Rome RIC I, p. 256, no. 496 but obv. no. 19 (*cf.* p. 243)	Galba c. July 68 to January 69	205
4	Illegible Head laur. l.	Illegible Worn	7.70 26.52	As	G1-61	Imperial Mint of Rome No ref.	Vespasian or Titus (?)	184
5	IMP CAES DOMIT AVG GERM COS XIII CENS PER P P Head laur. r.	Illegible Worn	10.58 28.68	As	G-27	Imperial Mint of Rome RIC II, p. 198, nos. 353-356	Domitian 87	164
6	[...] AVG GERM [...] Head laur. r.	FO[RTVNAE AVGVS]TI S C Fortune stg. l., hld. rudder and cornuco-piae.	10.08 29.25	S	G1-40	Imperial Mint of Rome No ref.	Domitian	102
7	Illegible Head l.	Illegible Worn	7.22 27.10	As	G-45	Imperial Mint of Rome No ref.	Julio-Clau-dian dynasty	277

8	Illegible Head bare l.	Illegible Worn	6.72 28.60	S	G1-128	Imperial Mint of Rome No ref.	Julio-Claudian dynasty	425
9	[IMP] CAES NERVAE TRAIANO AVG GER DAC P M TR P COS V P P] Bust dr. r. l. sh., head laur.	[S P Q R] OPTIM[O PRINCIPI] S C Fortuna stg. l., hld. rudder resting on prow and cornucopiae.	9.03 27.50	As	G-47	Imperial Mint of Rome RIC II, p. 280, no. 500	Trajan 103–111	306
10	[IMP CAES] NERVAE TRAIANO [AVG GER DAC P M TR P COS V P P] Head rad. r.	S P Q R OPTIMO PRINCIPI S C Legionary eagle between two standards.	9.02 27.42	Dp	G1-91	Imperial Mint of Rome RIC II, p. 285, no. 589	Trajan 103–111	300
11	[...] TRAIA- NO AVG [...] Bust r., head rad.	Illegible Worn	10.60 28.50	Dp	G-27	Imperial Mint of Rome No ref.	Trajan	165
12	Illegible Head laur. r.	Illegible ex – S C Female figure (?) std. l.	10.13 26.43	As	G1-82	Imperial Mint of Rome No ref.	Trajan	264
13	HADRIANVS AVGVSTVS Head laur r.	COS III S C Salus stg. r., feeding snake, held in her arms, out of patera in l. hand.	8.28 25.05	As	G1-41	Imperial Mint of Rome RIC II, p. 427, no. 669	Hadrian 125–128	114
14	HADRIANVS AVG COS III P P Bust dr. r., head bare.	S C ex – DACIA Dacia std. l. on rock, hld. vexillum and curved sword, r. foot rests on globe (?).	10.71 28.00	Dp or As	G1-54	Imperial Mint of Rome RIC II, p. 447, no. 850	Hadrian 134–138	142
15	HADRIANVS AVGVSTVS P P Bust r., head laur.	COS III S C Salus stg. r., feeding snake, held in her arms, out of patera in l. hand	11.19 27.50	As	G1-46	Imperial Mint of Rome RIC II, p. 469, no. 975	Hadrian 134–138	117

16	Illegible Head r.	Illegible Ship with rowers and pilot r.	10.80 25.80	Dp or As	G1-118	Imperial Mint of Rome No ref.	Hadrian 125–128	388
17	Illegible Head r.	Illegible Two figures clasped hands.	13.38 27.20	Dp	G1-84	Imperial Mint of Rome No ref.	Hadrian	295
18	Illegible Head r.	Illegible Worn	6.93 26.50	As	G1-13	Imperial Mint of Rome No ref.	Hadrian	32
19	Illegible Head r.	Illegible Worn	8.45 27.22	As	G1-16	Imperial Mint of Rome No ref.	Hadrian	34
20	HADRIANVS AVG […] Head laur. r.	Illegible S C Female figure stg. l.	9.55 27.23	As	G1-16	Imperial Mint of Rome No ref.	Hadrian	35
21	Illegible Head laur. r.	Illegible S C Female figure (?) stg. r.	9.19 25.00	As	G-33	Imperial Mint of Rome No ref.	Hadrian	175
22	Illegible Head laur. r.	Illegible Female figure (?) stg. l.	9.88 28.30	As	G1-77	Imperial Mint of Rome No ref.	Hadrian	236
23	Illegible Head r.	Illegible Worn	9.80 25.90	Dp or As	G1-97	Imperial Mint of Rome No ref.	Hadrian	311
24	[SABIN]A HADRIANI AVG P P Bust dr., r., hair waved, rising into crest on top above stephane, knotted in queue, falling down neck.	PIETAS S C Pietas std. l., hld. patera and sceptre.	8.56 26.20	Dp or As	G-2	Imperial Mint of Rome RIC II, p. 478, no. 1039	Sabina striking under Hadrian 128 onwards	1
25	[IMP T AE] LIVS CAE [SAR AN-TONINVS] Head bare r.	[TRIB POT] COS S C Clasped hands, hld. winged caduceus and corn-ears.	8.94 27.35	As	G-36	Imperial Mint of Rome RIC II, p. 484, no. 1088	Antoninus Pius striking under Hadrian 138	185

26	ANTONINVS AVG PIVS P P TR P COS III Head laur. r.	BONO EVENTVI• S C Bonus Eventus, naked, stg. l., sacrificing with patera over altar and hld. corn-ears.	10.72 27.05	As	G1-81	Imperial Mint of Rome RIC III, p. 115, no. 676	Antoninus Pius 140–144	282
27	ANTONINVS AVG PIVS P P Head laur. r.	TRA POT COS III S C Pax stg. l. hld branch and cornucopiae	9.56 27.00	As	G1-60	Imperial Mint of Rome RIC III, p. 117, no. 701	Antoninus Pius 140–144	181
28	ANTONINVS AVG [PIVS P P TR P] COS IIII Head laur. r.	S C Apollo stg. front, head l., hld. patera and lyre.	11.26 26.74	As	G1-105	Imperial Mint of Rome RIC III, p. 130, no. 824a	Antoninus Pius 145–161	334
29	Illegible Bust dr. r.	Illegible Figure (?) stg. l.	6.34 27.57	As	G1-19	Imperial Mint of Rome No ref.	Antoninus Pius	31
30	[...] AVG PIVS [...] Bust r.	Illegible Worn	11.08 26.30	Dp or As	G-32	Imperial Mint of Rome No ref.	Antoninus Pius	177
31	DIVA FAVSTINA Bust dr. r., hair waved in several loops round head and then drawn up and coiled at top.	AVGVSTA S C Vesta stg. l., hld. palladium and sceptre.	10.53 25.10	Dp or As	G1-66	Imperial Mint of Rome RIC III, p. 168, no. 1179	Faustina I striking under Antoninus Pius 141–161	212
32	[AVRELIVS] CAESAR AVG PII F COS Head bare r.	[HILAR] ITAS S C Hilaritas stg. l., hld. long palm and cronucopiae.	9.83 26.50	Dp or As	G1-109	Imperial Mint of Rome RIC III, p. 174, no. 1236	Marcus Aurelius striking under A. Pius 140–144	357
33	[FAVSTINA AVG PII AVG F] Bust dr. r., head bare with hair waved and coiled on back of head.	V[ENVS] S C Venus stg. l., hld. apple and sceptre.	10.48 26.90	Dp or As	G1-16	Imperial Mint of Rome RIC III, p. 194, no. 1408	Faustina II striking under Antoninus Pius 147–161	36

34	IMP M AVREL ANTONINVS AVG P M Head bare r.	SALVTI AVGVSTOR TR P XVII S C ex – COS III Salus stg. l., feeding snake twined round altar.	8.68 25.10	As	G1-1	Imperial Mint of Rome RIC III, p. 280, no. 847	Marcus Aurelius Dec. 162 – Autumn 163	8
35	Illegible Head l. (?)	Illegible Worn	6.27 24.74	As	G1-130	Imperial Mint of Rome No ref.	2nd c.	441
36	Illegible Head r.	Illegible Worn	6.92 26.15	Dp or As	G1-109	Imperial Mint of Rome No ref.	2nd c. (?)	355
37	Illegible Worn	Illegible Worn	6.69 23.58	As (?)	G-65	Imperial Mint unknown No ref.	2nd c. (?)	410
38	[...] SE[...] Head laur r.	Illegible Worn	8.07 28.26	As	G1-121	Imperial Mint of Rome No ref.	Septimius Severus	401
39	Illegible Head r.	Illegible Figure (?) stg.	4.70 28.10	As	G1-74	Imperial Mint of Rome No ref.	Septimius Severus (?)	229
40	[...]O[...]EPT Head laur. r.	[...]OIA[...] Artemis adv. r. hld. bow in l. hand, drawing arrow with r. hand; at her feet, hound running r.	4.22 22.14	Ae	G1-6	Provincial Mint unknown	Septimius Severus	2
41	-VS PI AV C M [...] [ANTONIN]- Bust r., head laur.	[...] STOBEN Victory stg. r., one foot on the globe, writing on oval shield resting on her knee.	4.87 24.60	Ae	G1-90	Provincial Mint of Stobi Type 25	Caracalla	297
42	[...] M AVR [...] Bust dr. cuir. r., head laur.	STOBEN [...] Victory adv. l., hld. wreath and palm.	9.04 27.80	Ae	G1-90	Provincial Mint of Stobi Type 19	Caracalla	298

43	M AYP CEYH [...] Bust dr., r., head laur.	NI-K-AI-E ex – ΩN Type 1	5.05 21.95	Ae	G-48	Provincial Mint of Nicaea	Severus Alexander	330
44	[...] ΛEΞANΔ[POC AVΓ] Bust dr., r., head laur.	NI-K-A-IE ex – ΩN Type 1	3.66 20.90	Ae	G-63	Provincial Mint of Nicaea	Severus Alexander	403
45	[...]ANΔPOC [...] Bust dr., r., head laur.	N-IK-A[...] ex – ΩN Var. 6b	4.98 21.23	Ae	G-76	Provincial Mint of Nicaea	Severus Alexander	466
46	M AVP CEVH [...] Bust dr., r., head laur.	N-IK-AI-E ex – [ΩN] Type 6 (?)	2.16 19.64	Ae	G1-87	Provincial Mint of Nicaea	Severus Alexander	284
47	Illegible Bust dr. r., head rad.	N-I-K-A-I ex – EΩN Type (?) (four standards).	3.08 19.31	Ae	G-3	Provincial Mint of Nicaea	Severus Alexander	16
48	[...] ΓORΔIANOC AVΓ Bust dr., cuir., r., head rad.	N-I-K-A-I ex – EΩN Var. 27c	3.02 19.55	Ae	G-16	Provincial Mint of Nicaea	Gordian III	107
49	Illegible Head rad. r.	Illegible Male figure (Apollo ?) stg. l.	9.60 23.50	Ae	G-7	Provincial Mint unknown	Severus Alexander or Gordian III (?)	48
50	IMP VALERI-ANVS P AVG Bust dr. cuir. r., head laur.	P M S C-OL VIM ex – AN XVI Personification stg. front, head l., between lion and bull, hands above animals heads.	7.90 25.70	S	G-52	Provincial Mint of Viminacium Борић-Брешковић 1976, no. 1679	Valerianus I 254–255	365
51	Illegible Bust cuir. r., head rad.	Illegible Figure (?) stg. l.	2.33 18.80	Ant	G-62A	Imperial Mint unknown No ref.	Gallienus 253–268	398
52	Illegible Head r.	Illegible Worn	5.58 23.32	Ae	G1-37	Provincial Mint unknown	1st – 3rd c.	93
53	Illegible Worn	Illegible Worn	3.99	Ae	G1-99	Imperial or provincial ?	1st – 3rd c. burned not illustrated	312

54	D N VAL-ENTINI-AN-VS P F AVG Bust dr., cuir., r. head diad.	GLORIA RO-MANOR-VM in field r. – K ex – [.]SIS[.] Emp. adv. r., with r. hand dragging captive, l. hld. *labrum*.	2.46 18.79	AE3	G-71	Mint of Siscia RIC IX, p. 146, no. 5(a)	Valentinianus I 364–367	452
55	D N VALEN-S P F AVG Bust dr. r., head diad.	GLORIA RO-MANOR-VM ex – TES Emp. adv. r., with r. hand dragging captive, l. hld. *labrum*.	2.21 17.87	AE3	G-71	Mint of Thessalonica RIC IX, p 176, no. 16(b)	Valens 364–367	451

Coins from layers

Cat. no.	**Obverse**	**Reverse**	**Wt. (gr) Size (mm)**	**Den.**	**Position of find**	**Mint/Ref.**	**Reign/Date**	**Vim. Coll.**
56	Illegible Helmeted head of Roma r.	Illegible Dioscuri gal-loping r.	3.22 17.93	D	Trench 40	Republic Mint of Rome No ref.	2nd c. BC	74
57	[...] COS XII CENS [...] Head laur. r.	Illegible Worn	9.26 28.60	As	Ternch 97	Imperial Mint of Rome No ref.	Domitian 86	392
58	Illegible Head l.	Illegible Victory (?) adv. r.	6.82 27.25	As	Trench 79	Imperial Mint of Rome No ref.	Domitian 81–96	346
59	Illegible Head laur r.	COS VI P P S P Q R ex – FORT RED Fortuna std. l., hld rudder and cornucopiae.	2.34 18.80	D	Trench 39	Imperial Mint of Rome RIC II, p. 261, no. 253 or RIC II, p. 265, no. 308	Trajan 112–117	47
60	Illegible Bust r., head laur.	Illegible Worn	9.43 29.40	As	Trench 35	Imperial Mint of Rome No ref.	Trajan	18

61	Illegible Head laur r.	Illegible Worn	8.40 26.18	As	Trench 40	Imperial Mint of Rome No ref.	Hadrian	59
62	LVCILLA AVGVSTA Bust dr. r., head bare, hair waved and coiled on back of head.	IVNO S C Juno std. l., hld. patera and sceptre.	22.14 29.25	S	Trench 40	Imperial Mint of Rome RIC III, p. 353, no. 1746	Lucilla striking under M. Aurelius 164–169	136/1
63	LVCIL-LAE AVG ANTONINI AVG F Bust dr. r., head bare, hair waved and coiled on back of head.	VENVS S C Venus stg. l. hld. apple and sceptre.	21.36 30.98	S	Trench 40	Imperial Mint of Rome RIC III, p. 354, no. 1763	Lucilla striking under M. Aurelius 164–169	136/2
64	Illegible Worn	Illegible Worn	6.08 24.80	As	Trench 43	Imperial Mint of Rome No ref.	2nd c.	100
65	Illegible Head r.	Illegible Worn	9.23 23.72	As (?)	Trench 118	Imperial Mint of Rome No ref.	2nd c.	454
66	Illegible Bust dr. r., head laur.	IO[VΛ]-IOΠ-O[ΛEI] ex – TΩ[N] Two standards.	4.09 18.34	Ae	Trench 125	Provincial Mint of Iuliopolis	Caracalla (?) 211–217 (?)	473
67	[...] GET[...] Bust dr. r., head bare.	[ST]OBEN - MVNIC[...] Victory adv. l., hld. wreath and palm.	8.07 25.11	Ae	G-29	Provincial Mint of Stobi Type 19	Geta	162e
68	[...] ANΔPOC AVΓ Bust dr., r., head laur.	NI-K-AI-E ΩN Type 1	4.80 20.37	Ae	Trench 123	Provincial Mint of Nicaea	Severus Alexander	472
69	Illegible Bust dr. r.	Illegible Octastyle temple	3.39 21.87	Ae	Trench 36	Provincial Mint of Nicomedia (?)	Severus Alexander	7

70	IMP C[AES M ANT GOR]DI-ANVS AVG Bust dr. cuir. r., head laur.	P M S C-OL VIM ex – AN II Personifica-tion stg. front, head l., be-tween lion and bull, hands above animals heads.	5.04 20.37	As	Trench 115	Provincial Mint of Vi-minacium Борић-Брешковић 1976, no. 148	Gordian III 240–241	426
71	IMP GOR-DIANVS PIVS FEL AVG Bust dr. cuir. r., head rad.	P M - S - C-O-L VIM ex – AN IIII Personifi-cation stg. front, head l., between lion and bull, hld. in both hands *vexilum*.	8.66 23.47	Dp	Trench 118	Provincial Mint of Vi-minacium Борић-Брешковић 1976, no. 475	Gordian III 242–243	448
72	[M] ANT OPΔIANOC Bust dr., r., head laur.	N-I-K-AI ex – EΩN var. 17a	3.79 19.54	Ae	Trench 118	Provincial Mint of Nicaea	Gordian III	447
73	M ANT OPΔIANOC AVΓ Bust dr., cuir., r., head rad.	N-I-K-A-I ex – EΩN var. 22e	3.43 19.02	Ae	Trench 115	Provincial Mint of Nicaea	Gordian III	427
74	[...]NOC AVΓ Bust dr., cuir., r., head rad.	Illegible Type (?) (three standards)	1.80 18.85	Ae	Trench 115	Provincial Mint of Nicaea	Gordian III broken	428
75	IMP C GALLVS P FELIX AVG Bust dr. cuir. r., head laur.	P M S C-OL [VIM] ex – AN XIII Personifica-tion stg. front, head l., be-tween lion and bull, hands above animals heads	9.51 25.40	S	Trench 40	Provincial Mint of Vi-minacium Борић-Брешковић 1976, nos. 1478-1522	Trebonianus Gallus 251–252	60

76	[...]SIANVS AVG Bust dr. cuir. r., head laur.	P M S C-OL VIM ex – AN XIII Personification stg. front, head l., between lion and bull, hands above animals heads.	11.40 26.68	S	Trench 96	Provincial Mint of Viminacium Борић-Брешковић 1976, nos. 1592-1637	Volusianus 251–252	377
77	Illegible Female bust r.	Illegible Worn	3.33 25.77	Ae	Trench 53	Imperial Mint of Rome No ref.	1st half of the 3rd c. broken	199
78	Illegible Worn	Illegible Figure (?) stg. l.	3.77 20.50	Ae	Trench 115	Provincial Mint unknown	3rd c.	437
79	Illegible Head l.	Illegible Worn	6.70 25.00	Ae	Trench 41	Provincial Mint unknown	1st – 3rd c.	55
80	CON-STAN-TIN-VS AVG Bust cuir. r., head laur.	D N CONSTANTINI MAX AVG Laurel wreath enclosing VOT / XX / crescent ex – ST	2.58 18.75	F	Trench 125	Imperial Mint of Ticinum RIC VII, p. 381, no. 167	Constantine I 321–322	474
81	Illegible Bust dr. cuir. r.	Illegible. ex – Illegible. *Gloria exercitus* type with one standard.	0.78 16.20	F	Trench 126	Imperial Mint unknown	Constantine I 335–337 broken	477
82	FL HEL-ENA – AVGVSTA Bust dr., with necklace r., head diad.	SECVRITAS - REIPVBLICE ex – •ESIS• Securitas stg. l., hld. branch pointing down, raising robe with r. hand.	2.74 18.85	F	Trench 123	Imperial Mint of Siscia RIC VII, p. 453, no. 218	Helena striking under Constantine I 328–329	459
83	[CONST] ANTI-VS P F AVG Bust dr. cuir. r., head diad.	[GLORIA EXER]-CIT-VS ex – SMTSA *Gloria exercitus* type with one standrard.	1.41 15.74	AE3	Trench 125	Imperial Mint of Thessalonica RIC VIII, p. 407, no. 56	Constantius II 337–340	475

84	D N CON-STAN-[…] Bust dr. cuir. r., head diad.	[FEL TEMP] REPARATIO Falling horse-man.	1.63 18.83	AE3	Trench 117	Imperial Mint un-known	Constantius II 350–361	444
85	D N CON-STAN-[…] Bust dr. cuir. r., head diad.	Illegible Falling horse-man.	1.51 16.86	AE3	Trench 123	Imperial Mint un-known	Constantius II 350–361	471
86	Illegible Bust r.	Illegible Falling horse-man (?)	1.82 16.05	AE3	Trench 123	Imperial Mint un-known	Constantius II (?) 350–361 (?)	458
87	Illegible. Bust r.	[SPES] REI-PVB[LICE] ex – Illegible Emp. stg. l., hld. globe and spear.	1.59 16.80	AE3	Trench 126	Imperial Mint un-known	Constantius II (?) 355–361 (?)	479
88	Illegible. Bust r.	GLOR-IA EXERC-ITVS ex – Illegible *Gloria exer-citus* type with one standard.	1.62 15.55	AE3	Trench 126	Imperial Mint un-known	Sons of Con-stantine I 335–341	476
89	D N VAL-ENTINI-[...] Bust dr., cuir., r. head diad.	Illegible Worn	2.81 20.73	AE4	Trench 115	Imperial Mint un-known	Valentini-anus I 364–375	433
90	Illegible Head r.	Illegible Worn	1.12 14.86	AE4	Trench 115	Imperial Mint un-known	4th c.	432

BIBLIOGRAPHY

Bogdanović, I. 2009
Rezultati arheološko-geofizičkih istraživanja na lokalitetu Kod Koraba (istočna nekropola Viminacijuma), *Arheologija i prirodne nauke* 5: 83–109.

Борић-Брешковић, Б. 1976
Новац колоније Виминацијума у збирци Светозара Ст. Душанића, Београд: Музеј града Београда.
(Borić-Brešković, B. 1976
Novac kolonije Viminacijuma u zbirci Svetozara St. Dušanića, Beograd: Muzej grada Beograda).

Борић-Брешковић, Б. 1992
Реверсне представе на новцу муниципијума Стоби, *Нумизматичар* 15: 25–46.
(Borić-Brešković, B. 1992
Reversne predstave na novcu municipijuma Stobi, *Numizmatičar* 15: 25–46).

Borić-Brešković, B. and Vojvoda M. 2017
Coins of the municipium Stobi from the necropolises ov Viminacium – Više Grobalja and Pećine, *Numizmatičar* 35: 7–31.

Borić-Brešković, B. and Vojvoda M. 2018
Circulation of Provincial Coins of the Viminacium Colony, in: VIVERE MILITARE EST, *From Populus to Emperors – Living in the Frontier*, Vol. II, S. Golubović and N. Mrđić (eds.), Belgrade: Institute of Archaeology: 73–100.

Clarke, G. 1979
Pre-Roman and Roman Winchester, Part II: *The Roman Cemetery at Lankhills*; Oxford: Oxford University Press.

Cooke, N. 1998
The definition and interpretation of Late Roman burial rites in the Western Empire, Unpublished PhD thesis, London: Institute of Archaeology, Univeristy College.

Црнобрња, А. и Васић Дерименовић, Ј. 2017
Нови налази новца битинијске ковнице Никеје на територији града Београда, *Нумизматичар* 35: 33–61.
(Crnobrnja, A. i Vasić Derimanović, J. 2017
Novi nalazi novca bitinijske kovnice Nikeje na teritoriji grada Beograda, *Numizmatičar* 35: 33–61).

Црнобрња, Н. 1981
Новац града Никеје у нумизматичкој збирци Музеја града Београда, *Годишњак града Београда* XXVIII: 5–23.
(Crnobrnja, N. 1981
Novac grada Nikeje u numizmatičkoj zbirci Muzeja grada Beograda, *Godišnjak grada Beograda* XXVIII: 5–23).

Găzdac-Alföldy, Á. **and Găzdac, C. 2009**
Coins in Funerary Contexts. The Case of Brigetio, in: *Ex Officina… Studia in honorem Dénes Gabler*, B. Szilvia (ed.), Győr: Mursella: 161–173.

Голубовић, С. 2008
Археолошка истраживања на локацији код Кораба, Виминацијум, *Археолошки преглед* 4 (2006): 91–94.
(Golubović, S. 2008
Arheološka istraživanja na lokaciji kod Koraba, Viminacijum, *Arheološki pregled* 4 (2006): 91–94).

Golubović, S., Vojvoda, M. and Redžić, S. 2022
Istočna nekropola Viminacijuma – lokalitet kod Koraba, u pripremi.

Istenič, J. 2000
Petovio, zahodna grobišča II, Grobne celote iz Deželnega muzeja Joanneuma v Gradcu, Ljubljana: Narodni muzej Slovenije.

Mikić, I., Lisul, B. and Grga Đ. 2019
Dental anthropological status of the human population found in the Roman site of Viminacium necropolis „Kod Koraba“, *Serbian Dental Journal*, Vol. 66, No. 3: 140–147.

Miškec, A. 2012
The analysis of monetary finds from the graves of Emona`s cemeteries, in: *Emona: med Akvilejo in Panonijo / Between Aquileia and Pannonia*, I. Lazar, B. Županek (eds.), Koper: Univerza na Primorskem: 133–141.

Mrđić, N. 2009
Topografija i urbanizacija Viminacijuma, nepublikovana magistarska teza, Beograd: Univerzitet u Beogradu.

Petru, S. 1972
Emonske nekropole (odkrite med leti 1635–1960), Ljubljana: Narodni muzej Slovenije.

Plesničar-Gec, Lj. 1972
Severno emonsko grobišče, Ljubljana: Mestni muzej.

Pop-Lazić, S. 2002
Nekropole rimskog Singidunuma, *Singidunum* 3: 7–100.

RIC I–VIII
Sutherland, C. H. V. 1984, *The Roman Imperial Coinage*, I, *From 39 BC to AD 69*, London: Spink & Son Ltd; Mattingly, H. and Sydenham, E. A. 1926, repr. 1962, *The Roman Imperial Coinage*, II, *Vespasian to Hadrian*, London: Spink & Son Ltd; Mattingly, H. and Sydenham, E. A. 1930, repr. 1962, *The Roman Imperial Coinage*, III, *Antoninus Pius to Commodus*, London: Spink & Son Ltd; Mattingly, H. and Sydenham, E. A. 1936, repr. 1962, *The Roman Imperial Coinage*, IV/1, *Pertinax to Geta*, London: Spink & Son Ltd; Mattingly, H., Sydenham, E. A. and Sutherland, C. H. V. 1938, *The Roman Imperial Coinage*, IV/2, *Macrinus to Pupienus*, London: Spink & Son Ltd; Mattingly, H., Sydenham, E. A. and Sutherland, C. H. V. 1949, *The Roman Imperial Coinage*, IV/3, *Gordian III to Uranius Antoninus*, London: Spink & Son Ltd; Webb, P. H. 1968, *The Roman Imperial Coinage*, V/1, London: Spink & Son Ltd; Webb, P. H. 1968, *The Roman Imperial Coinage*, V/2, London: Spink & Son Ltd; Sutherland, C. H. V. 1967, *The Roman Imperial Coinage*, VI, *From Diocletian's reform to the death of Maximinus*, London: Spink & Son Ltd; Bruun, P. M. 1966, *The Roman Imperial Coinage*, VII, *Constantine and Licinius* A.D. 313–337, London: Spink & Son Ltd; Kent, J. P. C. 1981, *The Roman Imperial Coinage*, VIII, *The family of Constantine* I A.D. 337–364, London: Spink & Son Ltd.

Speal, C. S. 2015
A paleodemographic / Mortuary study of graves from the eastern necropoli at Roman Viminacium, *Arheologija i prirodne nauke* 11: 167–186.

Teichner, F. 2011
Die römischen Gräberfelder von Intercisa II: *Die Altfunde aus den Museumssammlungen in Berlin. Mainz und Wien*, Berlin-Charlottenburg: Museums für Vor-und Frühgeschichte SMPK.

Topál, J. 1981
The Southern Cemetery of Matrica (Százhalombatta-Dunafüred), Budapest: Akadėmiai Kiadò.

Војвода, М. 2011
Реверсне представе са војним ознакама ковнице у Никеји на основу узорака са виминацијумске некрополе Више Гробаља, *Гласник САД* 25: 243–256.
(Vojvoda, M. 2011
Reversne predstave sa vojnim oznakama kovnice u Nikeji na osnovu uzoraka sa viminacijumske nekropole Više Grobalja, *Glasnik SAD* 25: 243–256).

Војвода, М. 2013
Новац битинијске ковнице Никеје са виминацијумске некрополе Више гробаља, *Нумизматичар* 31: 155–196.
(Vojvoda, M. 2013
Novac bitinijske kovnice Nikeje sa viminacijumske nekropole Više Grobalja, *Numizmatičar* 31: 155–196).

Vojvoda, M. 2017
Coins of the Bithynian Mint of Nicaea from the Viminacium Necropolis of Pećine, *Starinar* LXVII: 131–150.

Војвода, М. и Бранковић, Т. 2016
Новац битинијске ковнице Никеје из римске нумизматичке збирке Народног музеја у Пожаревцу, *Нумизматичар* 34: 103–142.
(Vojvoda, M. i Branković, T. 2016
Novac bitinijske kovnice Nikeje iz rimske numizmatičke zbirke Narodnog muzeja u Požarevcu, *Numizmatičar* 34: 103–142).

Vojvoda and Crnobrnja 2018
Circulation of the coins of Bithinian mint of Nicaea in Moesia Superior, In: *Proceedings of the International Numismatic Symposium »Circulation of Antique Coins in Southeastern Europe«*, held in Viminacium 2017, V. Ivanišević, B. Borić-Brešković, M. Vojvoda (eds.), Belgrade: Institute of Archaeology: 131–141.

Vojvoda, M. i Mrđić, N. 2015
Nalazi novca sa viminacijumske nekropole Više grobalja i njihova uloga u pogrebnom ritualu (Coin finds from the Viminacium necropolis of Više grobalja and their role in funerary ritual), Beograd: Institute of Archaeology.

Vojvoda, M. i Mrđić, N. 2017
Nalazi novca sa viminacijumske nekropole Pećine i njihova uloga u pogrebnom ritualu (Coin finds from the Viminacium necropolis of Pećine and their role in funerary ritual), Beograd: Institute of Archaeology

Војвода, М. и Петровић, С. 2011
Новац битинијске ковнице Никеје из Бановог Поља у Мачви, *Нумизматичар* 29: 283–308.
(Vojvoda, M. i Petrović, S. 2011
Novac bitinijske kovnice Nikeje iz Banovog Polja u Mačvi, *Numizmatičar* 29: 283–308).

REZIME
NALAZI NOVCA S ISTOČNE VIMINACIJUMSKE NEKROPOLE LOKALITET KOD KORABA

KLJUČNE REČI: RIMSKO CARSTVO, NEKROPOLA, VIMINACIUM, KOD KORABA, NOVAC.

Istočna nekropola Viminacijuma nakon južne predstavlja drugu po veličini nekropolu ove antičke metropole, a čine je lokaliteti: Pirivoj, Kod bresta, Brest i Kod koraba. Ova oblast neposredno je ugrožena radom površinskog kopa uglja Drmno i njeni pojedini delovi uništeni su u potpunosti. Zbog toga se zaštitna arheološka istraživanja obavljaju od kraja 90-tih godina prošlog veka sve do danas.

Tokom zaštitnih arheoloških iskopavanja na lokalitetu Kod koraba u periodu od 2005. do 2007. godine istraženo je 210 grobova: 78 (37,15%) inhumiranih i 132 (62,85%) kremiranih pokojnika. Ukupno je nađeno 90 primeraka novca, od čega je 55 (61%) predstavljalo grobne priloge, a 35 (39%) nalaze iz slojeva na nekropoli.

Najstariji primerak novca koji je pronađen na nekropoli Kod koraba pripada neodređenim republikanskim emisijama iz 2. veka stare ere, a najmlađi izdanjima Valentinijana I između 364–375. godine (Tabele 7–8). Svi primerci su bronzani, osim dva denara (Cat. nos. 56, 59) i jednog antoninijana (Cat. no. 51). Veći broj pripada imperijalnim izdanjima 64 kom. (72%), dok na provincijalne emisije otpada 25 kom. (28%).

Na osnovu analize monetarnih nalaza sa lokaliteta Kod koraba, koji predstavlja deo istočne nekropole Viminacijuma, možemo zaključiti da je nekropola formirana krajem 1. veka, a zatim intenzivno korišćena tokom 2. i prve polovine 3. veka. Nalazi novca 4. veka ukazuju da se nekropola širila ka severu. Arheološkim istraživanjima utvrđeno je da na istočnoj nekropoli postoje prazni prostori bez grobova široki i do 200 m. Tek nakon publikovanja svih lokaliteta istočne nekropole (Kod koraba, Pirivoj, Brest, Kod bresta) bićemo u mogućnosti da donesemo izvesnije zaključke kako u vezi monetarnih nalaza, tako i u vezi drugih nedoumica.

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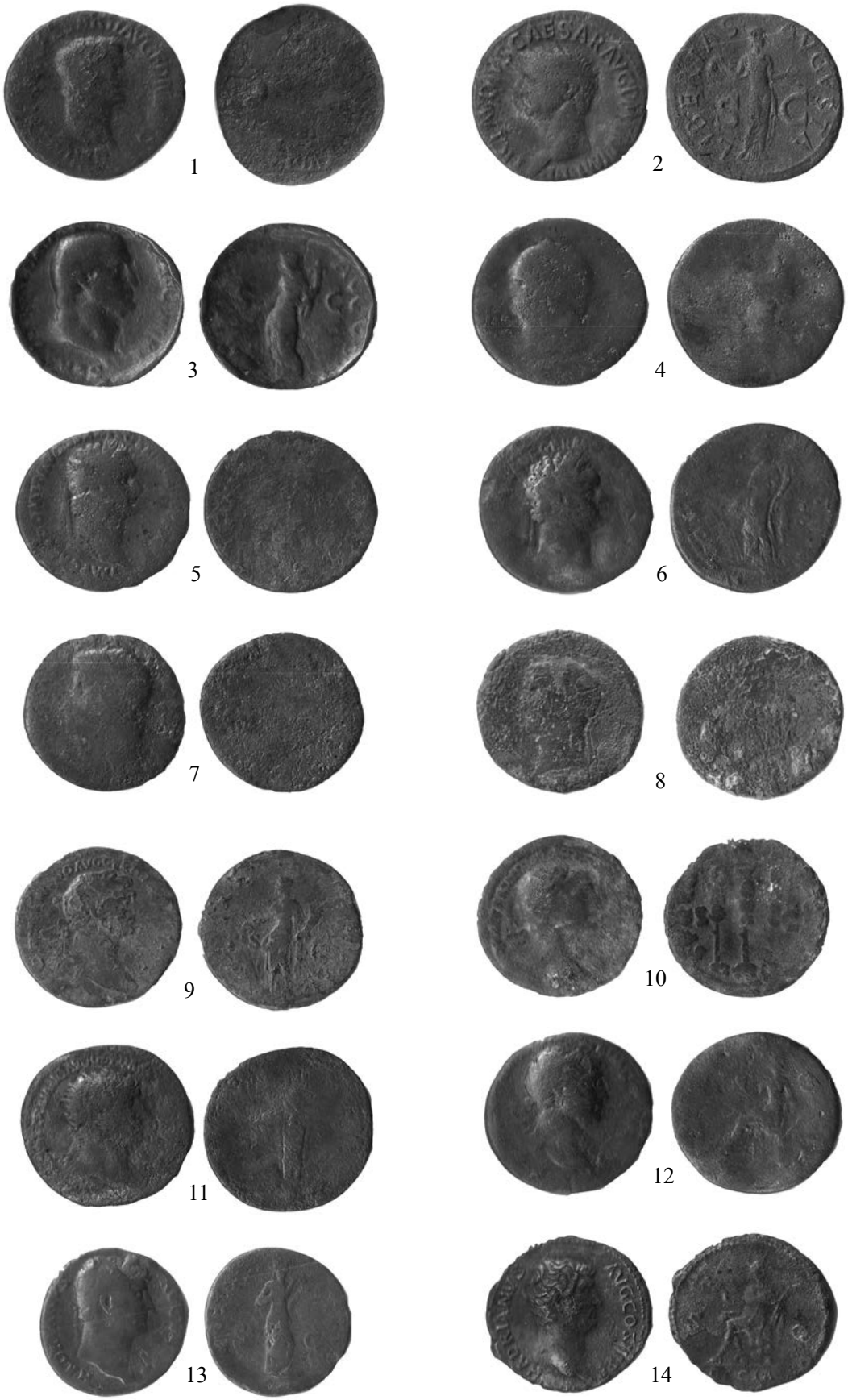
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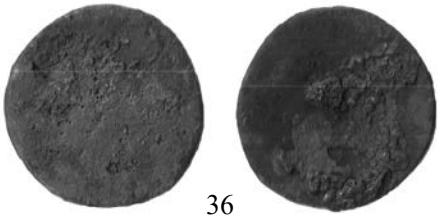
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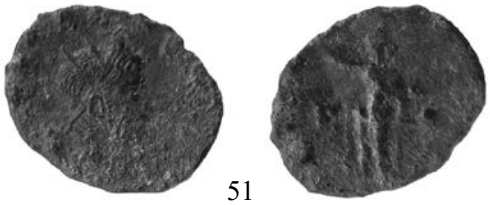
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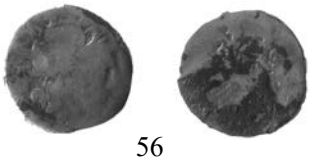
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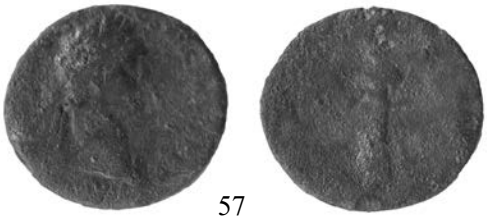
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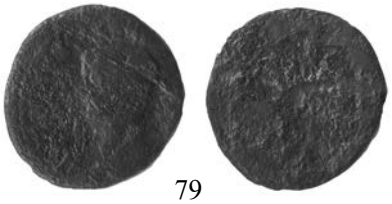

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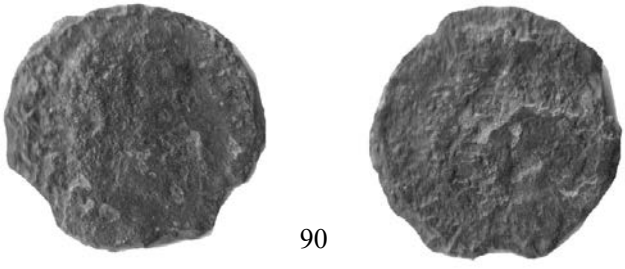

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A CONTRIBUTION TO THE STUDY OF THE CULT OF THE GOD MITHRA IN MOESIA SUPERIOR: FINDINGS FROM THE MIDDLE AND SOUTHERN MORAVA VALLEY

ABSTRACT

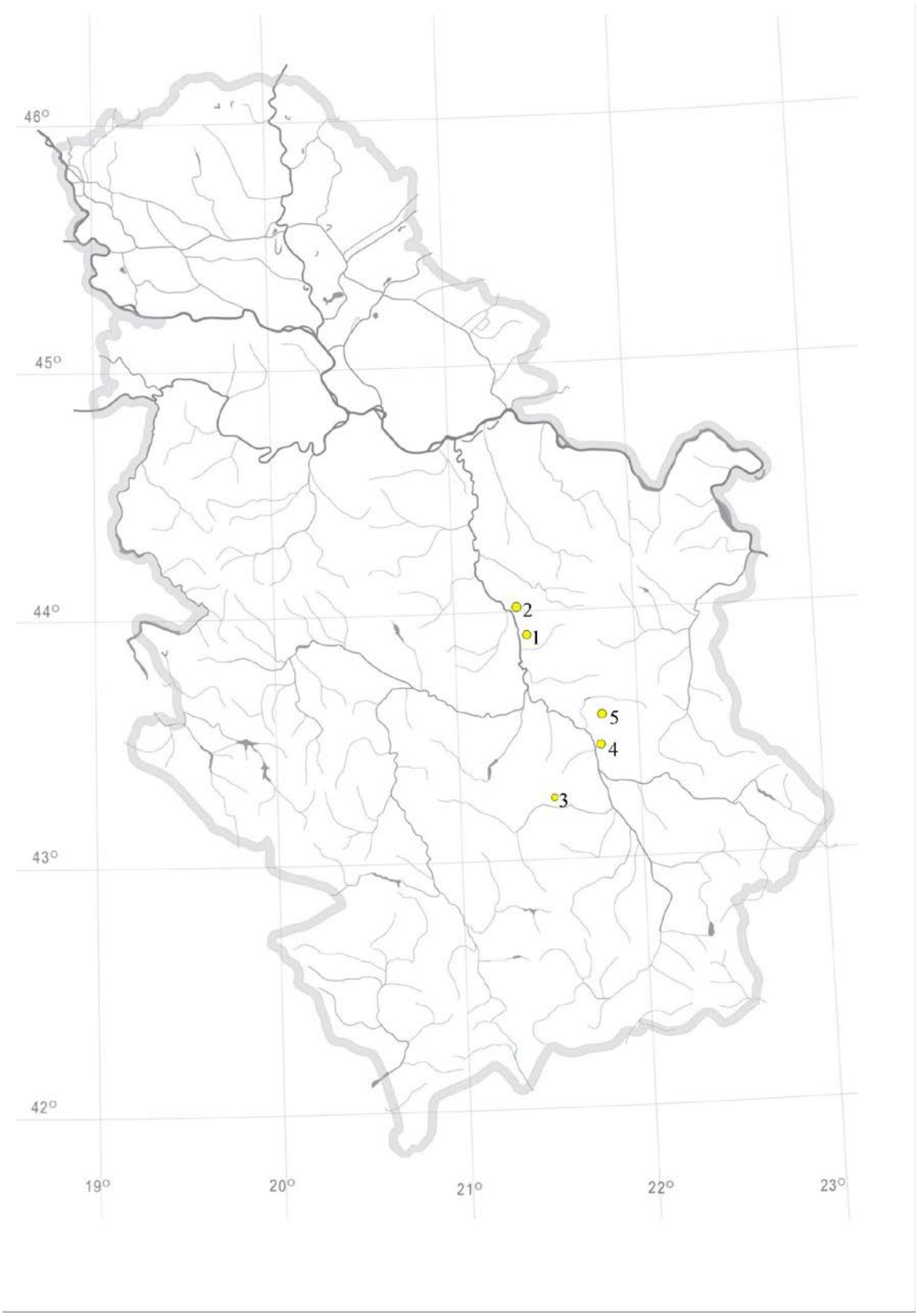
The paper presents the findings regarding the cult of Mithra from the territory of the Southern and Middle Morava River valley, which are taken into consideration according to their iconographic characteristics, as well as within the historical-geographical circumstances of the area to which they belonged during the Roman era. On the basis of the analysis of artistic details, it was concluded that these are monuments that mostly do not differ from the famous monuments of the cult of Mithra from our area, confirming the previously stated opinions of researchers that certain atypical iconographic traits on them probably arose as a result of insufficient understanding of the Mithraic doctrine, i.e. a lack of control in reproducing the canonised pattern of this cult. Furthermore, by considering the broader context of their findings, we also looked at possible ways in which the cult of Mithra could have been practiced in this area.

KEYWORDS: MITHRA, TAUROCTONY, ROMAN CULT, ICONOGRAPHY, THE SANCTUARIES, MORAVA RIVER VALLEY.

In the territory of the province of *Moesia Superior*, the cult of the god Mithra has been recorded in the form of a large number of findings (Зотовић 1973; Гавриловић-Витас 2017). In this paper, the immediate cause of which is the material from the exhibition "The cult of Mithra in the environment of the confluence of the three Morava rivers" of the National Museum Kruševac, from 2011 (Рашковић 2011), our intention is to contribute to a better understanding of the nature of this cult in Roman provinces by considering the iconographic characteristics and the broader context of their findings. These findings are votive reliefs that were recorded in Ćuprija, the village of Dragovo near Rekovac and in the area of the village of Džigolj near Prokuplje, then the village of Nozrina near Aleksinac and the surroundings of the village of Ražanj, i.e. from sites that mostly follow the main road between two large urban settlements of the Roman era, the municipality of *Horreum Margi* and the peripheral area of *Naissus* (Map 1).

THE MORAVA RIVER VALLEY DURING THE ROMAN ERA

From a geographical point of view, the territory whence the mentioned findings come from



Map 1 Sites of the cult of Mithra of the Southern and Middle Morava River valley (author: Nataša Miladinović).

includes the area of the Middle Morava River valley and the northern part of the Southern Morava River valley, i.e. the valley of Aleksinac. Today, the Middle Morava valley completely coincides with the territory of the Pomoravlje administrative district, which consists of five municipalities – Paraćin, Ćuprija, Despotovac, Svilajnac, Rekovac and the city of Jagodina, extending over the territory of the conurbation of Jagodina–Ćuprija–Paraćin (Танић 2016: 9–10). The position of the Middle Morava valley clearly indicates the great strategic importance of this area, which was recognised during Antiquity as well, since it is located in the northern part of the Morava–Vardar valley, as the main natural road and the main connecting line between the Aegean Sea and the Middle Danube Valley, or the interior of the Balkans and Pannonia. On the opposite side, the valley of Aleksinac, encompassing the northern part of the flow of the Južna Morava River, is bordered by the mountains of Poslonske Planine and Bukovik in the north, Bovan gorge and Ozren in the east, the hills of Mojsinje and Mali Jastrebac in the west, and the valley of Niš in the south, continuing the above mentioned communication towards Northern Macedonia. (Рашковић 2006: 205).

It is believed that the Romans were present in the Morava River valley from the second half of the 2nd century BC, when they set out on expeditions to the territories north of the province of Macedonia, while during the 1st century BC, Roman legions sought to establish their positions within the Balkan Peninsula and on the Danube, with this territory playing an important role (Mirković 1996: 29). Finally, it became part of the Roman state around the year 15, when the areas of the Dardanians, Tribals and Moesi became part of the province of *Moesia*. Realising the strategic importance of this area, the Romans soon started the construction of the road (*Via millitaris*), which was completed in the year 33, connecting the interior of the Balkans with the Danube Valley and enabling the transfer of the Roman army from Greece and Thrace to Pannonia. This important communication started from *Singidunum*, through *Viminacium* across the Morava Valley, where there were numerous settlements and road stations on the way to *Naissus* and Constantinople (Петровић 2007: 68–74; Рашковић 2017a).

In addition to its role in terms of traffic, the Romans realised the logistical importance of the Morava Valley, so this area had a significant role later as a granary that fed not only the army in the Danubian limes, but also the neighbouring mining areas (Рашковић 2006: 210–220). Thus, a settlement with the military fortification of *Horreum Margi* (Ćuprija) stands out in this area as the main station for collecting food products, primarily cereals, in the valley of the river *Margus* (Velika Morava), while its importance is also evidenced by the fact that it was an episcopal see in the 4th century. *Horreum Margi* was founded at the beginning of the 2nd century, and during the 3rd century it was surrounded by ramparts, and then additionally extended to the west at the beginning of the 4th century (Tapavički-Ilić and Petković 2017: 165–166). The first destruction of the fortification occurred during the 3rd century, with the invasion of the Goths in the territory of the Balkan Peninsula, and the peak of instability of the Roman administration occurred after the battle of Hadrianopolis in 378. However, life in this Roman settlement died out only after the Huns invasion in the period 441–443, as was essentially the case with most others in the Morava Valley (Васић и Петковић 2010: 21–22).

In the territory to which the mentioned findings of the cult of Mithra belong, two road stations have been located with certainty, *mansio Idimum* and *mansio Praesidium Pompei*, known from late antique road maps such as *Tabula Peutengeriana*, then *Itinerarium Antonini Augusti* and *Itinerarium Hierosalymitanum* (*Itinerarium Burdigalense*) (Vasić and Milošević 2000: 9; Рашковић 2006: 213; 2017a: 67–69). Thus, *Mansio Idimum* was located near the village of Medveđa, on the left bank of the Resava river, representing a post and road station on the public road *Viminacium–Nais-*

sus, about 16 miles from *Horreum Margi* (Vasić and Milošević 2000: 9). The *Praesidium Pompei* station was located at the site of Zindan in the village of Ćićina, on a vast fertile terrace, through which the public road passed, following the course of the river. It was an open-type *mansio* that existed from the second half of the 3rd century, with a fortification added at the beginning of the 4th century. Thanks to the material remains and mobile findings from that site, it is known that the settlement was located next to the *mansio*, as the seat of the civil administration and, according to the epigraphic testimonies, the military unit of the II cohort of the Dardanians (*cohors II Aurelia Dardanorum*) resided here, which was formed by Emperor Marcus Aurelius for the purpose of fortifying the border of the territory of *Naissus* in the north during the Marcomannic wars (Ђорђевић и Рашковић 2004: 33–34, 36).

Late antique itineraries record the presence of other stations and settlements along the route of the public road *Horreum Margi – Naissus*, such as *mutatio Sarmatorum*, *Praesidium Dasmini*, *mutatio Cametas* and *mutatio Rappiana* as stops alongside roads that merged with the main road communication (Рашковић 2017a: 60). According to numerous archaeological findings from the Roman period in the areas of the villages on the left bank of the Južna Morava, it is believed that the main road from *Praesidium Pompei* to *Naissus* led right there (Гарашанин и Гарашанин 1951: 45–46, 166–169). When it comes to the monuments of the cult of Mithra that will be discussed here, it is important to note that *mutatio Cametas* was usually placed in the village of Ražanj near Aleksinac in older literature, where a late antique necropolis was found at the site of Nišbar in 1954 (Јуришић 1956; Зотовић-Жунковић и Шалабалић 1958−1959: 205), while according to a more recent opinion, this necropolis can only be considered a part of *Cametas*, and the Roman settlement and the road station were most likely located in the immediate vicinity, in the area where the villages of Kačanica and Lipovac meet (Рашковић 2017a: 67). Also, an assumption was made that *mutatio Rappiana* could have been located in the village of Nozrina, as indicated by a large concentration of findings, as well as its distance of 12 Roman miles in relation to the station *Praesidium Pompei*, which corresponds to its location on late antique maps (Рашковић 2017a: 71).

The importance of this area during the Roman era, in addition to testimonies that speak in favour of the existence of road stations and settlements, is emphasised by findings of a religious nature, indicating the peculiarities of the sacral practice. However, it is necessary to point out that a major problem here is the insufficient level of research, because in this region, except in the case of the site *of Horreum Margi*, the small amount of data that we have at our disposal has been obtained through systematic archaeological research. This fact has been repeatedly pointed out in literature, and, accordingly, the placing of the mentioned settlements is based mainly on data from literary sources, i.e. material obtained by field surveys or through gifts from private individuals (Кузмановић-Цветковић 1995: 169; Рашковић 2013; 2017: 71–72).

CATALOGUE

Marble relief from Ćuprija (*Horreum Margi* – Ravno Museum, inv. no. 614) – **Fig. 1.**

Dimensions: height 35 cm, width 57 cm, thickness 9-10 cm.

References: Васић и Петковић 2010: 17, fig. 7; Васић 1992; Tapavički and Petković 2017: 165–166, fig. 1.

Fragment of a relief depicting the god Mithra in the act of tauroctony, with the torchbearers Cautes and Cautopates, next to him. The rest of the decorated outlet that frames the scene can be seen on the left side of the relief. In front of the body of a prostrate bull, the figure of a snake with its head raised towards a wound on the bull can be seen, while on its right side there is a figure of a dog.

Fig. 1 Marble relief with the representation of the Mithras from Ćuprija (after:Tapavički and Petković 2017: fig. 1).

Fig. 2 Marble relief with the representation of the Mithras from the village of Dragovo (photo: Zavičajni muzej Jagodina).

Below the central field with the figural representation there is an inscription which is reconstructed as: *SOLI INVICTO AVR(elius) AQUIL[a ±12letters] GORDIANAE V(otum) [s(olvit) l(ibens) m(erito)]*.

Marble relief, village of Dragovo (Regional Museum Jagodina, inv. no. 47_5.) – **Fig. 2.**[1]
Dimensions: height 14 cm, width 12 cm, thickness 1 cm.
References: Vetnić 1967: 117; Зотовић 1973: 25; Cvetković i Dodić 2001: 60, sl. 29.
Fragmentarily preserved relief with a central representation of the god Mithra in the act of tauroctony, with torchbearers next to him. Cautes and Cautopates are holding a *pedum* instead of torches. In front of the prostrate body of a bull, there is a snake with its head raised in the direction of a wound on the bull's neck, while on the lower part of the relief there is a frieze with three scenes illustrating the rite of initiation into the cult and scenes related to the mythological cycle of Mithra and Sol.

Marble relief, village of Džigolj (National Museum of Toplica inv. no. 900) – **Fig. 3.**
Dimensions: height 28 cm, width 28.5 cm, thickness 3.5 cm.
References: Кузмановић-Цветковић 1995.
Relief with a representation of the god Mithra in

Fig. 3 Marble relief with the representation of the Mithras from the village of Džigolj (photo: Petar Ćeranić).

1 On this occasion, we would like to cordially thank our colleague Smiljana Dodić from the Regional Museum Jagodina for the photo of the finding.

the act of tauroctony, with torchbearers next to him. Above them are the busts of Sol and Luna, while the figure of a raven is given on the edge of the *chlamys* of the god Mithra. Above that image, in a rectangular field, there is a gable with no decoration.

Marble relief, village of Nozrina (National Museum Kruševac, inv. no. 4) – **Fig. 4.**
Dimensions: height 17.7 cm, width 23.4 cm, thickness 3.5 cm.
References: Рашковић 2013: 76, сл. 1; Васиљевић 2017: 24.
A fragment of a relief composed of four parts, on which the lower part of a representation of the god Mithra in the act of tauroctony can be identified, with torchbearers, Cautes and Cautopates, next to him. In front of the body of a prostrate bull, the figure of a snake with its head raised towards a wound on the bull can be seen, while the figure of a dog can be noted on its right side. There is a relief frieze in the lower part with four separated representations, which provide a standard depiction of the rite of initiation into the cult and scenes related to the mythological cycle of Mithra and Sol, while the first scene consists of a figure riding an animal (bull or horse?).

Marble relief, area of Ražanj (National Museum in Niš, inv. no. 1095) – **Fig. 5.**[2]
Dimensions: height 32 cm, width 33 cm, thickness 1.5 cm.
References: Зотовић-Жунковић и Шалабалић 1958−1959; Зотовић 1973: 61−62; Petrović 1979: 113−114, n. 93; Пешић 2004: 165, кат. 88; Рашковић 2013: 59, T. I, 1; Гавриловић-Витас 2017: сл. 1-2;
Marble relief with a central representation of the god Mithra in the act of tauroctony, with torchbearers, Cautes and Cautopates, next to him. There is a bust of the goddess Luna above Cautes,

Fig. 4 Marble relief with the representation of the Mithras from the village of Nozrina (photo: Narodni muzej Kruševac).

Fig. 5 Marble relief with the representation of the Mithras from the area of Ražanj (photo: Narodni muzej Niš).

while a very summary scene of Mithra's birth is given above Cautopates. Below the bull, there is the figure of a snake with its head raised towards a wound on the bull, depicted in full length. A relief frieze is at the bottom, with three scenes illustrating the rite of initiation into the cult and scenes related to the mythological cycle of Mithra and Sol. There is a short inscription in ancient Greek beneath it, which is partly illegible. The dedicant with the Thracian name Καρδένθης, whose patronymic is Τετεεγος (?), is recognisable, and the rest is most likely an abbreviated votive formula.

2 We would like to cordially thank our colleague Vesna Crnoglavac from the National Museum in Niš for the photo of the finding.

ICONOGRAPHIC TRAITS OF THE FINDINGS

The findings of the cult of Mithra that we present in this paper can be divided into two groups: those that have only a central field with a tauroctony and those with a lower frieze with scenes as well. The first group includes findings from Ćuprija and Džigolj (**Figs. 1, 3**), and the second from the villages of Dragovo, Nozrina and the surroundings of Ražanj (**Fig. 2, 4, 5**).[3] The scene of tauroctony, as the main depiction of the Mithraic cult,[4] is given on all the mentioned reliefs in the standard manner: the god Mithra, dressed in a fluttering *chlamys*, presses down a bull with one foot, standing on the ground with the other, and stabs him with a dagger at neck height. In addition to the deity, in all cases, the classic depictions of *dadophoroi*, Cautes and Cautopates, are given, in a standing position with crossed legs, frontally or in half profile. They are holding torches pointed in different directions, and it is only on one finding from Dragovo that one of them holds a *pedum*, as a typical detail of the iconography of Mithraic reliefs from *Moesia Superior* (Vetnić 1967: 117; Зотовић 1973: 25, 131). Beneath the prostrate bull is a representation of a snake on all findings except for the one from Džigolj, while the standard figure of a dog attacking the bull on the right can be recognised in the reliefs from Ćuprija and Nozrina. Additionally, the relief from the village of Džigolj shows a raven, almost on the edge of the fluttering dress of the deity, with the busts of Sol and Luna depicted above, and on the example from the area of Ražanj, it seems that only Luna's bust is represented.

The lower frieze with scenes below the tauroctony appears on reliefs from the villages of Dragovo, Nozrina and the surroundings of Ražanj. These are representations that continually fill the lower part of these plates, standardly illustrating the rite of initiation into the cult,[5] the sacred feast of Mithra and Sol, and the departure of the deities, in Sol's chariots, to heaven, that is, to immortality. This type of icon is associated with the so-called Danubian provinces of the Roman Empire, and it is believed that its iconography was probably formed in the bordering area of *Moesia Superior* and *Moesia Inferior*, from where it spread to the territory of the mentioned provinces, starting from the second half of the 2nd century (Najdenova 1989: 1417−1419; Гавриловић-Витас 2017: 200–201). In the area of *Moesia Superior*, the appearance of such icons has been confirmed many times, so we find close analogies for them on examples from nearby Mramor, near Niš (Гавриловић-Витас 2017: fig. 3-4), the village of Ragodeš, near Pirot, and Belgrade (Vermaseren 1960: fig. 619, mon. 2243; Зотовић 1973: 15, fig. 1, 60–61; Гавриловић-Витас 2017: 200, fig. 7-8).

The literature traditionally emphasises the peculiarity of the iconography of the Danube re-

3 According to the typology of L. A. Campbell, all Mithraic reliefs are divided into eight groups (I–VIII), with subtypes marked with letters from A to E (Campbell 1968: 1–3). Accordingly, the reliefs from Ćuprija and Džigolj belong to the first type, while the examples from the village of Dragovo and the surroundings of Ražanj belong to the second and seventh group, where types whose field ends in a semicircle and with a lower three-part frieze are classified. When it comes to the relief from Nozrina, it is not possible to determine the exact typological affiliation because there is no preserved upper part, while there are four scenes on the lower frieze. Additionally, all the icons we consider in this paper belong to subtype A, which includes representations of a tauroctony where the god Mithra is depicted frontally, with a bent left leg placed on the back of a slightly smaller figure of a bull.

4 The representation of the god Mithra in the act of tauroctony, the symbolic killing of a bull, is considered a cosmogonic act of a deity who thus saves the world from ruin. Today, most researchers have accepted that the scene of tauroctony is a star map on which each figure symbolises a certain constellation, and other artistic contents on the cult objects of the god Mithra are interpreted accordingly (Gordon 1975: 215–248; Hinnells 1975; Beck 1976: 95–98; 1988; Ulansey 1991).

5 It is a scene where one standing figure swings his hand or places it on the head or shoulders of another kneeling figure, which used to be interpreted, in older literature, as the end of the massive battle of Mithra and Sol, i.e. the act in which Sol expresses his final submission to Mithra, which was considered typical for the reliefs from the area of the Balkans (Cumont 1903; Vermaseren 1960: 80). However, L. A. Campbell's explanation is generally accepted today, who identifies the rite of initiation into the cult in that scene, taking place in the *mithraeum* (Campbell 1968: 291).

liefs, as well as their consistency (Hinnells 1975: 52; Turcan 1996: 213), while more recently the emphasis has been on the artistic specificities of the monuments of the Mithraic cult from the Roman provinces of the Central Balkans, conditioned by the geographical, temporal and social context (Гавриловић-Витас 2017: 202). It is in this context that we can view the details of reliefs discussed here: thus, on the example from Ćuprija, we can see the rest of a decorated frame with floral ornaments around the scene of tauroctony, which is assumed to have had the shape of a trapezoid or triangle, something not known from other Mithraic monuments (Tapavički-Ilić and Petković 2017: 166). Two explanations are offered for this detail: according to one hypothesis, the craftsman who made this relief did not really understand the symbolism of the depicted scene and thus placed it in an imaginary environment, rather than in the symbolic representation of a cave, while according to the other, the emphasis is on the symbolism of the triangle as a heavenly roof and a place where the plane of the gods meets that of the mortals (Васић 1992: 382). We are more inclined to favour the first hypothesis, that is, the possibility that this was in fact an inconsistent imitation of the framed scene of tauroctony known from some Italian examples. We will mention the relief with Mithra that is built into the renaissance Palazzo Mattei in Rome today, on which a similarly made ornamental arch-shaped outlet can be seen, which resembles the flat shape of a triangle in the lower left part, as can also be seen on one of reliefs with Mithra from the Vatican Museum (Vermaseren 1960: mon. 534, 546–547). What is typical for both those scenes from the territory of Italy is that only a figure of a deity with a wounded bull is placed in a frame, while Cautes and Cautopates are either not represented or placed outside of it. This reinforces the impression of a poorer compositional solution of the relief from Ćuprija even further, where the *dadophoroi* are disproportionately incorporated within the profiled field.

Furthermore, the empty gable field that appears at the top of the icon with Mithra from Džigolj was mostly uncommon on reliefs of this cult (Vermaseren 1960: fig. 500, mon. 1919). Otherwise, the very shape of this icon – a rectangle with a gable – is somewhat rarer in the Central Balkans, where only few more such examples have been recorded (Зотовић 1973: cat. 30, 37, 47e, 106). Also, there are no main cult animals on this relief – namely, snake and dog, while a raven and possibly a scorpion are represented, which can only be guessed at due to the poor execution (Кузмановић-Цветковић 1995: 166). This icon is made of coarse grain marble from the vicinity of Prokuplje, which suggests that it was made by a local craftsperson who could have known the artistic pattern of representations of Mithra, but was not able to implement it consistently.

A provincial character of production is also attributed to the icon from the area of Ražanj, which is a mediocre work with unskilfully executed details. This is evidenced by the figure of Cautes, who was pushed aside along the left edge, which caused a lack of space for his figure, which was, therefore, executed in a very simplified manner (Зотовић 1973: 61; Гавриловић-Витас 2017: 200). The scene of Mithra's birth from a rock is shown in a similar manner (*Mithras petragenes*), almost continuing above the head of Cautes. Mithra is depicted naked, with a Phrygian cap on his head, a knife in one hand and a torch in the other, as symbols that indicate that the god born from a rock was the creator of light and all life on earth. It is one of the scenes from the cycle of Mithra, which is represented in the friezes around the tauroctony scene, but is more typical of reliefs from the western provinces (Гавриловић-Витас 2017: 197, нап. 27).

Lastly, on a Mithraic icon from the village of Nozrina, on the lower frieze, instead of the standard three, there are four scenes. In addition to the scenes that usually represent the rite of initiation into the cult, the sacred feast of Sol and Mithra and the ascension of the deities in Sol's chariots to heaven, the first scene, that of a figure riding

an animal, stands out here. Mithraic icons typically feature a scene where this deity rides a bull or is shown almost lying on it while it is prancing or racing, wrapping his arms around its neck or holding it by the horns, often as part of smaller scenes arranged around the main scene of tauroctony. However, in accordance with the artistic traits of this representation, where one can see a bent rider on an animal in fast trot, one should not rule out a slightly smaller possibility that it is Mithra on horseback. In that case, it would be a rather rare depiction, especially on the lower frieze of Mithraic icons, while such an iconographic setting is recorded in larger numbers only in the so-called German monuments (Vermaseren 1956-1960: 1083, 1137, 1247a, 1289, 1292), where an interconnection of such scenes, as an allusion to hunting, with depictions of the sacred feast, was observed (Dirven 2016: 20).

In terms of the style, we can say that almost all the Mithraic reliefs we are discussing here were made in a very simplified manner, with schematically executed scenes and poorer general compositions. In addition to the iconographic deviations that we have pointed out, this speaks in favour of their provincial provenance, i.e. the possibility that in some cases, due to the insufficient knowledge or understanding of the Mithraic doctrine itself and its artistic expression, there was a lack of control in reproducing the canonised pattern of this cult (Зотовић 1973: 111–112; Кузмановић-Цветковић 1995: 168).

THE FINDING CONTEXT OF MITHRAIC RELIEFS IN THE MIDDLE AND SOUTHERN MORAVA VALLEY

Considering the fact that only examples from Ćuprija and Dragovo were excavated during systematic archaeological excavations, we have somewhat more detailed data on the context of those findings. The icon of Mithra from Ćuprija was found during excavations in 1990 in the area of a military fortification, when the stratigraphy of cultural layers along its northern and eastern ramparts was investigated. The dedication on this monument is in accordance with the finding place – by *Aurelius Aquila*, soldier of *Legio IV Flavia* or *Cohors II Aurelia Dardanorum*, which is why it was dated into the fourth or fifth decade of the 3rd century (Васић 1992: 384–385; Tapavički-Ilić and Petković 2017: 165). On the other hand, the relief from the village of Dragovo is testimony to the existence of a place located next to a forest spring where the cult of Mithra was practiced. Namely, this small icon was secured with iron wedges to the side of a large, crude stone block, which probably formed the altar of the sanctuary, while a hearth was located in its vicinity, with several plates on which sacrifices were offered. Next to the altar, a hoard of money was found, as well as pottery fragments, while several remains of burnt animal bones and pottery were recorded in the hearth itself. The findings from the area of this sanctuary include one fibula, as well as several fragmented vessels decorated with a relief depiction of snakes (Vetnić 1967; Cvetković and Dodić 2001: 60).

The icon of Mithra from Džigolj, from the slopes of Mali Jastrebac, was an accidental finding from when a well was being dug on a private property. A few more stones were removed from the same place, indicating the possibility that there was once a building there, but the layered deposits of mud brought by a nearby stream make it impossible to find additional traces that would confirm what it really was (Цветковић-Кузмановић 1995: 168–169). Although no significant remains of Roman culture have been recorded in Džigolj itself, remains of several late antique villas and buildings, such as *thermae* and built tombs, were found only a few kilometres away (Цветковић-Кузмановић 1995: 165), which nevertheless point to the possibility that the inhabitants of that estate could have practiced their religious rites in a sacred place near a forest spring, analogous to the one from the village of Dragovo.

As for the relief from the village of Nozrina, also an accidental finding, by considering data from the literature and other archaeological material found in the same place, it can be concluded that it could have been a votive gift from a smaller temple where other deities were worshiped. Namely, in the village of Nozrina, on the site of Mogile, from where an icon with Mithra came, two stone sarcophagi, a luxurious bronze vessel, a bronze head, ceramics and a silver coin of Marcus Aurelius were found in a tumulus, in the 19th century (Рашковић 2013: 63), and somewhat later, a fragmented tombstone, stone statuettes of lions, architectural remains and a tomb built with bricks were also discovered (Вулић 1934: 49; Јовановић 1980: 5; Рашковић 2013: 63). The fact that fragments of marble reliefs depicting Sol-Apollo and the Thracian horsemen came from there is also of great importance to us, as well as the fragments of a marble icon of Jupiter and a small part of a cult image of Jupiter and Juno, today in private ownership (Рашковић 2013: 64, T. 4-5; Васиљевић 2017: 23–25). It is precisely the number of votive monuments from the site of Mogile, along with the concentration of other findings from the Roman era, that is the basis for the already mentioned assumption that the village of Nozrina was once a road station of *mutatio Rappiana* (Рашковић 2017a: 71), i.e. that it could have been a developed Roman settlement with a smaller sanctuary.

Finally, in the case of the icon with Mithra from the surroundings of Ražanj, it was considered that it originated from Ražanj itself because it was brought from its Cultural Centre to the National Museum in Niš (Гавриловић-Витас 2017: 188, нап. 1). This possibility was also indicated to the researchers by the remains of the walls of an ancient building and necropoles from the 4th century in Ražanj (Зотовић-Жунковић и Шалабалић 1958−1959: 205). However, according to more recent field data, the locals found this icon not far from Ražanj, on a stretch of land called Drugovac, between the villages of Rujište and Crni Kao, which stands out in the wider vicinity of the valley of Aleksinac because of the richness of accidental findings and number of layers, while the station *mutatio Cametas* could have been in its immediate vicinity (Рашковић 2013: 59; 2017a: 72).

CONCLUDING REMARKS

From all that we have discussed above, it can be seen that the territory we have considered on this occasion is very rich in material from the Roman and Late Antiquity era, however, obtaining a better overview of it would certainly require a more thorough exploration of this terrain. Despite such a situation, its religious complexity is obvious, even from the modest data we have presented here. Although only few classical *mithraea* were recorded on the territory of *Moesia Superior*, and it is believed that, due to the historical development of this province and the instability of its borders, the cult of Mithra was practiced only within smaller temporary chapels (Зотовић 1973: 12), we have hinted here at some other possible ways it could have been practiced. Namely, regardless of the fact that the small quantity of findings from the village of Dragovo, as well as the central *arae* found near the forest spring on the same site, does not allow for a more precise determination of this sanctuary or the assumption of an open *spelaeum* (Зотовић 1973: 25), the parallel with the finding from Džigolj, which also originates from terrain near a forest stream, indicates that the cult of Mithra could have been practiced in the open air, i.e. in hidden forest sanctuaries by water. Additionally, in terms of more urban areas, this deity was most likely worshiped along with other solar deities such as Apollo and the Thracian horsemen,[6] and such a collective finding was recorded

6 Mithra, Helios/Apollo and the Thracian horsemen are somewhat related deities because of their solar character, which was especially emphasised during the second half of the 3rd century. It was then, under the strong oriental influence of combining religion with astrology and philosophical tendencies, that the Roman religion was directed

not only in the village of Nozrina, but also in the Morava River valley under the hill of Karađorđevo Brdo, near Paraćin (Cermanović-Kuzmanović 1963: 32–33). When it comes to the repertoire of worshiped deities, a similar parallel can be seen at the site of Sveta Trojica (Holy Trinity) in Ravna (*Timacum Minus*), where, in addition to the monuments of Apollo (or Asclepius) and the Thracian horsemen, a significant number of reliefs of Jupiter and Juno were registered (Jovanović 2007: 176–183). As the dyad of Jupiter and Juno is marked with the phrase "Thracian Zeus and Hera" due to the frequency of votive tablets with their representation in the central and western part of Thrace, in the regions of Philippopolis, Serdica and Pautalia (Јовановић 2007: 180, 183; Вълчев 2015: 118–121, карта 5), the mentioned site in Ravna is also brought into connection with the sacral ambience intended for the population of Thracian origin. That is additionally witnessed by the dedications of soldiers from the cohort *II Aurelia Dardanorum,* which was stationed in Ravna (Petrović 1995: 70–71, 92–93, no. 13, 44). We believe that a similar influence could have existed in the area of the Morava Valley, as confirmed by the votive inscriptions of dedicants with Thracian names on the relief with Sol-Apollo from the village of Nozrina or on the relief with Mithra from the surroundings of Ražanj (Зотовић-Жунковић и Шалабалић 1958−1959: 209; Зотовић 1973: 62; Petrović 1979: 114; Veljković and Vasiljević 2020). Therefore, we hope that any new findings of the cult of Mithra from this area will possibly further clarify the manner in which this cult was practiced, which is certainly a task worthy of future research attention.

towards monotheism, and cults of deities such as Jupiter, Mars, Serapis, Dionysus or Mithra became only local manifestations of one or the supreme god Helios i.e. Sol (Пилиповић 2011: 78–79). Additionally, the cult community of the Thracian horsemen and Apollo is known from the wider Thracian areas, where these gods intertwined because of their solar nature and iatric function, especially through monuments with the standard iconography of the Thracian horsemen with a dedication to Apollo (Dimitrova 2002: 216).

BIBLIOGRAPHY

Beck, R. 1976
The seat of Mithras at the equinoxes: Porphyry, De Antro Nympharum 24, *Electronic Journal of Mithraic Studies* 1/1: 95-98.

Beck, R. 1988
Planetary gods and planetary orders in the mysteries of Mithras, Leiden: Brill.

Campbell, L. A. 1968
Mithraic Iconography and Ideology, Leiden: Brill.

Cermanović-Kuzmanović, A. 1963
Die denkmaler des trakischen Heros in Jugoslawien und das Problem des trakischen reitergottes, *Archeologica Iugoslavica* 4: 32-39.

Cumont, F. 1903.
The Mysteries of Mithras, Chicago: Open court.

Cvetković, B. i Dodić, S. (ur.) 2001
Zavičajni muzej Jagodina, Stalna izložbena postavka – Katalog, Jagodina: Zavičajni muzej.

Dimitrova, N. 2002
Inscriptions and Iconography in the Monuments of the Thracian Rider, *Hesperia* 71/2: 209-229.

Dirven, L. 2016
A New Interpretation of the Mounted Hunters in the Mithraeum of Dura-Europos, in: *Icon, Cult, and Context. Sacred Spaces and Objects in the Classical World*, eds. M.K. Heyn and A. Irvine Steinsapir, Cotsen: Institute of Archaeology, 17-33.

Ђорђевић, М., Рашковић, Д. 2004
Налазишта и налази римског периода на доњем току Јужне Мораве, Саопштења XXXV-XXXVI (2003-2004): 29-56.
(Đorđević, M. i Rašković, D. 2004
Nalazišta i nalazi rimskog perioda na donjem

toku Južne Morave, *Saopštenja* XXXV-XXXVI (2003-2004): 29-56).

Гавриловић-Витас, Н. 2017
Вотивне иконе бога Митре из Античке збирке Народног музеја у Нишу, Зборник радова Народног музеја – Археологија XXIII: 187-206.
(Gavrilović-Vitas, N. 2017
Votivne ikone boga Mitre iz Antičke zbirke Narodnog muzeja u Nišu, *Zbornik Narodnog muzeja – Arheologija* XXIII: 187-206).

Гарашанин, М., Гарашанин, Д. 1951
Археолошка налазишта у Србији, Београд: Просвета.
(Garašanin, M. . Garašanin, D. 1951
Arheološka nalazišta u Srbiji, Beograd: Prosveta).

Gordon, R. 1975
Franz Cumont and the doctrines of Mithraism, in: *Mithraic studies, Proceedings of the First International Congress of Mithraic Studie*s II, ed. J. R. Hinnells, Manchester: Rowman and Littlefield, 215-248.

Hinnells, J. R. 1975
Reflections on the bull-slaying scene, in *Mithraic studies, Proceedings of the First International Congress of Mithraic Studies* II, (ed.) J. R. Hinnells, Manchester: Rowman and Littlefield, 290-312.

Јовановић, А. 1980
Тумули из античког периода у југоисточној Србији и на Косову, Старинар XX: 1-16.
(Jovanović, A. 1980
Tumuli iz antičkog perioda u jugoistočnoj Srbiji i na Kosovu, *Starinar* XX: 1-16).

Јовановић, А. 2007
Огледи из античког култа и иконографије, Београд: Филозофски факултет
(Jovanović, A. 2007
Ogledi iz antičkog kulta i ikonografije, Beograd: Filozofski fakultet).

Јуришић, А. 1956
Ражањ-Нишбар, Саопштења Завода за заштиту споменика културе Народне Републике Србије I: 133-135.
(Jurišić, A. 1956
Ražanj-Nišbar, *Saopštenja Zavoda za zaštitu spomenika kulture Narodne Republike Srbije* I: 133-135).

Кузмановић-Цветковић, Ј. 1995
Митрина икона из Џигоља, Нишки зборник 19: 165-169.
(Kuzmanović-Cvetković, J. 1995
Mitrina ikona iz Džigolja, *Niški zbornik* 19: 165-169).

Mirković, M. 1996
The Iron gates (Đerdap) and Roman policy on the Moesian limes ad 33-117, in: *The Roman limes on the Middle and Lower Danube*, (ed.) P. Petrović, Beograd: Archaeological Institute, 27-40.

Najdenova, V. 1989
Mithraism in Lower Moesia and Thrace, in: *Aufstieg und Niedergang der Römischen Welt*, Band 18.2, (eds.) H. Temporini und W. Haase, Berlin−New York: Walter de Gruyter, 1397−1422.

Петровић, В. 2007
Дарданија у римским итинерарима. Градови и насеља, Београд: Балканолошки институт.
(Petrović, V. 2007
Dardanija u rimskim itinerarima. Gradovi i naselja, Beograd: Balkanološki institut).

Petrović, P. 1979
Naissus-Remesiana-Horreum Margi, *Insriptions de la Mésie Supérieure* IV, Beograd: Faculté de philosophie de l'Université de Beograd.

Petrović, P. 1995
Timacum Minus et la vallée du Timok, *Inscriptions de la Mésie Supérieure* III/2, Beograd: Faculté de philosophie de l›Université de Beograd.

Пешић, Д. (ур.) 2004
Археолошко благо Ниша од неолита до средњег века, Београд: Српска академија наука и уметности .
(Pešić, D. (ur.) 2004
Arheološko blago Niša od neolita do srednjeg veka, Beograd: Srpska akademija nauka i umetnosti).

Пилиповић, С. 2011
Култ Бахуса на Централном Балкану, I-IV век, Београд: Балканолошки институт САНУ. (Pilipović, S. 2011
Kult Bahusa na Centralnom Balkanu, I-IV vek, Beograd: Balkanološki institut SANU).

Рашковић, Д. 2006
Римско насеље Praesidium Pompei – Римљани у Алексиначкој котлини, Ниш и Византија V: 205-226.
(Rašković, D. 2006
Rimsko naselje Praesidium Pompei- Rimljani u Aleksinačkoj kotlini, *Niš i Vizantija* V: 205-226).

Рашковић, Д. 2011
Култ бога Митре у окружју састава три Мораве – Каталог изложбе, Крушевац: Народни музеј Крушевац.
(Rašković, D. 2011
Kult boga Mitre u okružju sastava tri Morave – Katalog izložbe, Kruševac: Narodni muzej Kruševac).

Рашковић, Д. 2013
Прилог познавању археолошких налаза Алексиначке котлине, Карапић - Часопис за историју, етнологију, археологију и уметност 5 (Завичајни музеј Алексинац): 57-77.
(Rašković, D. 2013
Prilog poznavanju arheoloških nalaza Aleksinačke kotline, *Karadžić – Časopis za istoriju, etnologiju, arheologiju i umetnost* 5 (Zavičajni muzej Aleksinac): 55-77).

Рашковић, Д. 2017a
Прилози познавању римских путних станица у Поморављу, Карапић - Часопис за историју, етнологију, археологију и уметност 9 (Завичајни музеј Алексинац): 59-74.
(Rašković, D. 2013
Prilozi poznavanju rimskih putnih stanica u Pomoravlju, *Karadžić – Časopis za istoriju, etnologiju, arheologiju i umetnost* 9 (Zavičajni muzej Aleksinac): 59-74).

Рашковић, Д. 2017b
Археолошко налазиште Грабак у селу Почековини и римски локалитети у долини Западне Мораве, Зборник Народног музеја – Археологија XXIII: 327-343.
(Rašković, D. 2017b
Arheološko nalazište Grabak u selu Počekovini i rimski lokaliteti u dolini Zapadne Morave, *Zbornik Narodnog muzeja – Arheologija* XXIII: 327-343).

Танић, Д. 2016
Средње Поморавље, Ресава и Левач – Простор, појам, војно-стратешки и општи стратешки значај кроз историју, Корени: Часопис за историографију и архивистику X: 9-16.
(Tanić, D. 2016
Srednje Pomoravlje, Resava i Levač – Prostor, pojam, vojno-strateški i opšti strateški značaj kroz istoriju, *Koreni: Časopis za istoriografiju i arhivistiku* X: 9-16).

Tapavički-Ilić, M., Petković, S. 2017
Figural Stone Decoration from Horreum Margi (Ćuprija), *Banatica* 27: 163-185.

Turcan, R. 1996
The cults of the Roman empire, Oxford: Blackwell.

Ulansey, D. 1991
The origins of the Mithraic Mysteries: Cosmology and Salvation in the Ancient World, Oxford: Oxford University Press.

Васић, М. 1992
Нов Митрин рељеф из Horreum Margi (Ћуприја), Зборник радова Народног музеја – Археологија XIV/1: 379–385.
(Vasić, M. 1992
Nov Mitrin reljef iz Horreum Margi (Ćuprija), *Zbornik Narodnog muzeja – Arheologija* XIV/1: 379-385).

Vasić, M., Milošević, G. 2000
Mansio Idimum. Rimska poštanska i putna stanica kod Medveđe, Beograd: Arheološki institut i Narodni muzej.

Васић, М., Петковић, С. 2010
Резултати истраживања вишеслојног налазишта Horreum Margi – Равно – Ћуприја у 1990. години, Весник војног музеја 37: 9–25.
(Vasić, M. Petković, S. 2010
Rezultati istraživanja višeslojnog nalazišta Horreum Margi – Ravno – Ćuprija u 1990. godini, *Vesnik vojnog muzeja* 37: 9–25).

Васиљевић, Љ. 2017
Вотивни рељефни споменици из античке археолошке збирке Народног музеја Крушевац, у: Капија Поморавља у духовној историји српског народа, Својново-Крушевац: Удружење за културу и уметност Логос и Историјски архив Крушевац, 23-26.
(Vasiljević, Lj. 2017
Votivni reljefni spomenici iz antičke arheološke zbirke Narodnog muzeja Kruševac, u: *Kapija Pomoravlja u duhovnoj istoriji srpskog naroda*, Svojnovo-Kruševac: Udruženje za kulturu i umetnost Logos i Istorijski arhiv Kruševac, 23-26).

Veljković, Ž., Vasiljević, Lj. 2020
The Votive Inscription of ΗΡΟΔΟΤΟΣ ΡΑΔΟΥ Found in Nozrina, *Linguistique Balkanique* LIX -2 (2020): 333-338.

Vermaseren, M. 1960
Corpus Inscriptionum et Monumentorum Religionis Mithriacae, Vol. 2, Hague: Martinus Nijhoff.

Vetnić, S. 1967
Ilinjača, Dragovo, Svetozarevo – Antički period, *Arheološki pregled* 9: 116-118.

Вулић, Н. 1934
Антички споменици наше земље, Споменик Српске Краљевске академије LXXVII: 29-84
(Vulić, N. 1934
Antički spomenici naše zemlje, *Spomenik Srpske Kraljevske akademije* LXXVII: 29-84).

Вълчев, И. 2015
Извънградските светилища в римската провинция Тракия, София: Университетско издателство „Св. Климент Охридски."
(Valchev, I. 2015
Extraurban sanctuaries in the Roman province of Thrace, Sofia: St. Kliment Ohridski University Press).

Зотовић, Љ. 1973
Митраизам на тлу Југославије, Посебна издања, књ.11, Београд: Археолошки институт.
(Zotović, Lj. 1973
Mitraizam na tlu Jugoslavije, Posebna izdanja, knj. 11, Beograd: Arheološki institut).

Зотовић-Жунковић, Љ., Шалабалић, Р. 1958/1959
Нов споменик Митриног култа, Старинар (н.с.) 9/10: 205-210.
(Zotović-Žunković, Lj., Šalabalić, R. 1958/1959
Nov spomenik Mitrinog kulta, *Starinar* (n.s.) 9/10: 205-210).

REZIME
PRILOG PROUČAVANJU KULTA BOGA MITRE U GORNJOJ MEZIJI: NALAZI IZ SREDNJEG I JUŽNOG POMORAVLJA

KLJUČNE REČI: MITRA, TAUROKTONIJA, RIMSKI KULT, IKONOGRAFIJA, SVETILIŠTA, POMORAVLJE.

U radu su predstavljeni nalazi Mitrinog kulta sa teritorije Južnog i Srednjeg Pomoravlja, kao područja koje je imalo izuzetan strateški značaj tokom rimske epohe, povezujući unutrašnjost Balkana sa Podunavljem. Važnost komunikacije koja se odvijala dolinom Morave naglašena je materijalnim ostacima brojnih naselja i putnih stanica, uz mnoge nalaze religiozne prirode. Tako su ovde prikazani votivni reljefi koji su zabeleženi u Ćupriji, selu Dragovu kod Rekovca i u ataru sela Džigolj kod Prokuplja, zatim selu Nozrina kod Aleksinca i okolini sela Ražanj, odnosno sa lokaliteta koji uglavnom prate magistralni put između dva veća gradska naselja rimske epohe, municipijuma *Horreum Margi* i perifernog područja *Naissus*-a.

Analizom ikonografskih i stilskih osobenosti predstavljenih nalaza, došlo se do zaključka da je reč o spomenicima mahom provincijalne izrade, koji uglavnom ne odudaraju od poznatih spomenika Mitrinog kulta sa naših prostora. Oni potvrđuju ranije izneta mišljenja istraživača da su određene ikonografske netipičnosti na njima verovatno nastale kao rezultat nedovoljnog razumevanja mitraičke doktrine, što je opet vodilo ka odsustvu kontrole pri reprodukovanju kanonizovanog obrasca ovog kulta.

Dodatno, takva atmosfera iznedrila je i jednu interesantnu religioznu praksu, koja se mogla odvijati u dva pravca. Prvi se odnosi na mogućnost da je bog Mitra ovde poštovan na otvorenom, u skrivenim svetilištima pokraj šumskih izvora, na šta nas navode podaci o kontekstu nalaza reljefa iz sela Dragovo i Džigolj. Sa druge strane, u nešto urbanijim područjima, javlja se tendencija da se ovo božanstvo poštovalo u sklopu manjih hramova zajedno sa drugim solarnim božanstvima poput Apolona i Tračkog konjanika odnosno vrhovnom dijadom Jupitera i Junone. O tome svedoče nalazi votivnih spomenika iz sela Nozrine, koji su pored pomenutog Mitrinog reljefa nađeni na istom lokalitetu, čineći jedan od osnova za pretpostavku da je upravo u tom mestu mogla biti smeštena rimska putna stanica *mutatio Rappiana*, poznata sa kasnoantičkih itinerera. Na području Pomoravlja sličan skupni nalaz votivnih spomenika zabeležen je i pod Karađorđevim brdom kod Paraćina, dok se paralela kada je u pitanju repertoar poštovanih božanstava donekle uviđa i na lokalitetu Sveta Trojica u Ravni (*Timacum Minus*).

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ICONOGRAPHIC REPRESENTATIONS OF ANTHROPOTHERIOMORPHIC SILVANUS IN THE TERRITORY OF SERBIA (EASTERN PROVINCE OF DALMATIA)

ABSTRACT

Representations of the god Silvanus most commonly depict two iconographically different deities. One is shown in the anthropomorphic form, the other in the form in which most scientists usually recognise the Greek god Pan, meaning that the deity was shown in an anthropotheriomorphic form, that is to say, with horns and goat legs. In this paper, votive monuments are examined that have been discovered in the territory of today's Serbia on which Silvanus was depicted in an anthropotheriomorphic form. These are findings from Zemun, Prijepolje, an unknown site in western Serbia, Jabučje near Lazarevac and Gradašnica near Leskovac.

KEYWORDS: SILVANUS, SERBIA, FINDINGS, ANTHROPOTHERIOMORPHIC REPRESENTATION.

Representations of the god Silvanus most commonly depict two iconographically different deities.[1] One is shown in the anthropomorphic form, and in the other form many usually recognise the Greek god Pan, meaning that the deity was depicted in an anthropotheriomorphic form, that is to say, with horns and goat legs. In this paper, we will examine votive monuments found in the territory of today's Serbia on which Silvanus was depicted anthropotheriomorphically.

From the area of Pannonia (Zemun), we have the finding of a fragmented relief-epigraphic monument, on which, along with a representation of Liber, there is a smaller, damaged figure of Silvanus with goat legs (the head and upper part of the body are missing), and Silvanus is placed next to a female figure. The monument most probably originates from a sanctuary of Dionysus.

From the eastern part of the province of Dalmatia, today's western Serbia, we have a relief-epigraphic monument from Prijepolje and a relief monument from an unknown site, which is kept at the Museum of Užice. We will also include here the finding of a silver cup from Jabučje, near Lazarevac, where, within the rich relief decoration, there is also a representation of Pan leading a goat to the altar. It can be assumed that these monuments, for the most part, can be linked to the Del-

1 This article is a result of research activities performed within the research project “Among Gods and Men / The Cults and the Population of Roman Dalmatia According to the Votive Inscriptions”, financed by the Croatian Science Foundation “Among Gods and Men” (HRZZ IP-2020-02-7214, headed by Ljubica Perinić).

matean type of representations of Silvanus, typical for the inner parts of the province of Dalmatia.

A unique finding from Moesia is an iron ring with a silver gem from Gradašnica, near Leskovac. There is a representation of Silvanus, playing with a billy goat, on the gem. The question remains as to whether the ring had a votive character, as seems to be the case with the findings discovered in the north of Pannonia.

The research of the cult of Silvanus in these areas can be divided into two phases and two main streams: one denies any autochthonous character to Silvanus, considering him to be an Italic deity, and the other believes that Silvanus, at least in terms of the province of Dalmatia, was a response of the local population to the Roman influence, that is to say, the syncretism of a local deity with the Italic Silvanus. As already mentioned, we will examine three votive monuments linked to the cult of Silvanus in this paper, along with two everyday use items (a cup and a ring). All three votive monuments depict the so-called Dalmatian type of Silvanus, while only one of the two everyday use items could possibly be linked to Silvanus. The votive monument from Zemun can be linked to the syncretism of Silvanus and Liber, which can be linked to, or represents a continuation of, the theory of a notable identification of Silvanus and Liber in the area of today's Bosnia and Herzegovina, i.e. the eastern part of the province of Dalmatia.

The spread of the Roman religion was a part of the same principle used in politics as well, which also intertwined in this system. Therefore, it could be (justly) assumed that such a system of the Roman Empire, which was a novelty in the area of Dalmatia, had to have had an influence on the religion of conquered and assimilated autochthonous ethnic groups: if not by force, then with the passing of time and by living together.

What changes were those? Was this influence felt on the autochthonous religious system or on beliefs themselves? What was the religious system of the population of Dalmatia before it became a part of the Roman Empire? What was the nature of the autochthonous religious system? These questions will be more easily answered if our perception of autochthonous communities is supported by knowledge of their social structures, organisation and administration, religion and all other elements that form everyday life. As for Dalmatia, we know of some of the local deities, but not much about the religious system as a whole, and certainly not as well as we know the Roman pantheon and its gods.

The most popular gods (if not supreme) in the province of Dalmatia differ by ethnic community. According to findings, Liburnians (settled along the coastal area of the north-eastern Adriatic Sea, between the rivers *Arsia* ─ Raša and *Titius* ─ Krka) worshiped local goddesses with different names, e.g. Ica, Ansotica and Sentona. The situation with the Iapodes (settled to the north from mount Velebit, to the north and more in the hinterland than the Liburnians) was not as clear, but it is probable that Bindus, who was assimilated with Neptune, was the supreme, or at least the most popular, deity; for the Delmatae (eastern Adriatic coast, between the rivers Krka and Neretva in Croatia and the hinterland, today in Bosnia and Herzegovina), the supreme deities were Silvanus and Diana.

Often, only the name of the deity is preserved on inscriptions, hence, it can be difficult to unfold their true nature and the scope of their influence. Sometimes, an epichoric deity could have been worshiped through several religions within an ethnically more uniform area or it could have been worshiped in a geographically wider context. Also, it cannot be excluded that a seemingly Roman deity, e.g. by his name, could have been hiding an autochthonous deity. Judging by the number of preserved reliefs and inscriptions dedicated to Silvanus, his cult was very widely spread among the inhabitants of Dalmatia. However, whether a Delmatean deity was hiding under the guise of Silvanus, there is still no final answer, nor is there irrefutable arguments on the topic. To date, the name of a possible autochthonous deity whose traits could have been recognised in Silvanus by

the autochthonous population has yet to be found. In the research of the cult of Silvanus, finding the name of the unknown deity would be a huge, if not the final, step forward in solving this question.

Solving the mentioned unknown facts linked to these monuments would contribute to a deeper understanding of the relationships between the autochthonous population and the Roman imperial culture. As for the two phases and two main streams in the research of the cult of Silvanus, we will mention only some of the authors who are (or were) dedicating special attention to this topic. Older foreign and local scientists, e.g. A. von Domaszewski (Domaszewski 1895: 1─123), R. Schneider (Hirschfeld and Schneider 1885: 31─84) and D. Rendić-Miočević (Rendić-Miočević, D. 1989: 461─507) believed that a true *interpretatio Romana* occurred in Dalmatia, i.e. that under the Latin name of Silvanus a (supreme) autochthonous deity was worshiped, whose name, unfortunately, was not preserved to today. The same belief is also shared by N. Cambi (Cambi 1968: 131─141).

In more recent scientific literature, there are two streams. One is represented by P. Dorcey, who negates any autochthonous trait to the Delmatean Silvanus. Furthermore, his opinion is that the Delmatean Silvanus was, in fact, the Greek Pan (Dorcey 1992: 49─84). The other stream is represented by A. M. Nagy, who does attribute some autochthonous traits to the Dalmatian/Delmatean Silvanus (Nagy 1994: 773).

As for the scientists from this region, for example D. Maršić (Maršić 1997─1998: 45─69), A. Rendić-Miočević and N. Cambi, they still believe that Silvanus was a local deity. A. Rendić-Miočević analysed this problem in detail, and he came to the conclusion that Silvanus was an autochthonous deity, who attained his visual aspect of Pan through the process of *interpretatio Graeca*, and then, through *interpretatio Romana*, attained the name of the Italic deity (Rendić-Miočević, A. 1982: 121─140). His approach is shared by some other scientists as well (Matijašić and Tassaux 2000: 89).

Representations of Silvanus in Dalmatia differ from those in Italy, and it was believed that there were even differences between variations depending on different geographical areas in Dalmatia. It was believed that along the Dalmatian coast, i.e. in the area that was longest and most intensely under the Greek influence, Silvanus was most commonly represented alone and in the form of Pan. The Aegipan Silvanus usually has a mild facial expression, stands *en face* and is surrounded by trees that were dedicated to him (spruce, laurel), animals (dogs, goats), as well as other symbols and attributes (cloak, *pedum*, *syrinx*, etc.). Unlike the Aegipan Silvanus, in the hinterland of the province, behind the Dinara (originally a Delmatae area), Silvanus was most commonly depicted as young and beardless, in free space, most commonly in an anthropotheriomorphic form, but also sometimes in a completely human form, which then brings him closer to the Italic Silvanus (Rendić-Miočević, D. 1989: 469).

Today, however, the catalogue of relief monuments of Silvanus was supplemented with new findings, the already mentioned differences pale and the "border" between the two areas is not so clear anymore. The monuments on which Silvanus was depicted alone still prevail in the coastal area, but the difference between the "old" and the "young" Silvanus is not notable anymore, nor is the former premise that he was depicted in free space in the hinterland (Perinić 2016: 16─20).

Three monuments dedicated to Silvanus (with nymphs) were discovered in Hvar (Ibid.: 19). On the neighbouring island of Brač, two indirect confirmations of the cult have been discovered, along with one relief, probably linked to the sanctuary of Silvanus (Demicheli: 175─185).

M. Zaninović believes that the mentioned monuments from Hvar confirm the cult syncretism of Silvanus and Liber, hence, that they connect, in a manner, the islands and the coastal Delmatae area within a unique cult image of Silvanus (Paškvalin 1963: 131; Zaninović 1966: 15─25).

The pantheon of mid-Dalmatian islands (Brač, Hvar, Vis, Korčula) is somewhat more complex

because of the interdependence between older and more recent, durable and manifold, and cultural and ethnic influences. The Hellenistic component is represented by Zeus, Aphrodite, Artemis and Hermes; the Roman by Jupiter and Diana, while the oriental one can be recognised through Mithras. The local, autochthonous component seems to have been lost. It is not possible to determine to what extent the local population could also have seen certain traits of local deities in these components – if at all – but it was certainly possible to look for them in simple reliefs of Silvanus and Liver, whose worshipers could have been found among the local population (Ibid.: 20─21).

The worshiping of Silvanus and Liber had common elements, as was indicated on some monuments, especially on the monument from Krakašica, and especially on monuments on which Silvanus was depicted with grapes. Liber, the deity who was the protector of the vine and viniculture, one of the oldest paleo-Italic deities, was the god of fertility and vegetation in his original interpretation. Some authors believe that Liber (only in the area of today's Bosnia and Herzegovina, i.e. the eastern Roman province of Dalmatia) was identified with Silvanus. A similar opinion was held for the monuments dedicated to Liber from Užice (Зотовић 1995: 5─9).

Numerous reliefs bear witness to the approaching of Dalmatian Silvanus to Priapus, Liber, Mercury, Italic Silvanus and other deities. Liber is depicted with a (living) panther. In Gaul, where Succelus was identified with Silvanus (on several levels), the appearance of the dog or the wolf on a monument was interpreted as an expression of life in the wilderness, as opposed to the urban life. Toulec believes that an animal hide, when worn as a cloak, belongs to the sphere of Hercules' symbols, as suggested by representations of differences between rural and urban life (Toulec 1996: 47).

D. Rendić-Miočević came to the same conclusion many years before when he suggested that elements from Hercules' iconography can be identified, and not the influence of Liber, on the relief from Solin representing Silvanus, holding a lion's skin in his left, lowered hand. On that same relief, many elements can be seen united – symbols and attributes of different deities and various cults, indicating the undeniable intrusion of various elements of autochthonous religious traits, but also cult elements from Greece or Rome (Rendić-Miočević, D. 1989: 461–507).

Our monument from Zemun shows the extraordinary closeness of Silvanus and Liber (No. 5), considering the fact that both deities are depicted. As for the monuments marked with numbers 1 and 2, they completely correspond to the image of Silvanus that was common in the province of Dalmatia.

We will also mention that two votive monuments with inscriptions dedicated to Liber also originate from Užice. According to the testimony of Pandora Bećarević, a teacher at the Gymnasium of Užice, they were discovered in the field of Pašinovac (property of Raca Dedević), located near Užice. The first altar was made of limestone. Two dimensions of the monuments are known: the height of 100 cm and width of 50 cm. A representation of a rosette can be discerned on the capital.

The text of the inscription is: Lib(ero) P(atri) C() | T. Aur(elius) Ni | grinus | sac(rum) p(ro) p(atre).

The other altar from Užice was made from bluish marble. The dimensions of the altar: height 100 cm, width 46 cm. At the corners of the upper part of the monuments there are acroteria. N. Vulić notes that a representation of a bucranion was in the middle of the upper part of the monument. Today, this ornament cannot be seen. The text of the inscription on the other monument is:

L(ibero) P(atri) Cap() | T. Aur(elius) Pro | vincialis | ob honor(em) | II viratus | v(otum) s(olvit) l(ibens) m(erito)

For the topic of this paper, it is important to note the assumption, made by R. Zotović, that the name of Liber hides the *interpretatio Romana* of the local deity of fertility, pastures, forests and meadows, who was more linked to the cult of Silvanus. The mentioned assumption was based,

first and foremost, on the theoretical approach, that is to say, the linking of attribute compositions of Silvanus with similar ones that had to have belonged to the supreme deity of the local population, which were mostly shepherds and farmers (Вулић 1948: 248, бр, 486, 487; Зотовић 1995: 7-8; Eadem 1996/1997: 7─10).

MONUMENTS CATALOGUE

PRIJEPOLJE

Figure 1 Relief-epigraphic monument from Prijepolje, according to: Зотовић 2001: 185, сл. 5.
Dating: middle of the 2nd century (3rd century?)
References: CIL III 8306; Kubitschek 1928: 37-38, fig. 2; Mirković 1975: 105; Зотовић 2001: 185─186, 190; Васиљевић 2008: 50─51; Perinić 2016: 84, бр. 49.

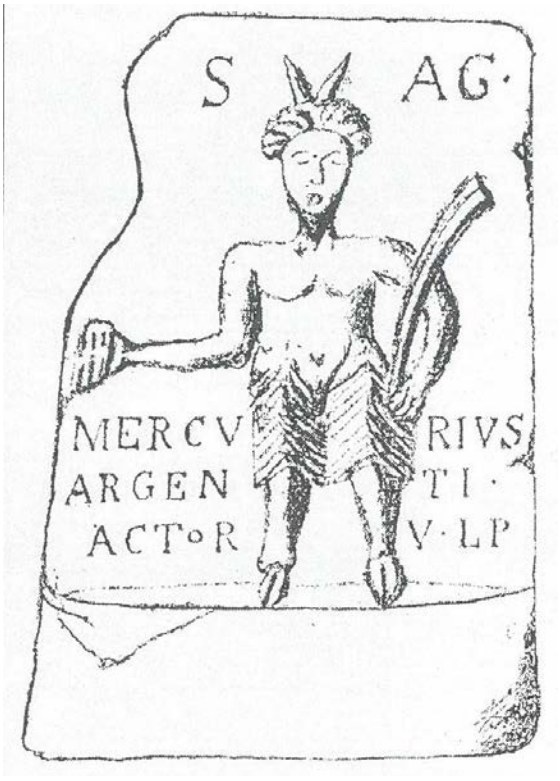

Fig. 1 Relief-epigraphic monument from Prijepolje (after: Zotović 2001: 185, fig. 5).

A votive monument with a relief and inscription dedicated to Silvanus. Dimensions of the monument are: height 50 cm, width 35 cm. Silvanus is depicted in an anthropotheriomorphic manner, naked. He is holding a *pedum* in his left hand, and a *syrinx* in his right, semi-extended hand. From the short stylised hair (the goal was probably to depict curly hair), two goat horns are emerging, and he has only a beard, but no moustache, on his face. His legs are also those of a goat, and the hair in the upper part (on the thighs) is shown in parallel geometric zigzag lines.

The text of the inscription is:

S(ilvano) A(u)g(usto) | Mercurius | argenti | actor v(otum) l(ibens) p(osuit)

The first row of the inscription is at the top of the relief, above the head of Silvanus. The second, third and fourth rows were written in the lower half of the relief, above the profiled place on which Silvanus is standing. The inscription is divided into two parts by the representation of the deity itself.

R. Zotović believes that the dedicant of the monument, Mercurius, was a farmer and cattle breeder who expressed his respects to Silvanus, as the protector of herds and shepherds, in order to obtain protection for his cattle, and she dates the monument into the 3rd century (Зотовић 2001: 186). M. Mirković, on the other hand, states the opinion that the inscription is linked to the silver mines, the exploitation of which in the Antiquity period is registered in the surroundings of Kolovrat and Prijepolje (Mirković 1975: 105, nap. 42).

Certainly, the opinion of M. Mirković is closer to the truth, considering the fact that Mercurius introduced himself on this votive monument with his full title: *argenti actor*. During the reign of Marcus Aurelius, all Illyrian mines were united, and the silver mines from the south-east of Dalmatia were managed from the Roman settlement in Kolovrat, near Prijepolje, in the Lim valley, where our senior mining clerk Mercurius comes from.

Clerks with the title of *actors* and *procuratores* managed large agricultural units (Škegro: 1998, 95─96), especially during the Late Antiquity pe-

Fig. 2 Relief monument from an unknown site in western Serbia (photo: Documentation of the National Museum of Užice).

Fig. 3 Silver cup from Jabučje (after: Popović 1994: 255, cat. 140).

riod (Sanader 1995: 101). Near the end of the first half of the 2nd century, imperial overseers of silver mines with provincial designations appeared. Unlike the overseers of mining regions in the Lim valley, in the south-east of Dalmatia and Kosmaj, who were imperial freedmen, the overseers of Pannonian silver mines came from the rank of Roman knights. Aside from the aforementioned Mercurius, a senior mining clerk, lower-rank clerks have also been registered in this area, and those were all trustworthy persons, considering the fact that they all came from the so-called *Familae Caesaris* (Mirković 1975: 106). A. Mirković dated the monument into the period before the reform of Marcus Aurelius (Škegro 1998: 96).

UNKNOWN SITE, WESTERN SERBIA

Figure 2 Relief monument from an unknown site in Western Serbia, photo: Documentation of the National Museum Užice[2]

2 We would like to thank our colleague Marina Kotarac for her cooperation and for allowing us to use the photo from the collection of the National Museum Užice.

Dating: 3rd century
References: Zotović 1992/1993: 177─182, fig. 1; Васиљевић 2008: 57─59; Perinić 2016: 50.

The second relief representation of Silvanus, also made of stone, was found on a monument from the collection of the National Museum Užice. The exact find location is unknown.

The relief was carved on a rectangular stone plate, shaped into a triangular ending in the upper part. The surface of the relief was relatively well preserved. It was partially damaged on the bottom edge, on both the left and the right side. Climatic conditions caused damage to the head, more precisely, the hair, both hands and the left side of the upper part of the body. The plate is 40 cm long, 30 cm wide and 10 cm thick.

Silvanus is depicted in a standing position, *en face*, as a bearded, naked man with goat legs and horns (anthropotheriomorphically). Hairy parts can be noted on the legs. The depicted horns are exceptionally graceful, but also uncommon. They are growing in parallel, from the centre of the head, bending slightly to the right. On the basis

of the well preserved upper right part of the head, it can be concluded that hair was carved in almost parallel incisions, imitating curvy or wavy hair, the same as on the previous monument. The short beard is carved in, giving the impression of being thick and wavy. There is a nipple preserved on the right side of the breasts.

Silvanus is (most probably) holding a *syrinx* in his left hand. This arm is bent and raised. The pipes of the *syrinx* are unrecognisable now. In his right, relaxed hand, there is an object, which could be a grape cluster, but we cannot be certain of it because the relief is very much damaged in this part. A goat, or perhaps a dog, is depicted on the left side of the monument (another dog is undoubtedly shown on the other side of the deity), raised on its hind legs towards the grapes(?) and leaning on Silvanus' thigh with its front legs. A *pedum*(?), barely visible, in the form of a thin line, is in the right hand of the deity. It can be seen that the animal (dog or goat) is grabbing with its mouth the item, whatever it may be, that Silvanus is holding in his lowered hand. The indisputable representation of a dog is on the right side of the relief, also near Silvanus' legs. The dog, shown with its head raised, is looking towards the deity. The background of the relief is decorated in the same manner as the hairy parts of Silvanus' legs.

JABUČJE NEAR LAZAREVAC

Figure 3 Silver cup from Jabučje, according to: Поповић 1994: 255, кат. 140
Dating: first half of the 1st century AD.
References: Величковић 1983: 61─62, бр 35; Поповић 1994: 45─54, 255, бр. 140; Васиљевић 2008: 66─68.

Silver cup made in the casting and embossing technique. It was found during sand extraction from the Kolubara, in the place called Jabučje, near Lazarevac. It represents a part of a luxurious set of silver vessels. It is dated into the first half of the 1st century. The dimensions of the cup are: diameter 12.3–13.2 cm, height 11.2 cm. The weight of the cup is 341.85 grams. Today, it is kept at the National Museum in Belgrade (inv. no. 4102/III).

The cup (*calathus*) is funnel shaped, gradually widening from the bottom to the opening. It is made of three parts: insert (recipient), with a massive ornamented rim, outer shell with a relief representation and a massive ornamented foot. The insert consists of an embossed tin recipient, with a rim decorated along the edge with two rows of impressed ornaments. The massive tin foot is decorated in the same manner. The outer shell of the cup (*emblema*) was embossed, from thin silver tin. It has a relief representation of a libation in a closed space, surrounded by walls. Beneath the tree (*arbor sacrum*), on whose branches a *syrinx* and goat hide are hanging, there is a plateau with an itiphallic Silenus standing on it, turned to the right, with a *thyrsus* in his right hand. Under the pedestal of the statue in the middle of the composition, there is an altar, on which a priestess, standing on the left side, is offering a sacrifice. Behind her, there is a semi-nude Maenad, playing a double flute. For us, the most interesting representation is located on the right side, with Pan leading a goat, which is resisting, to the altar (a scene that can be seen on monuments dedicated to Silvanus in the province of Dalmatia). An amphora is set against the altar. A panther is depicted behind the musician. There are numerous masks and amulets on the wall (Silenus, Pan, *cantharos*, *thyrsi*, garlands).

The recesses on the inner side of the outer shell are filled with a special lead alloy (*plumbatum*), so as to protect the relief composition from damage. This type of cup with a double wall appeared in the 1st century BC, and they were being made at the beginning of the 1st century AD as well. The cup belongs to the rare known examples of this type. It was used for wine and it represented a part of a luxurious drinking set (argentum *potorium*). It was made according to the models of Alexandrian toreutic, most probably in a Campanian workshop.

Fig. 4 Ring from Gradašnica (photo: Documentation of the National Museum Leskovac).

Fig. 5 Relief-epigraphic monument from Zemun (after: Dautova Ruševljan 1983: Pl. 21, fig. 3).

M. Veličković and I. Popović believed that it was Pan depicted on the cup (Величковић 1983: 62; Поповић 1994: 255). According to the attributes and other characteristics, the sacrifice scene has a Dionysian character. Since Silvanus was never a participant of a Dionysian procession and also because of the depiction of the itiphallic Silenus, which were never typical for the Italic Silvanus, and neither for the Dalmatian or Pannonian Silvanus (Perinić 2016: 81), we would agree with the surmises of M. Veličković and I. Popović.

Even though Silvanus and the father of Silenus, Pan, have traits which are similar or identical (when observing their cults in general), they still differ in most cases. In the sources, they appear together, but it is always, without exception, clear that those are two different deities. What they have in common is: lordship of the forests, nudity, company of nymphs and shepherds, and a depiction of pines. It is precisely those things that differentiate Faun (as the Roman counterpart of Pan) from Silvanus that also differentiate Pan from Silvanus: sexual aggression, musical talent and a tendency to cause panic. Those differences are visible not only in the literature, but also in the cult practice, from which two iconographically different deities originate (Perinić 2015: 86; Dorcey 1992: 16, 40).

GRADAŠNICA NEAR LESKOVAC

Figure 4 Ring from Gradašnica, photo: Documentation of the National Museum of Leskovac[3]
References: Зотовић 1997: 23─27; Васиљевић 2008: 68─70.
Dating: middle of the 2nd century – end of Antiquity

The National Museum of Leskovac has an example of an iron ring with an incrusted silver gem. It is an accidental finding, which arrived at the Museum in 1985. The finding was discovered at the site of Musin Grob, in the village of Gradašnica. The ring is preserved in a fragmented state – the head of ring with the shoulder and slightly preserved beginning of the band on one side.

The band and the head of the ring make up one whole piece. The head of the ring is round, with a diameter of 1 cm. The shoulders of the ring, judging by the side which was preserved, had the shape of a short and rounded triangle. On the head of the ring, in a round girdle, a silver gem was set with a representation of Silvanus(?), playing with a billy goat. On the right side, there is a depiction of Sil-

3 We would like to thank our colleagues Smilja Jović, Julijana Pešić, Vladimir Stojanović and Vladimir Stevanović for their cooperation and for allowing us to use the photos from the collection of the National Museum of Leskovac.

vanus(?) as a bearded man, with a naked upper part of the body. Silvanus(?) has the horns and legs of a billy goat. The representation of Silvanus(?) is "frozen" in a semi-turn, his head turned left, towards the billy goat, and hands outstretched to the right. He is holding an object in his hand, which is not clearly visible, but it can be assumed that it is a *syrinx*, which the deity is holding away from the billy goat. On the left side of the gem, a billy goat is shown, jumping. Behind the billy goat, a branch of a tree is depicted. At the very bottom, under the feet, the horizontal line of the ground is shown.

The scene was made in the casting technique, with the exception of the branch, which was engraved. The simplified production technique, casting instead of engraving, was dictated, on the one hand, by the type of material used, but only in terms of the need for a quicker, cheaper and easier production. On the other hand, the technique of casting in a mould is a testimony of the fact that artistic production was replaced by industrialisation in provincial workshops.

It can be noted on the ring that the mould from which it was made was prepared for a very good imitation of the original model, as testified by the attempt at representing the wreath and curls on the head of Silvanus(?), as well as the goat fleece or fleece on the legs. This impression is especially strengthened by the depicted horizontal line of the ground, which would have certainly been omitted in a poorer imitation. It is a similar case with the representation of the branch: here, it was probably because of the lack of space, on the one hand, and the meticulousness of details, on the other, that it was not made within the "complete" scene, in the mould, but later instead, by engraving.

The representation belongs to the group of genre scenes, which can be denoted, with all their diversity of motifs, as the group in which we find Dionysus and his dissolute companions. R. Zotović believes that it is a representation of Pan depicted on the ring (Зотовић 1997: 23─24). We believe that there is a possibility of it being Aegipan Silvanus (anthropotheriomorphic), who took on certain iconographic elements of Pan (goat legs and horns), considering the presence of the relief votive monument.

The closest analogy to our ring is a gem from the workshop *Officina della Corona* from Aquileia. The difference is in the fact that on the gem from Aquileia, behind the back of the billy goat, there is a representation of a tree instead of a stylisation. R. Zotović believes that it was a product of some of the earlier local workshops from the area of *Moesia Superior*, whose work was based on a good imitation of the original models. The workshop was probably active from the middle of the 2nd century, somewhere in the area of today's south-eastern Serbia (Ibid.: 26─27).

ZEMUN (TAURUNUM)

Figure 5 Relief-epigraphic monument from Zemun (Taurunum), according to: Dautova Ruševljan 1983: T. 21, sl. 3

References: Dautova Ruševljan 1983: 29, 89, T. 21/3; Васиљевић 2008: 55─56.

Dating: 2nd century

A fragment of a votive monument, from white marble, with an inscription and a relief scene from the cycle of Dionysus. It was found in 1891, in Zemun (*Taurunum*), in the place of a probable Dionysus sanctuary. Today, it is kept at the Archaeological Museum in Zagreb (inv. no. 113). The dimensions of the preserved fragment are: height 18.5 cm, width 18 cm, thickness 3 cm.

The preserved part of the inscription is:

C Marcianus | M.

On the fragment of the votive monument from Zemun (*Taurunum*), we can see part of a figure of Liber, in larger dimensions, and to the right of him, a smaller figure of Silvanus, with goat legs, and next to him, on the same level, a female figure, without her head. On the right side of the plaque, there is a clothed female figure, leaning on her right arm, and holding something in her left

hand, with the left arm bent at the elbow.

There is a stylised representation of a snake under the female figure, while a panther can be discerned near the feet of Liber. The folds of clothing of this figure are vertically indicated, sharp and rough, while the other parts of the body are made in a disproportional and unskilful manner. Silvanus(?) is depicted with goat legs, playing the *syrinx*. The relief probably originates from the sanctuary of Dionysus in *Taurunum*. The existence of this sanctuary is indicated by a large number of fragments with representations of Liber and Libera, Hercules, Maenads, Silvanus et al., discovered near the foundations of a Roman building. The remains of the sanctuary and the reliefs were discovered in 1891 at the corner of Račja and Tri Goluba Streets (later Zmaj Jovina and Gajeva Street, respectively), at a depth of 2.5 m. All find from this site were taken to Zagreb that same year.

The worship of Liber and Silvanus had elements in common, as can be noted on certain monuments discovered in Dalmatia, especially in the area settled by Delmatae (Perinić 2016: 19). Here, we should single out the monument from Karakašica, near Sinj (*Ibid*.: T. III/82), which is certainly comparable to the monument from Zemun.

Furthermore, for the sake of comparison, we can also mention two monuments from Salona and one from Županjac, near Tomislavgrad (Perinić 2016: Salona: T. III/1 and III/3; Županjac: T. III/44). On these monuments, Silvanus is holding a grape cluster in his hand, with which some scientists believe that it brings Silvanus into direct connection with Liber (Rendić-Miočević, 2007: 33─43; Matijević i Kurilić 2011: 154-155; Džino 2012: 265).

Furthermore, there are opinions that Silvanus was equated to Liber in the area of eastern Bosnia and Herzegovina (Paškvalin 1963: 131; Zaninović 1966: 20–21). For those reasons, we believe that there are two different levels, each of them demanding special attention, and that is the connection between Silvanus and Liber, and Liber and Dionysus, in which Silvanus and Dionysus do not meet, or maybe actually do meet, and that is a topic that requires especially comprehensive investigation.

We have presented, on the pages of this paper, monuments with an anthropotheriomorphic representation of the god Silvanus, originating from the area of today's Serbia. The fundamental differences linked to the symbolism of certain representations and their connection to various deities were also presented. By using the scientific knowledge available so far, we have attempted to bring forth the fundamental suppositions on the creation of this type of representation of this deity and the reasons which lead to him being worshiped, which have their specificities in the Balkan-Pannonian area, from which the presented findings originate.

BIBLIOGRAPHY

Cambi, N. 1968
Silvan – Atis, primjer kultnog sinkretizma, *Diadora* 4: 131-141.

Dautova Ruševljan, V. 1983
Rimska kamena plastika u jugoslovenskom delu provincije Donje Panonije, Novi Sad: Vojvođanski muzej ─ Savez arheoloških društava Jugoslavije.

Demicheli, D. 2010
Reljef nimfa i Silvana iz Vodne jame na otoku Braču, u: *Arheološka istraživanja na srednjem Jadranu* (Znanstveni skup Arheološka istraživanja na srednjem Jadranu, Vis, listopad 2009), ur. S. Ivčević. Izdanja Hrvatskog arheološkog društva 26: Zagreb: Hrvatsko arheološko društvo - Split: Arheološki muzej, 173─183.

Domaszewski, A von. 1895
Die Religion des römisches Heeres, *Westdeutsche Zeitschrift* für *Geschichte und Kunst* 14: 1─123.

Dorcey, P.F. 1992
The cult of Silvanus, A study in Roman folk religion, Leiden – New York – Köln: Brill.

Džino, D. 2012
The cult of Silvanus: Rethinking provincial identities in Roman Dalmatia, *Vjesnik za arheologiju Arheološkog muzeja u Zagrebu*, treća serija, XLV: 261─278.

Kubitschek, W. 1928
Aus Dalmatien und seinem Hinterlande, *Vjesnik Arheološkog muzeja u Zagrebu* Vol. 15 No. 1: 35─42.

Maršić, D. 1997-1998
Tri Silvanova žrtvenika iz Salone, *Radovi Filozofskog fakulteta u Zadru* 36 (23): 45─69.

Matijašić, R. and Tassaux, F. 2000.
Liber et Silvanus, Les cultes polythéistes dans l'Adriatique Romaine, in: *Les cultes polythéistes dans l'Adriatique romain*, eds. Ch. Delplace and F. Tassaux. Bordeaux: Ausonius Éditions, 65─119.

Matijević, I. i Kurilić, A. 2011
Dva neobjavljena žrtvenika iz Salone, *Opuscula Archaeologica* 35: 133─165.

Mirković, M. 1975
Iz istorije Polimlja u rimsko doba, *Godišnjak Centra za balkanološka ispitivanja* XIV/12: 95─108.

Nagy, A. M. 1994
Silvanus, in: Lexicon iconographicum mythologiae classica (LIMC) VII, ed. Hans Christoph Ackermann. Zürich: Artemis-Verlag, 773.

Paškvalin, V. 1963
Kultovi u antičko doba na području Bosne i Hercegovine, *Glasnik Zemaljskog muzeja u Sarajevu* XVIII: 127─153.

Perinić, Lj. 2015
Različite razine sinkretizma na tri Silvanova spomenika, *Prilozi Instituta za arheologiju* 32: 215─229.

Perinić, Lj. 2016
The Nature and Origin of the Cult of Silvanus in the Roman Provinces of Dalmatia and Pannonia, Oxford: Archaeopress.

Поповић, И. 1994
Продукција сребра у периоду раног царства: локални производи и импорт, у: Античко сребро у Србији, ур. И. Поповић, Београд: Народни музеј, 45─54.
(Popović, I. 1994
Produkcija srebra u periodu ranog carstva: lokalni proizvodi i import, u: *Antičko srebro u Srbiji*, ur. I. Popović, Beograd: Narodni muzej, 45─54.)

Rendić-Miočević, D. 1989
Iliri i antički svijet, Split: Književni krug.

Rendić-Miočević, A. 1982
Uz dva Silvanova svetišta u okolici Salone, *Arheološki radovi i rasprave* 8─9: 121─140.

Rendić-Miočević, A. 2007
Sylvanus of the Delmatae and traces of cult syncretism with Liber, *Histria Antiqua* 15: 33─43.

Sanader, M. 1995
Vilicus – prilog poznavanju djelatnosti upravitelja imanja i državnog namještenika, *Opuscula Archaeologica* 19: 97─109.

Schneider, R. 1885
Über die bildlichen Denkmäler Dalmatiens, Bericht über eine Reise in Dalmatien Bericht über eine Reise in Dalmatien, I, *Arch.-epigr. Mittheilungen aus Österreich-Ungarn* Band IX: 31─84.

Škegro, A. 1998
Eksploatacija srebra na području rimskih provincija Dalmacije i Panonije, *Opuscula archaeologica* Vol. 22 No. 1: 89─117.

Toulec, D. 1996
Images de Silvanus dans l'Occident romain, Images romaines, in: Images romaines : Actes de la table ronde organisée à l'Ecole normale supérieure, 24-26 octobre 1996, Clara Auvray-Assayas (ed.), par Florence Dupont et Clara Auvray-Assayas, Rue d'Ulm: Paris, 1996, 37─61.

Васиљевић, Љ. 2008
Култ бога Силвана и његове култне заједнице у римским провинцијама на територији Србије, Магистарски рад, Филозофски факултет, Универзитет у Београду.
(Vasiljević, Lj. 2008
Kult boga Silvana i njegove kultne zajednice u rimskim provincijama na teritoriji Srbije, Magistarski rad, Filozofski fakultet, Univerzitet u Beogradu).

Величковић, М. 1983
Антика, у: Археолошко благо Србије из музејских збирки, ур. Ј. Јевтовић, Београд: Народни музеј, 59─103.
(Veličković, M. 1983
Antika, u: *Arheološko blago Srbije iz muzejskih zbirki*, (ur.) J. Jevtović, Beograd: Narodni muzej, 59─103).

Вулић, Н. 1941─1948
Антички споменици наше земље, Споменик Српске академије наука XCVIII: 1─255.
(Vulić, N. 1941─1948
Antički spomenici naše zemlje, *Spomenik Srpske akademije nauka* XCVIII: 1─255).

Zaninović, M. 1966
Tri antička reljefa s Hvara, *Opuscula Archaeologica* VI: 15─25.

Zotović, R. 1992/1993
A Relief of Silvan and Some aspect of His Cult, *Starinar* XLIII─XLIV: 177─182.

Зотовић, Р. 1995
Антички култови на подручју Ужица, Ужички зборник 24: 5─10.
(Zotović, R. 1995
Antički kultovi na području Užica, *Užički zbornik* 24: 5─10).

Зотовић, Р. 1996/1997
Питања и проблеми археолошког истраживања урбанизације римског периода на подручју ужичког краја, Ужички зборник 25─26: 5─16.
(Zotović, R. 1996/1997
Pitanja i problemi arheološkog istraživanja urbanizacije rimskog perioda na području užičkog kraja, *Užički zbornik* 25─26: 5─16).

Зотовић, Р. 1997
Прстен са представом Пана из збирке Народног музеја у Лесковцу, Лесковачки зборник XXXVIII: 23─27.
(Zotović, R. 1997
Prsten sa predstavom Pana iz zbirke Narodnog muzeja u Leskovcu, Leskovački zbornik XXXVIII: 23─27).

Зотовић, Р. 2001
Антички култови на подручју Пријепоља и Пљеваља, у: Vestigatio Vetustatis Александрини Цермановић Кузмановић од пријатеља, сарадника и ученика, (ур.) М. Лазић, Центар за археолошка истраживања књига 20: Београд: Универзитет у Београду Филозофски факултет, 181─195.
(Zotović, R. 2001
Antički kultovi na području Prijepolja i Pljevalja, u: Vestigatio Vetustatis Aleksandrini Cermanović Kuzmanović od prijatelja, saradnika i učenika, (ur.) M. Lazić, Centar za arheološka istraživanja knjiga 20: Beograd: Univerzitet u Beogradu Filozofski fakultet, 181─195).

REZIME
IKONOGRAFSKE PREDSTAVE ANTROPOTERIOMORFNOG SILVANA NA PROSTORU SRBIJE (ISTOČNE PROVINCIJE DALMACIJE)

KLJUČNE REČI: SILVAN, SRBIJA, NALAZI, ANTROPOTERIOMORFNA PREDSTAVA.

Predstave boga Silvana najčešće prikazuju dva ikonografski različita božanstva. Jedno je prikazano u antropomorfnoj formi, a drugo u formi u kojoj mnogi najčešće vide grčkog boga Pana, što znači da je božanstvo bilo prikazano kao antropoteriomorfno, dakle s rogovima i kozjim nogama.

U ovom radu obrađeni su votivni spomenici pronađeni na teritoriji današnje Srbije, a na kojima je Silvan prikazan antropoteriomorfno.

Sa prostora Panonije (Zemun) imamo nalaz fragmentovanog reljefno-epigrafskog spomenika na kome je na kojem se, uz predstavu Libera, nalazi manja oštećena figura Silvana sa kozjim nogama (nedostaje glava i gornji deo teverovatnije, potiče iz Dionisovog svetilišta), a Silvan je smešten pored ženske figure. Spomenik, najverovatnije, potiče iz Dionisovog svetilišta.

Iz istočnog dela provincije Dalmacije, današnje Zapadne Srbije, potiču reljefno-epigrafski spomenik iz Prijepolja i reljefni spomenik sa nepoznatog lokaliteta, koji se čuva u Muzeju u Užicu. Ovde dodajemo i nalaz srebrnog pehara iz Jabučja kod Lazarevca gde se, u okviru bogate reljefne dekoracije, nalazi i predstava Silvana koji privodi kozu žrtveniku. Može se pretpostaviti da se ovi spomenici, u najvećoj meri, mogu povezati sa delmatskim tipom predstava Silvana, karakterističnim za unutrašnjost provincije Dalmacije.

Jedinstven nalaz iz Mezije predstavlja gvozdeni prsten sa srebrnom gemom iz Gradašnice kod Leskovca. Na gemi se nalazi predstava Silvana u igri sa jarcem. Pitanje je je li prsten votivnog karaktera, kakvim se mogu smatrati oni pronađeni na severu Panonije.

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METHODS AND CAPACITY IN ARCHAEOLOGICAL DATA MANAGEMENT IN SERBIA

ABSTRACT

Over the past year and due to the COVID-19 pandemic, the entire world has witnessed inequalities across borders and societies. They also include access to archaeological resources, both physical and digital. Both archaeological data creators and users have spent a lot of time working from their homes, away from artefact collections and research data. However, this was the perfect moment to understand the importance of making data freely and openly available, both nationally and internationally. The authors of this paper selected databases from various institutions in Serbia responsible for the preservation and protection of cultural heritage, in order to understand their policies regarding accessibility and usage of the data they hold. It needs to be seen whether it is possible to access digital objects, if access is open for all users or it requires a certain hierarchical access, and what the policy of usage, re-usage and distribution is.

KEYWORDS: DATA, DATA MANAGEMENT, SERBIA, ARCHAEOLOGY, DATABASE.

INTRODUCTION

Over the past year and due to the COVID-19 pandemic, the entire world has witnessed inequalities across borders and societies. They also include access to archaeological resources, both physical and digital. Both archaeological data creators and users have spent a lot of time working from their homes, away from artefact collections and research data. However, this was the perfect moment to understand the importance of making data freely and openly available, both nationally and internationally.

This is why the authors of this paper chose to select databases from various institutions responsible for the preservation and protection of cultural heritage, in order to understand their policies regarding accessibility and usage of the data they hold. This will be done by simple visits to various web-sites or databases. They intend to check on the volume and content, but also to highlight the importance of the offered archaeological heritage. In addition, the authors will estimate whether the heritage has adequately been classified and described and also check whether data is available in foreign languages.

It needs to be seen whether it is possible to access digital objects (documents and the accompanying metadata), whether access is open for all users or if it requires a certain hierarchical access, and what the policy of usage, re-usage and distribution is. It remains to be seen whether there are public APIs and whether it is possible to collect data through an API. In cases where there is a public API, one needs to check whether the datasets are interoperable or messy, requiring data cleaning.

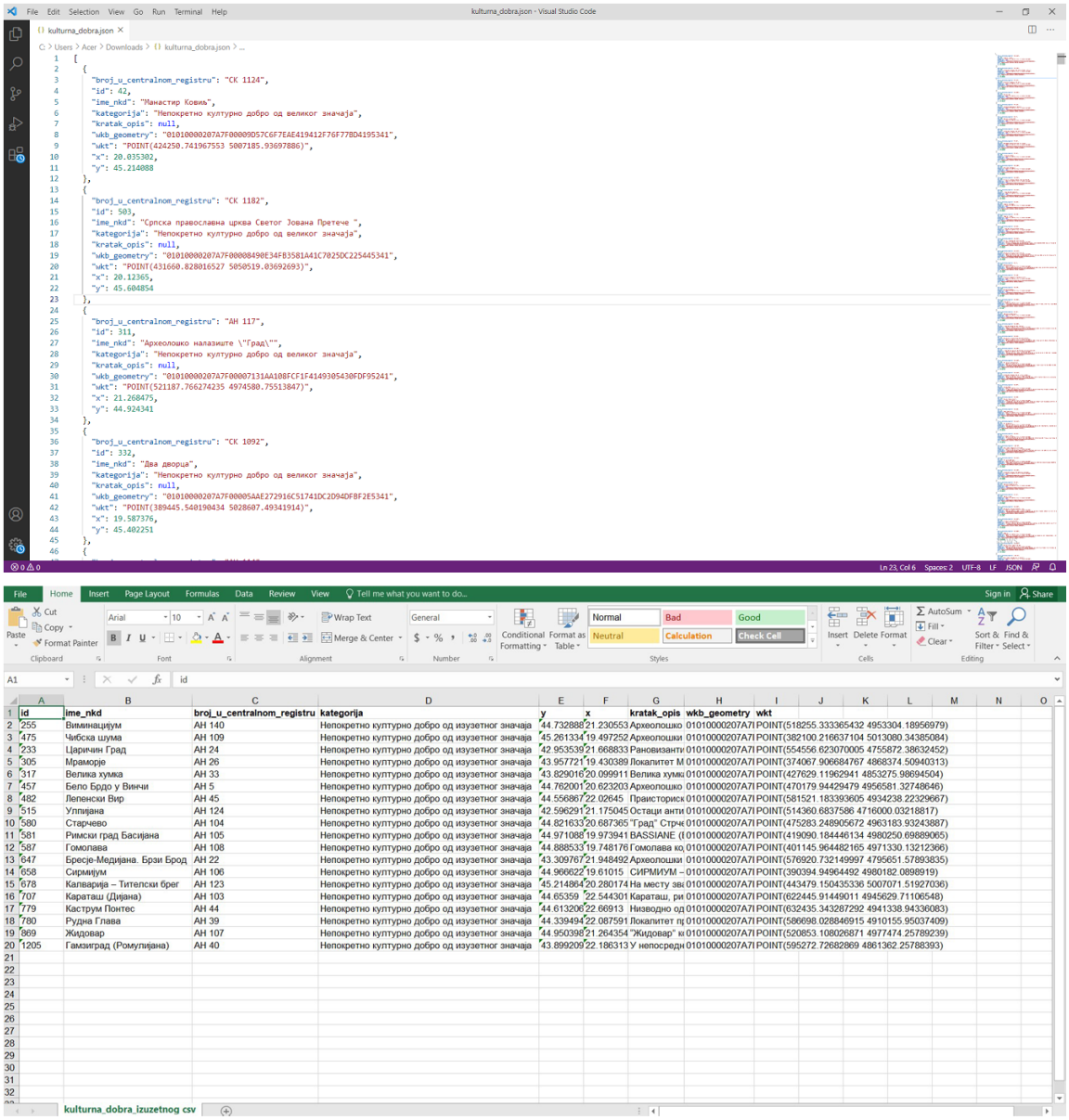

Fig. 1 – Data sets about immobile cultural heritage published at the Portal of open data in JSON format (top) and refined data set about archaeological sites of extreme importance downloaded from the Portal in CSV format (bottom).

After having visited a number of web-sites, the authors hope to collect enough data to make a satisfactory conclusion regarding the accessibility and usage of Serbian archaeological databases.

OPEN DATA – REGULATIONS IN SERBIA

In 2003, the European Union issued the *Directive on the re-use of public sector information,* which was subsequently upgraded in 2013 (Directive 2003/98/EC and Directive 2013/37/EU). Following the example of the European Union, the Serbian government recognised the importance of the re-use of data owned by its public institutions and highlighted its strategic determination to open them for the public. This is why, among others, the Government based its development programme of the electronic administration on the principles of the aforementioned Directive, on the G8 Open Data Charter (see G8 Open Data Charter), as well as on the guidelines of the international initiative

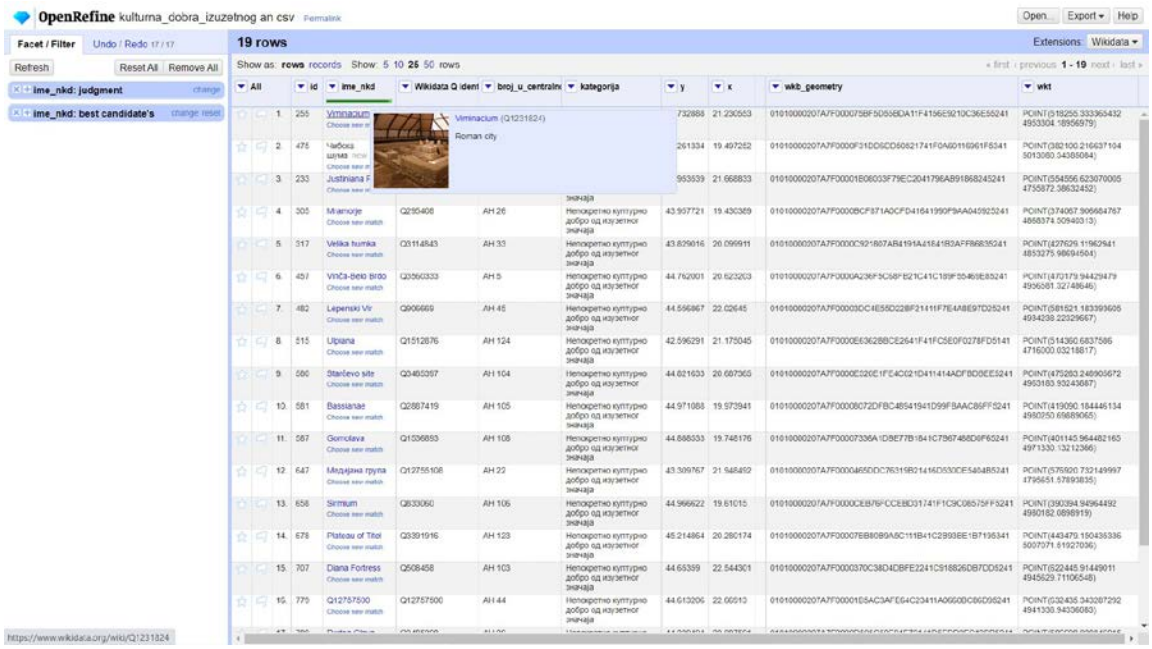

Fig. 2 – Cleaning and connecting the downloaded data set about cultural heritage of extreme importance from the Wikidata open knowledge base and creating a column with a Wikidata Q identificatory with the OpenRefine tool (see OpenRefine).

Open Government Partnership (*Partnerstvo za otvorenu upravu*). Serbia became a member of the Open Government Partnership in 2012 (see POU Serbia). In 2015, in its *Strategy for development of electronic administration (Strategija za razvoj elektronske uprave)*, it included special chapters related to open data (Službeni glasnik 107/2015). After that, in 2016, it formed a *Working group for open data (Radna grupa za otvorene podatke)*. However, only in 2018 did it actually begin with the legal regulations of open data by issuing the *Law on electronic administration* (*Zakon o elektronskoj upravi,* see Službeni glasnik 27/2018). At the same time, the *National portal of open data* (*Portal otvorenih podataka*, see Službeni glasnik 104/2018) also included some of the European regulations into the Serbian legal system (Церовић 2019: 64). At the time of this paper being written, Serbia was in 41st place on the list of 94 countries in which open administration has been introduced and developed (Global Open Data Index; Službeni glasnik 85/2020).

The *Law on electronic administration (Zakon o elektronskoj upravi)* introduced an obligation for state bodies to publish data that is within the scoop of their competence on the Portal of Open Data (*Portal otvorenih podataka*) in a way that allows for it to be easily searched and re-used (Službeni glasnik 27/2018). Open data includes data "that is available for re-use, along with metadata, in a machine-readable open form". Thus, it is made available to anyone to use it "in any way, for any purpose, without copyright restrictions and control mechanisms" (Церовић 2019: 19). The only obligation of the user is to state the source of the data and to record possible changes (Službeni glasnik 104/2018). This data, however, is not personal data, i.e. information related to specific persons, the processing of which is regulated by the *Law on personal data protection (Zakon o zaštiti podataka o ličnosti)* (Službeni glasnik 87/2018), nor data protected by copyright and/or property rights, again regulated by the *Law of copyright and related rights (Zakon o autorskim i srodnim pravima)* (Церовић 2019: 20). It should be borne in mind that there are numerous categorisations of open data. Therefore, further in the paper the emphasis is put on: 1) data on cultural content,

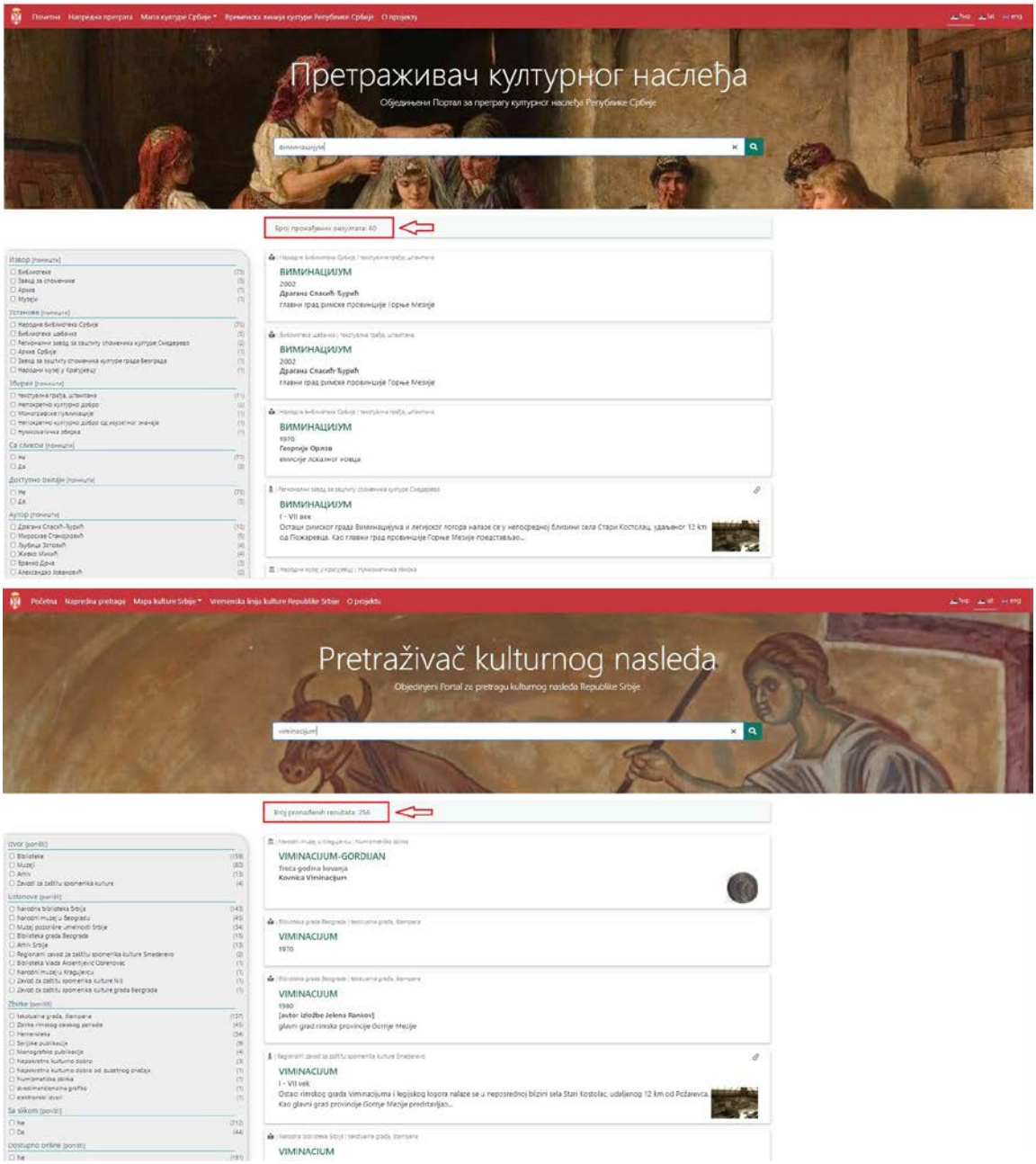

Fig. 3 – Search results by using the key word „виминацијум" (top) and „viminacijum" (bottom) in the Browser of cultural heritage (Pretraživač kulturnog nasleđa, accessed July 20th, 2021).

primarily on archaeological heritage and 2) data collected during research in social sciences, primarily in archaeology.[1]

Data about cultural heritage offers an overview of cultural items and the heritage of a coun-

1 In Serbian archaeology, the concept of archaeological heritage includes physical heritage (e.g. archaeological sites and archaeological finds), archaeological excavations/research and results (e.g. archaeological documentation), as well as heritage management (e.g. alienation and protection). Archaeological heritage, like archaeological sites, can be categorised as a cultural asset, determined by the Government of the Republic of Serbia and the authorised Institute for the protection of cultural monuments. Furthermore, archaeological research/excavations, as well as managing cultural heritage, are legally regulated in the Republic of Serbia and they are conducted within state institutions and organs (Šegan-Radonjić, Tapavički-Ilić 2021).

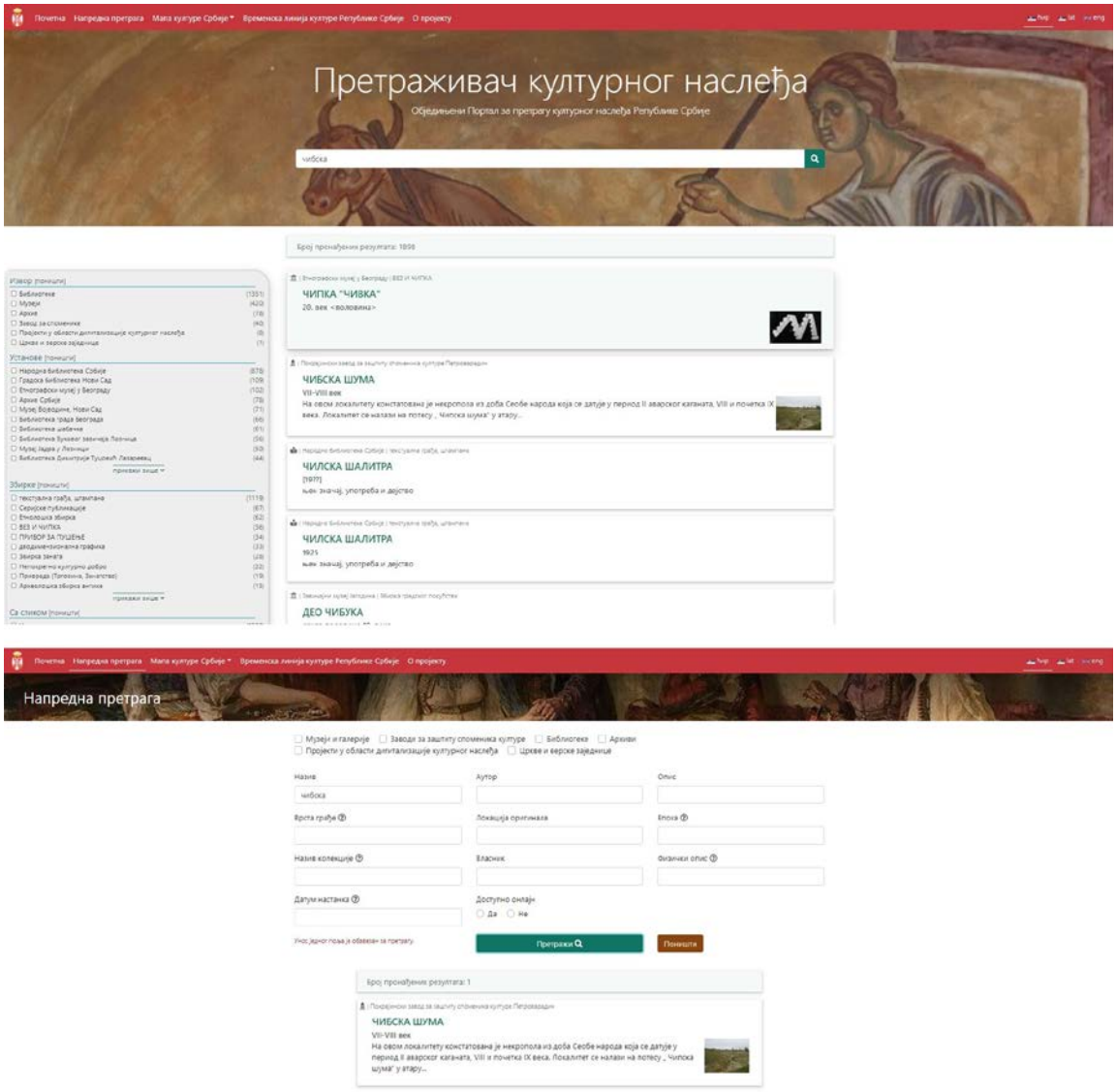

Fig. 4 – Search results of the word „čibska“ in the Browser of cultural heritage (Pretraživač kulturnog nasleđa, accessed July 20th, 2021).

try and is mostly owned by a responsible ministry (i.e. the Ministry of Culture and Information of the Republic of Serbia) or institutions for protection (i.e. archives, libraries, institutes for protection of cultural monuments, museums and other subjects in culture) (Церовић 2019: 20). Before 2020, in the Republic of Serbia and within the domain of culture, the principle of openness was not mentioned within laws and legal paragraphs. Only within the appendix of the *Law on culture* (*Zakon o kulturi*), issued in 2020, within the principles of cultural development, were the principle of openness and accessibility of cultural content added, but without a wider explanation (Službeni glasnik 72/2009, 6/2020). A detailed explanation was only given about the concept of accessibility to cultural content in an electronic form. If it is publicly accessible, it can also be publicly accessed in an electronic form, in a way that does not break regulations regarding protection of intellectual property and privacy (Službeni glasnik 6/2020; Smernice za digitalizaciju kulturnog nasleđa RS 2017). Public access mostly includes access to a digital object and the downloading of

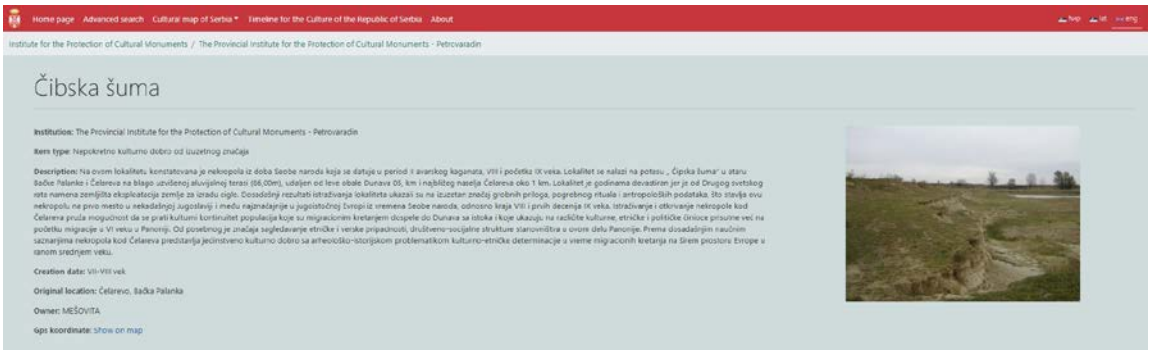

Fig. 5 – Basic descriptive metadata about the digital object Čibska šuma in the Browser of cultural heritage (Pretraživač kulturnog nasleđa, accessed July 20th, 2021).

metadata from an adequate information system, for example from the national Aggregator of Cultural Heritage (see *Pretraživač kulturnog nasleđa*) or the national Portal of Open Data (see *Portal otvorenih podataka*) (Službeni glasnik 76/2018).

When it comes to primary data collected through research that is fully or partly funded from the budget of the Republic of Serbia, the Government of the Republic of Serbia adopted recommendations of the European Commission (see Berlin Declaration 2003; Guidelines to the Rules on Open Access 2017) and introduced the principles of open science in its strategies and legal acts. Among others, these include access to scientific publications and open access to primary research data (Službeni glasnik 25/2016; Službeni glasnik 49/2019; Službeni glasnik 10/2021). Furthermore, in 2018, aiming to achieve the greatest possible efficiency in implementing the principles, it established the national *Platform for Open Science* (*Platforma za otvorenu nauku*) and gave a recommendation to universities and scientific institutions in Serbia to adopt specific repositories that are in accordance with the Platform. The repositories are intended for scientists to upload their data and secure their safe keeping and re-usage according to the FAIR standards[2] (*Platforma za otvorenu nauku* 2018). Usage and re-usage implies the right of every internet user to freely download, modify, keep and distribute data, while respecting corresponding copyrights and the obligation of stating the source of the information. However, this does not include data marked as confidential or confidential business data.

At the time of this paper being written, on the official page of the national *Portal of Open Science* (*Portal otvorene nauke*) there were 35 national/thematic/institutional repositories, some of them showing several initiatives of data open access (see *Portal za otvorenu nauku*). For example, the National Repository of Doctoral Theses in Serbia (*Nacionalni repozitorijum disertacija u Srbiji -NaRDuS*) gives access to doctoral theses (among others, in the field of archaeology) defended at all of the universities in Serbia and enables access to metadata (see NaRDuS). Depositing primary research data into specific repositories also became part of conducting projects within the national programmes of the Fund for Science of the Republic of Serbia (Fond za nauku Republike Srbije) (Smederevac 2020: 59)[3]. For example, participants of the Fund programmes are obliged to state the method of collecting, keeping and depositing research data in order to make them further accessible.[4] In order to manage the data,

2 About FAIR (Findable, Accessible, Interoperable, Reusable) principles see Smederevac 2020: 54 – 55.

3 Fund for science of the Republic of Serbia (Fond za nauku Republike Srbije) is a state authority established in March 2019. It funds projects in the field of scientific and technological development through public calls (see Fond za nauku RS). Until July 2021, of the total of 177 projects approved for funding, the Fund supported two projects in the field of archaeology.

4 Similar to the obligation of participants who take part in the funding programme of the EU for re-

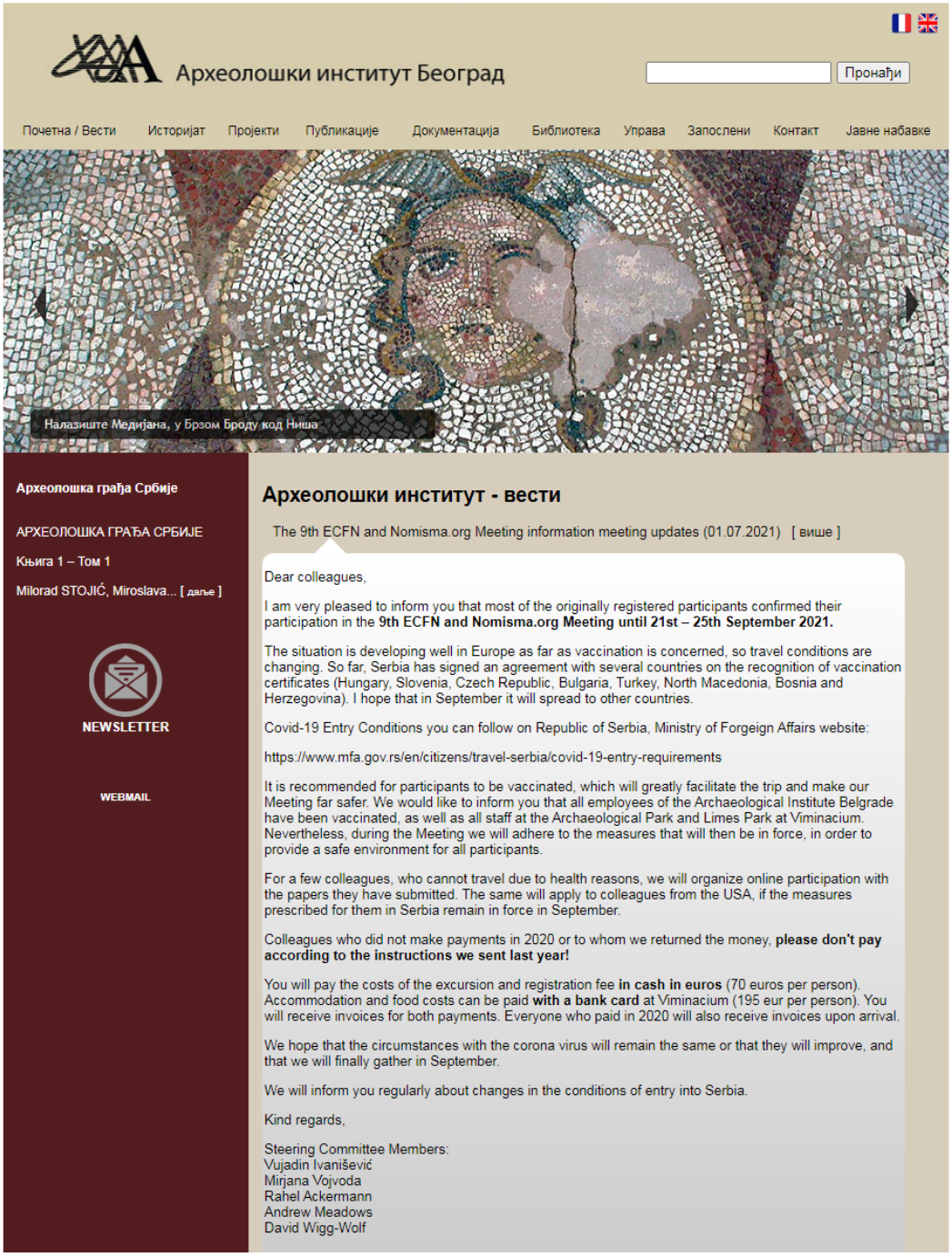

Fig. 6 – Homepage of the Institute of Archaeology (accessed July 6th, 2021).

they are advised to use one of the already existing open research infrastructures, such as Računarski centar Univerziteta u Beogradu (see RCUB) and Data centar Srbije za društvene nauke (see *DCS*), but also develop their own infrastructure in accordance with the Platform for Open Science (*Platforma za otvorenu nauku*).

search and innovation, Horizon 2020, who need to submit their Data Management Plan (DMG).

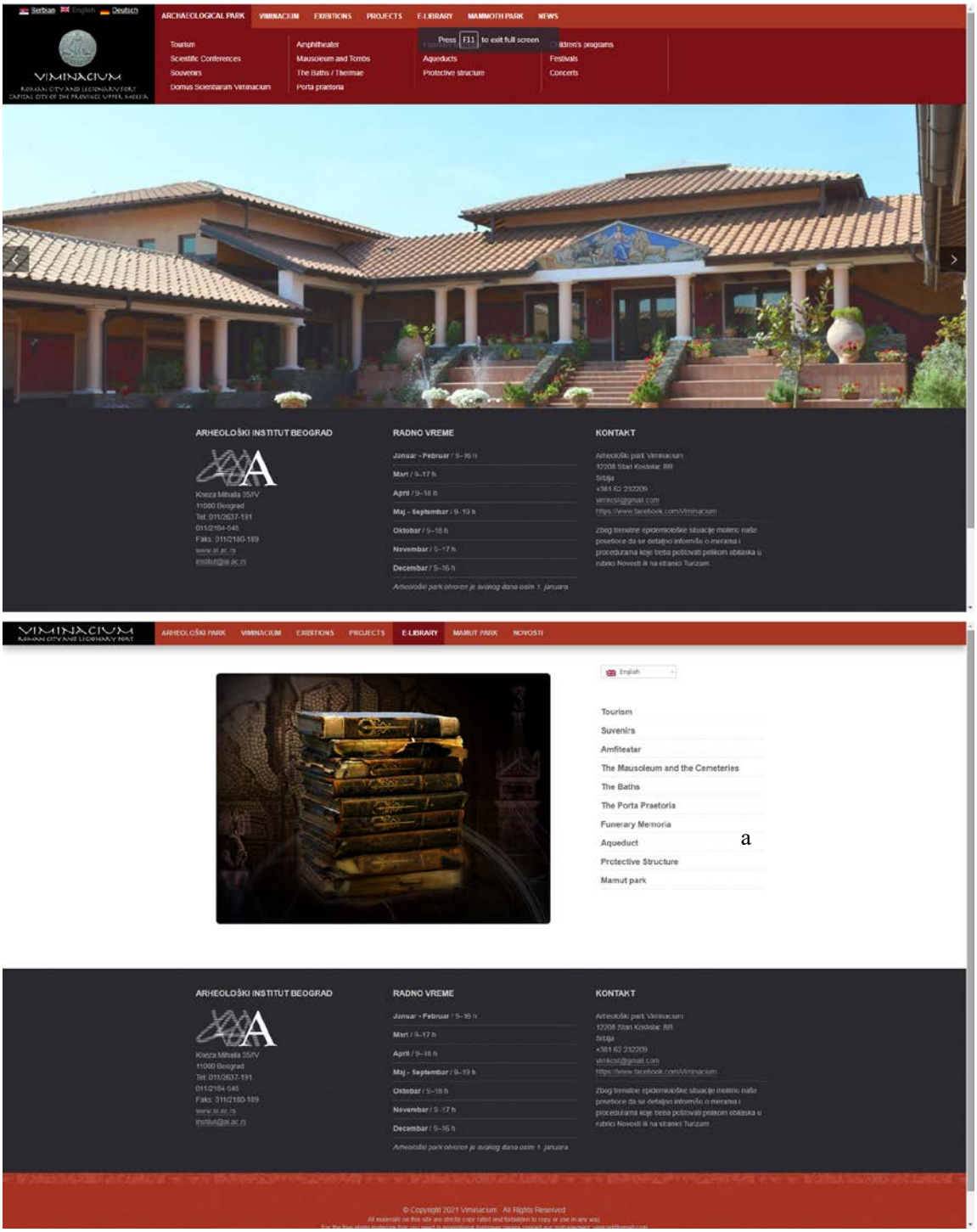

Fig. 7 - Website of the archaeological site Viminacium (top) and its E-library (bottom) (accessed August 12th, 2021).

PUBLIC ACCESS TO CULTURAL HERITAGE IN ELECTRONIC FORM – THE PORTAL OF OPEN DATA AND CULTURAL HERITAGE BROWSER

The national *Portal of Open Data* (*Portal otvorenih podataka*) was modelled on similar initiatives in the USA (see data.gov) and the EU (see data.europa.eu). It represents a repository in which state authorities of the Republic of Serbia are obliged to announce sets of open data that are in their possession (Službeni glasnik 104/2018). This data needs to be published in a raw and machine-legible form i.e. in accordance with the prescribed List of Interoperable Standards (see Lista standarda interoperabilnosti 2.1). It can be used by any physical or legal entity, both for commercial and non-commercial purposes, however with the obligation to state the source (i.e. the state authority that made the data accessible) and any possible changes.

Up to the middle of 2021, within the *Portal of Open Data* (*Portal otvorenih podataka*), the Ministry of Culture and Information of the Republic of Serbia has shared thirteen data sets, among which there were three metadatabases about immovable cultural heritage in Serbia. These databases can be downloaded in either JSON or CSV format, even without registration on the Portal and also without any fees (Fig. 1). The data is provided in both Cyrillic and Latin script. As an example, the database about immovable cultural heritage of extreme importance contains metadata about 213 cultural objects, among which there are also nineteen archaeological sites (Fig. 2). At this moment, the database is not linked to other knowledge bases (e.g. Wikidata or VIAF)[5], but the user can do this on his/her own and according to his/her needs. In the case of downloading data sets through API, authentication is necessary, meaning that one first needs to create an account on the Portal, generate the API secret code and then download data by using specific programme tools. Since within this section the earliest data sets were shared only recently, actually in 2019, it is presumed that the amount of shared data will grow in the period to come.

The national aggregator *Pretraživač kulturnog nasleđa* was modelled on the EU project – EUROPEANA – in cooperation with the National Library of Finland and with the support of the Microsoft Company Serbia (Objedinjeni portal 2019). It represents a system for searching all of the accessible data about cultural heritage collected from information systems that are owned by the responsible Ministry, actually institutions for protection (archives, libraries, institutes for the protection of cultural monuments and other subjects in culture) (Službeni glasnik 76/2018; Вуликић 2020). It secured the visibility and accessibility of information about cultural heritage kept at the institutions for protection.

Up to July 2021, within *Pretraživač*, one archive, eighteen libraries, sixty-four museums, thirteen institutes for the protection of cultural monuments and five church and religious communities have made their metadata about chosen digital objects in their possession digitally accessible. The user can search them in Serbian or English, by using a key-word or by typing a specific element (e.g. name of the author or location) into the form for an advanced search. In both cases, the browser shows a list of accessible objects with their metadata containing the specific term. One should bear in mind that browsing with a key-word shows different results for the same term, but written in the two different scripts. For example, if the user is interested in the popular archaeological site Viminacium, by typing the key-word in Cyrillic script ("виминацијум"), he/she receives 80 search results, while in the Latin script ("Viminacium") 256 results are obtained (Fig. 3). Furthermore, if the user is interested in a lesser known site, for example Čibska šuma, a

5 Wikidata is a free and open internet knowledge base used as a storage for structured data of sisterly Wikimedia like Wikipedia. VIAF (Virtual International Authority File) is a free internet service that links normative records of different libraries (see VIAF).

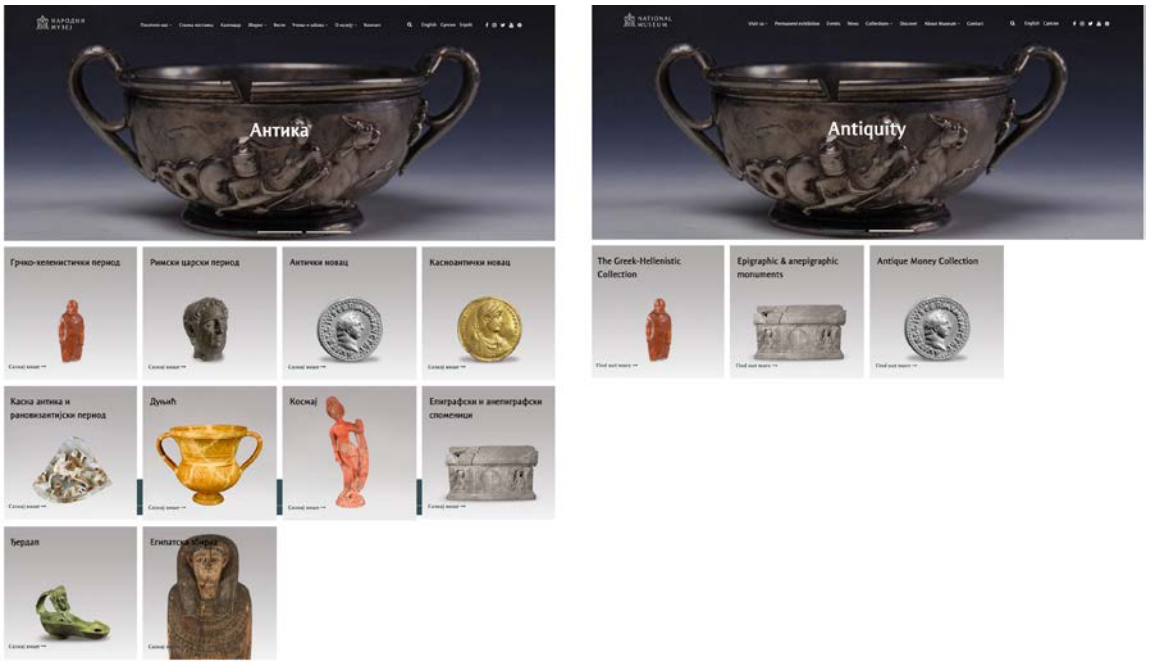

Fig. 8 – Data about „Collections“ („Zbirke“) as displayed on the website of the National museum in Belgrade are offered in Serbian (left) and English language (right) (accessed August 13th, 2021).

Fig. 9 - Accessing the English version of „Epigraphic and anepigraphic monuments“ of the National museum in Belgrade is possible only with a user-name and a password (accessed August 13th, 2021).

search with the key-word “čibska” does not give a satisfactory result and this is why it is better to use the form of advanced search (Fig. 4). By choosing specific search results (i.e. digital objects), the user gains access to basic metadata about the chosen object, such as name, place and year of creation (Fig. 5). Such a set of data is not opened, meaning that the user cannot download and re-use it. It only gives basic information about the object and offers an insight into the collection of the specific institution for protection.

PUBLIC ACCESS TO PRIMARY RESEARCH DATA IN INSTITUTIONAL REPOSITORIES

The first website that was visited was that of the Institute of Archaeology (Arheološki institut http://www.ai.ac.rs).[6] (Fig. 6) The content of this site includes its homepage with a subsection for news, history of the institution, a list of projects and a list of its publications, the documentation sector, library, its management team and the list of employees. For the time being, the site is usable for Serbian speaking users only. Regarding archaeological material, the homepage of this site displays five images, four of which show archaeological structures and finds. Accompanying each image there is a brief description of what is depicted. When one moves from the homepage through all the further sections, there are still the same five images shown repeatedly. However, since the Institute of Archaeology is a research institution and not one that deals with protection or storage of archaeological material, this can easily be understood. On the other hand, the great value of the Institute's website lies in its e-library, which is to be found in the section named "Publications". This particular link leads its visitors to the website http://viminacium.org.rs/e-biblioteka/[7] (Fig. 7, bottom).

The e-library of the Viminacium website offers access to a large number of publications issued by the Institute of Archaeology, both periodicals and monographs, and even to a limited number of relevant newspapers releases. One can say that in such a way, access to archaeological material is made possible, under the condition that the user knows exactly which bibliographic unit he/she is looking for.

If the website of the archaeological site of Viminacium is observed as a whole (http://viminacium.org.rs/arheoloski-park/)[8] (Fig. 7, top), it reveals a truly impressive amount of different data. From its homepage, one can follow the link to the "Archaeological park" ("Arheološki park"), to "Viminacium" ("Viminacijum") and to a virtual tour through this Roman city and legionary fort, but he/she can also be informed about exhibitions, projects, a special part of this park dedicated to mammoth remains, as well news related to the site.

On the link entitled "Archaeological park" ("Arheološki park"), visitors can read information about all of the parts of the Viminacium archaeological park. Among them, there are the amphitheatre, the mausoleum and tombs, the baths, the northern gate of the legionary fort, the memoriae and the aqueduct. By clicking on any of these links, the visitor gains access to a short descriptive text about the specific structure and a number of images that show the structure.

On the page entitled "Viminacium" ("Viminacijum"), in Serbian, but also in English, an overview of the site's history is given, both of the city and the legionary fort, together with a history of the research, the chronology, a list of the researchers, panoramic views, images of art and a gallery of old photographs.[9]

The part entitled "Art" ("Umetnost") is certainly the one that is most attractive for archaeologists, since it enables access to specific groups of finds from Viminacium: fresco-painted tombs, glass, pottery, jewellery and coinage. By following any of these links, one reaches basic data about a specific group of finds and also to a number of photographs. The texts are written by experts, but also understandable to the broader public. The same can be said about the photographs.

The next website that was visited by the authors of this paper was that of the National Museum in Belgrade (Narodni muzej u Beogradu, http://www.narodnimuzej.rs).[10] On the homepage, the visitor is able to inform him/herself about the permanent

6 http://www.ai.ac.rs (accessed on July 6th, 2021).

7 http://viminacium.org.rs/e-biblioteka/ (accessed on July 6th, 2021).

8 http://viminacium.org.rs/arheoloski-park/ (accessed on August 12th, 2021).

9 http://viminacium.org.rs/viminacium/ (accessed on August 12th, 2021).

10 http://www.narodnimuzej.rs (accessed on August 13th, 2021).

Fig. 10 – Examples of inadequate photographs within the "Collections" of the National museum in Belgrade (accessed August 13th, 2021).

exhibition, the calendar of events, the museum's collections, news, information on the history of the museum as an institution and "learning and fun" ("učenje i zabava"), a section about education workshops for younger visitors. This search can be performed in both Serbian and English.

The section entitled "Collections" ("Zbirke") is the most attractive for archaeologists who browse archaeological finds. Through it, one reaches the pages about collections of finds from pre-history, Antiquity, the Middle Ages and the New Age. In a random search, the authors visited the page dedicated to Antiquity, which offers access to ten links, each of them leading to a specific collection (Hellenistic-Greek collection, the Roman Imperial period, collections of coins from Antiquity and Late Antiquity, etc.). These ten links to collections are accessible only in Serbian, either in Cyrillic or Latin script, while the option in English offers access to only three collections (Greek-Hellenistic collection, collection of epigraphic and anepigraphic monuments, and the collection of coins from Antiquity)[11] (Fig. 8). In other words, the remaining seven collections do not yet exist in the English version. The user who browses in Serbian can directly access any of the aforementioned ten collections. The user who browses the English version of the site can access the page "Epigraphic and anepigraphic monuments" only if he/she logs in with a username and a password.[12] (Fig. 9)

By further browsing of the Antiquity collection, it was realised that it displays expert texts and a number of high quality photographs. However, it was noticed that some inadequate photographs found their way onto the page, while some of them have incorrect captions. (Fig. 10)

As a conclusion regarding the National Museum in Belgrade webpage, it certainly is of high quality, modern and well-structured and it offers a large amount of information about the museum itself and the objects kept therein. A comment remains that the full website is accessible only to those visitors who are fluent in Serbian, while those who browse the site in English are required to log in and enter a password. In other words, on this website, there is a specific hierarchy in accessing the data.

The Vojvodina museum in Novi Sad (Muzej Vojvodine u Novom Sadu) is the biggest museum in Vojvodina.[13] On its homepage it is clear that it can be browsed only in Serbian, while the visitor is allowed to choose whether he/she will be reading the content in Cyrillic or Latin script. From this page, the visitor can acquaint themselves with the museum itself, with stories about museum objects and with educational programmes in the museum, and can find directions on how to reach the museum.

By clicking on the "Museum stories" ("Priče iz muzeja") and then on "Stay at home and learn something new" ("Ostani kod kuće i nauči nešto

11 http://www.narodnimuzej.rs/ancient-history/?lang=en (accessed on August 13th, 2021).

12 http://www.narodnimuzej.rs/ancient-history/the-collection-of-roman-and-medieval-epigraphic-anepigraphic-monuments/?lang=en (accessed on August 13th, 2021).

13 https://www.muzejvojvodine.org.rs/ (accessed on September 1st, 2021).

Fig. 11 – Electronic catalogue of Cultural monuments in Serbia (Spomenici kulture u Srbiji) enables public access to basic data about a chosen object (bottom), as well as information collected during research (top) (accessed July 29th, 2021).

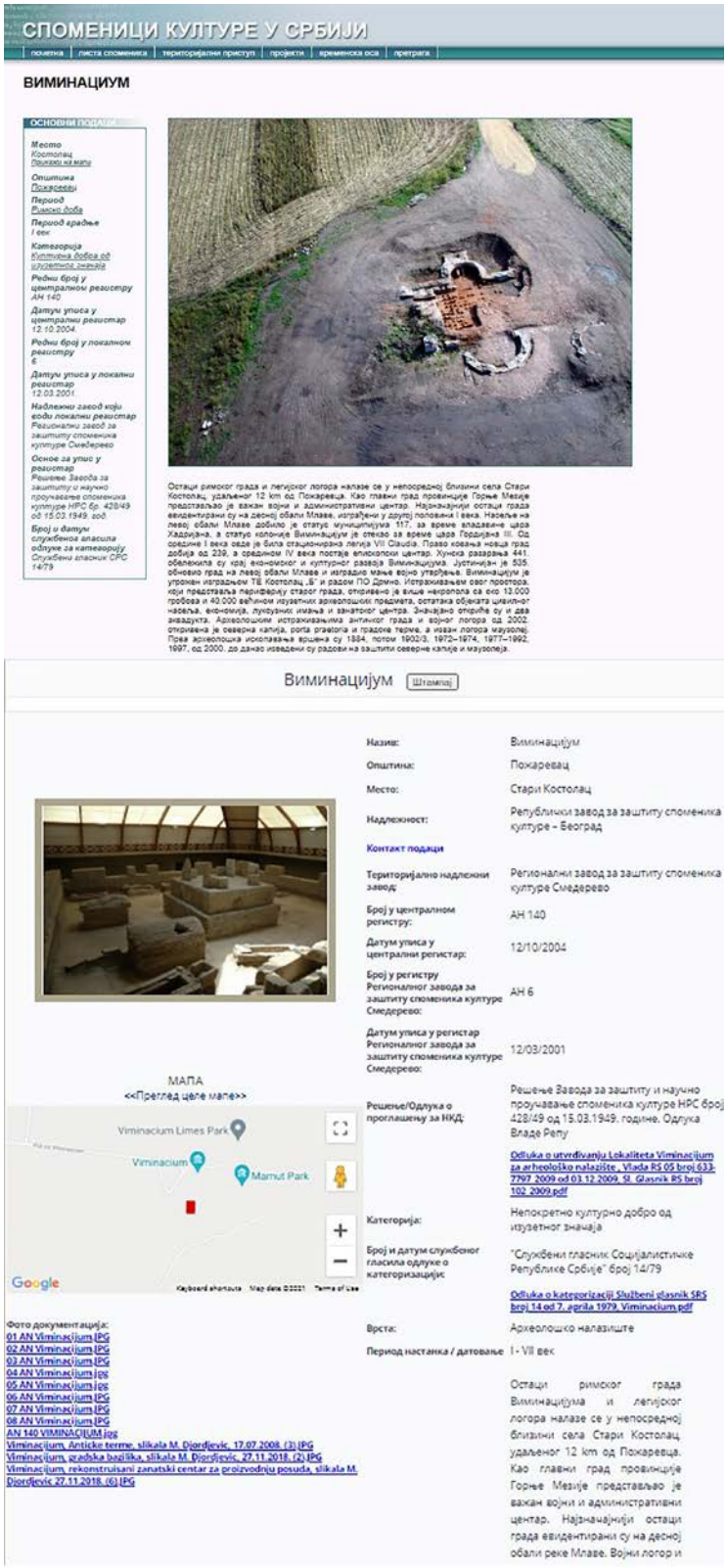

Fig. 12 – Description example of the same cultural object in the electronic catalogue of Cultural monuments in Serbia (Spomenici kulture u Srbiji, top) and in the Information system of immobile cultural objects (Informacioni sistem nepokretnih kulturnih dobara, bottom) (accessed July 30th, 2021). Although the content is partly duplicated, each description also contains unique information, indicating that they should be linked.

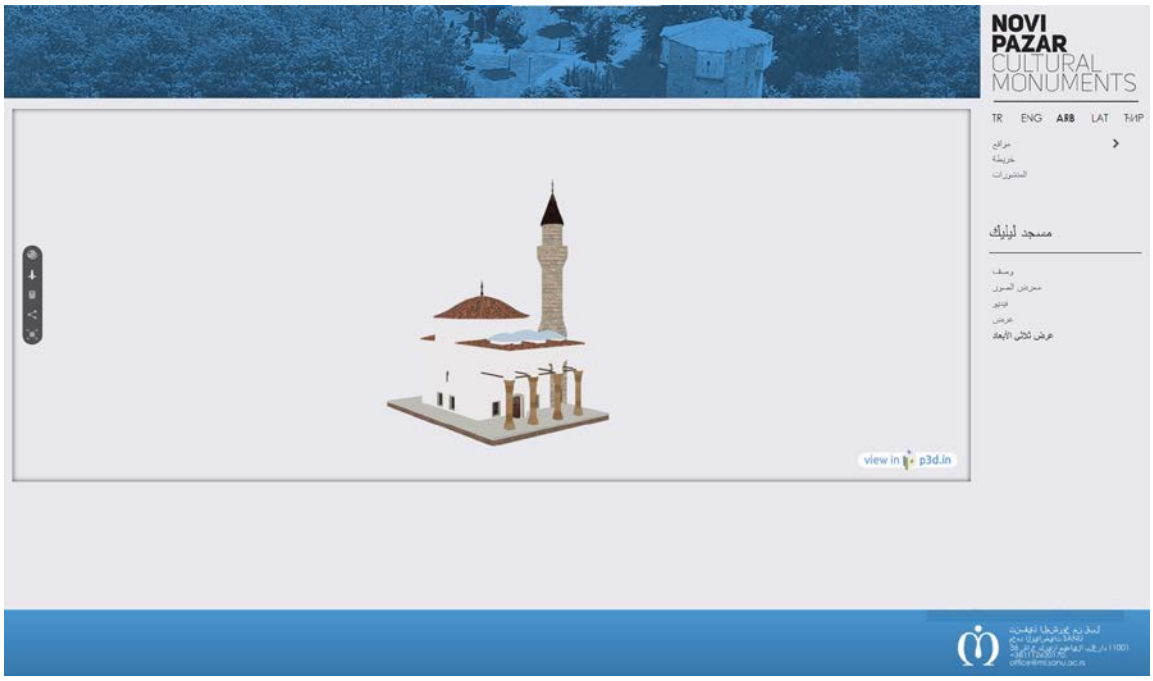

Fig. 13 – Interface in Arabic language and a 3D model of a chosen object of culture without accompanying metadata within the digital guide Novi Pazar – cultural monuments (Novi Pazar – Spomenici kulture) (accessed July 30th, 2021).

novo")[14], a possibility opens for ten stories to be explored, all of them written about museum exhibits. However, only two of them refer to archaeological finds: "A pandemic 2,800 years ago?" ("Epidemija pre 2,800 godina?") about a group grave from Gomolava near Hrtkovci, and "Fish and fishing through history in Vojvodina – or how archaeology considers this question?" ("Ribe i ribolov kroz istoriju u Vojvodini – ili kako arheologija razmišlja o ovom pitanju?"). Obviously, the website is designed in this manner due to the COVID-19 pandemic and the circumstances whereby visitors cannot access the museum physically, but there is no better way for one to gain a better insight into the archaeological collections owned by this museum.

Through the "Museum stories" link ("Priče iz muzeja") there is access to the page entitled "Be responsible to your spirit and body" ("Budi odgovoran prema svom duhu i telu")[15], a title that certainly does not reveal that under it more stories based on archaeological finds are hidden. Among them, there is the "Magic of the Roman glass" ("Magija rimskog stakla"), together with four articles related to archaeobotanics. Since this museum possesses its own space in which it grows its own experimental garden, it is a pity that these papers are not better highlighted and also not accessible to users who are not fluent in Serbian.

Regarding the fact that archaeological collections make up only a part of what is kept at the Museum of Vojvodina, it is clear that they are not the most represented category of this institution's website. A comment remains that maybe (even) more attention should be paid to the archaeobotanical collection, since it is unique not just in Serbia, but in the wider region. It would also be desirable to enable browsing of the website for those who are not fluent in Serbian.

When visiting the website of the National Museum in Niš (Narodni muzej u Nišu, http://narodnimuzejnis.rs)[16], visitors can inform themselves about basic data related to this museum, about exhibitions, news and events, about museum educa-

14 https://www.muzejvojvodine.org.rs/category/ostani-kod-kuce-i-nauci-nesto-novo/ (accessed on September 1st, 2021).

15https://www.muzejvojvodine.org.rs/category/budi-odgovoran-prema-duhu-i-telu/ (accessed on September 1st, 2021).

16 http://narodnimuzejnis.rs (accessed on September 1st, 2021).

tion and about publications of the museum. Aside from Serbian (either in Cyrillic or Latin script), the website can also be searched in English or in French.

By entering the page "About the museum" ("O muzeju"), and after that by choosing the "Department of Archaeology" ("Odeljenje arheologije") from the drop-down menu, the user is given a choice of visiting one of the three sub-departments: prehistoric, Ancient or Medieval.[17] By random choice, the authors of this paper visited the sub-department for prehistory ("Odsek za praistoriju").[18] It contains some twenty photographs that are displayed in a circle, as well as a short text about the entire prehistory of Niš and its surroundings. The text is available in Serbian and in French. A similar situation repeats in the remaining two sub-departments, the Ancient and the Medieval one.

Furthermore, by entering the "Exhibitions" ("Izložbe") and then the "Permanent exhibitions" („Stalne postavke"),users can virtually visit the exhibition space of this museum through some fifty photographs.[19] The same photographs can be reached through the page "About the museum" ("O muzeju") and then through the drop-down menu, by entering the "Objects" ("Objekti") and the "Archaeological hall" ("Arheološka sala"). Photographs of the showcases are of medium quality and only some of them clearly show the objects exhibited in them. There are no descriptions, nor explanations of what the user sees in those images.

At the end of this overview, by using reverse methods, the authors tried to reach Serbian websites that display archaeological collections. After typing in some of the keywords (archaeology or archaeological database), the authors concluded that there is not a single link leading to them.

For the purposes of examining the accessibility and openness of research data, several digital repositories have been chosen, created from a cooperation between the Mathematical Institute SASA and institutions for protection in Serbia. An example of such a repository is the electronic catalogue *Cultural Monuments in Serbia* (*Spomenici kulture u Srbiji*). It was designed in 2004, as a result of cooperation between the Mathematical Institute SASA, the Institute of Archaeology, the National Library and the Institute for the Protection of Cultural Monuments of the Republic of Serbia (see Spomenici kulture u Srbiji). It represents one of the oldest publicly accessible electronic collections of immobile cultural heritage in the territory of modern Serbia. Besides documentation on about 1,300 cultural monuments (among them also 123 archaeological sites), it also includes results of research projects within the field of digitizing cultural heritage. They, however, include actions undertaken between 2004 and 2014 by the Mathematical Institute with different partner institutions, supported by both international funds (e.g. UNESCO) and national ones (e.g. the Ministry of Culture). In this sense, and besides the standardised description of the object of culture, mostly including some basic text, photographs and metadata about the object, this electronic collection secures public access to specific information collected during field surveys (such as photographs, videos, GPS coordinates and metadata) (Fig. 11). It should be borne in mind that this virtual environment was created fifteen years before legal regulations pertaining to the digitization process in the field of culture in Serbia were created, even before the question of data accessibility and openness arose. This is why it was based on a locally developed infrastructure and standards, while the entirety of the content is protected by copyright or includes ownership rights by a third party. In other words, although the applied scheme of metadata is interoperable and compatible with the most commonly used international standards (Маринковић 2016: 74), at this moment there is no possibility to download

17 https://narodnimuzejnis.rs/o-muzeju/odeljenja/odeljenje-arheologije/ (accessed on September 1st, 2021).

18 http://narodnimuzejnis.rs/o-muzeju/odeljenja/odeljenje-arheologije/odsek-praistorija/?lang=RS (accessed on September 1st, 2021).

19 https://narodnimuzejnis.rs/izlozbe/stalne-postavke/?lang=RS (accessed on September 1st, 2021).

data without the written approval of the Mathematical Institute. One can say that this electronic collection was one of the earliest test solutions for managing cultural (archaeological) heritage and research data in a digital environment. This is why it needs to be upgraded and adjusted to modern regulations in order for it to follow new trends in managing heritage and link with other national knowledge bases, such as the information system for immobile cultural goods of the Republic Institute for Protection of Cultural Monuments (Informacioni sistem za nepokretna kulturna dobra Republičkog zavoda za zaštitu spomenika kulture (see IS NKD). (Fig. 12)

A somewhat more modern entity is the digital guide Novi Pazar – Cultural Monuments (Novi Pazar – spomenici kulture), developed in 2019 by the Mathematical Institute SASA with the support of the Ministry of Culture and Information of the Republic of Serbia. It is a virtual guide through cultural heritage in south-eastern Serbia, offered in several languages: Serbian, English, Turkish and Arabic (see Novi Pazar – spomenici kulture). At present, it contains documentation about twelve cultural monuments that depict cultural turmoil in the territory of modern Novi Pazar and its surroundings in a chronological frame spanning from the 13th to the 21st century. The documentation created during field surveys in 2019 includes textual descriptions, photographs, videos, panoramic views and 3D images captured using the most recent technology (Fig. 13). However, it does not include metadata, nor information about possibilities of downloading and re-using the data. This is why it would be interesting to link this guide to other national knowledge bases, to enrich the attractively presented content and offer support in further research.

CONCLUSION

During the late 1990s, in the Republic of Serbia, the earliest attempts to enable access in electronic form to data regarding cultural content, but also to primary research data in the field of social sciences and culture took place. They are mostly connected to the initial attempts of digitizing cultural heritage in Serbia by groups of enthusiasts that at the same time sought freedom in computing i.e. free software, open code and free licenses. However, the majority of representatives of cultural and scientific institutions did not share the same enthusiasm. For example, the results of research conducted in 2012 showed that researchers in the field of social sciences in Serbia are not aware of how useful it is to share research data (Bradić-Martinović 2012). Furthermore, a survey conducted in 2016, which included sixty museums and galleries with museum funding in Serbia, showed that collections in a digital form were accessible only in museums, but not in the internet. Also, preference was given to selective data accessibility rather than to absolute accessibility (Аћимовић 2016: 50). As shown in this paper, under these circumstances and due to the expectations of the EU and the wider world, the government of the Republic of Serbia applied a top-down approach and issued a range of strategies and laws designed to raise awareness about the usefulness of sharing data and to enforce making data accessible, especially that data owned by public institutions. In this paper, the authors try to analyse whether this attempt was fruitful and, if so, to what extent. They were able to conclude that the development dynamics and tendencies in accessing open archaeological databases clearly reflect on the existing databases and that they are also visible on websites of the institutions in charge of defining, protecting and maintaining cultural heritage. However, instead of a model of full accessibility and open data access, the majority still chooses the principle of selective accessibility. The paper shows that one section of the analysed databases and websites is accessible only to users fluent in Serbian. Another part offers the users only a small number of illustrations and poor descriptions of the archaeological material. Some websites even offer a different level of

accessibility to users fluent in Serbian to that offered to English speakers, asking the latter to enter a username and a password in order to continue browsing. Generally, public access is allowed to descriptive metadata and digital objects described with metadata, but there is no option of downloading data, nor is there information about the possibility of its re-use. Finally, the accessible data is not linked to other existing knowledge bases.

In the future, one should expect the level of accessibility of archaeological databases to rise, both for experts and the broader public. Archaeological research is mostly conducted with money collected through different taxes, which represents an additional reason for its results to be made publicly visible, at least to a certain extent. Recent strategies, rules and initiatives certainly represent a step forward in reaching this goal.

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BIBLIOGRAPHY

Аћимовић, М. 2016
Анкета о доступности фото-документације музеја у Србији, у: Отворени приступ музејској документацији *у* Србији*:* искуства*,* изазови и потенцијали, М. Стијовић (изд.), Београд: Централни институт за конзервацију, 43 – 52.

(Aćimović, M. 2016
Anketa o dostupnosti foto-dokumentacije muzeja u Srbiji, u: *Otvoreni pristup muzejskoj dokumentaciji u Srbiji: iskusta, izazovi i potencijali*, M. Stijović (izd.), Beograd: Centralni institut za konzervaciju, 43-52).

Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (published October 22nd, 2003). https://openaccess.mpg.de/Berlin-Declaration. (accessed July 22nd, 2021).

Bradic-Martinovic A., Zdravkovic, A. 2012
Integration of western Balkan countries into the European system of digital data archives in social sciences: the case of Serbia. *Review of Applied Socio-Economic Research*, 4(2): 32-41.

Брадић-Мартиновић, А. 2021
Архивирање и управљање подацима *у* друштвеним наукама – најбоља пракса. Вебинар одржан 15. јуна 2021. на Математичком институту САНУ.

(Bradić-Martinović, A.
2021. Arhiviranje i upravljanje podacima u društvenim naukama – najbolja praksa. Webinar held at the Mathematical Institute SASA.
https://miteam.mi.sanu.ac.rs/asset/x5PQQF8H-JTJmCHttn. (accessed July 26th, 2021).
VIAF. http://viaf.org/. (accessed July 16th, 2021).

Вуликић, Н. 2020
Употреба ИКТ у установама културе.
(Vulikić, N. 2020, *Upotreba IKT u ustanovama kulture*).
https://prezi.com/yxvqgmgpv6_v/presentation/. (accessed July 19th, 2021).

G8 Open Data Charter and Technical Annex (published June 18th, 2013). https://www.gov.uk/government/publications/open-data-charter/g8-open-data-charter-and-technical-annex. (accessed June 22nd, 2021).

Global Open Data Index. https://index.okfn.org/place/. (accessed July 13th, 2021).

Guidelines to the Rules on Open Access to Scientific Publications and Open Access to Research Data in Horizon 2020, version 3.2 (published March 21st, 2021). https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf. (accessed June 22nd, 2021).

data.europa.eu. https://data.europa.eu/en. (accessed July 20th, 2021).

data.gov. https://www.data.gov/. (accessed July 20th, 2021).

DCS - Data Centar Srbije za društvene nauke. https://datacentarserbia.com/. (accessed July 26th, 2021).

Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information. https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32003L0098. (accessed July 12th, 2021).

Directive 2013/37/EU of the European Parliament and of the Council of 26 June 2013 amending Directive 2003/98/EC on the re-use of public sector information Text with EEA relevance. https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32013L0037. (accessed July 12th, 2021).

EUROPEANA. https://www.europeana.eu/. (accessed July 20th, 2021).

Закон о архивској грађи и архивској делатности. Службени гласник РС, 6/2020.

Zakon o arhivskoj građi i arhivskoj delatnosti. *Službeni glasnik RS*, 6/2020.

https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2020/6/7/reg. (accessed July 14th, 2021).

Закон о ауторским и сродним правима. Службени гласник РС, 104/2009.

Zakon o autorskim i srodnim pravima. *Službeni glasnik RS*, 104/2009.

http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2009/104/30/reg/20190926. (accessed July 14th, 2021).

Закон о електронској управи. Службени гласник РС, 27/2018.

Zakon o elektronskoj upravi. *Službeni glasnik RS,* 27/2018.

https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2018/27/4/reg. (accessed July 12th, 2021).

Закон о заштити података о личности. Службени гласник РС, 87/2018.

Zakon o zaštiti podataka o ličnosti. *Službeni glasnik RS,* 87/2018.

http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2018/87/13/reg. (accessed July 14th, 2021).

Закон о култури. Службени гласник РС, 72/2009, 6/2020.

Zakon o kulturi. *Službeni glasnik RS*, 72/200, 6/2020.

http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2009/72/1/reg. (accessed July 13th, 2021).

Закон о науци и истраживањима. Службени гласник РС, 49/2019.

Zakon o nauci i istraživanjima. *Službeni glasnik RS*, 49/2019.

https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2019/49/1. (accessed July 21st, 2021).

ИС НКД – Информациони систем непокретног културног наслеђа.

IS NKD – Informacioni sistem nepokretnog kul-

turnog nasleđa.
https://nasledje.gov.rs/index.cfm/index/index. (accessed July 30th, 2021).

Листа стандарда интероперабилности, верзија 2.1.
Lista standarda interoperabilnosti, version 2.1. https://www.ite.gov.rs/extfile/sr/2002/LISTA_STANDARDA_Tehnicke_Interoperabilnosti%20v%202.1c.pdf. (accessed July 14th, 2021).

Маринковић, Б. 2016
Смернице за формат метаподатака за описивање културне баштине и начине њиховог очувања, у: Отворени приступ музејској документацији *у* Србији*:* искуства*,* изазови *и* потенцијали, (ур.) М. Стијовић, Београд: Централни институт за конзервацију, 61–77.
(Marinković, B. 2016
Smernice za format metapodataka za opisivanje kulturne baštine i načine njihovog očuvanja, u: *Otvoreni pristup muzejskoj dokumentaciji u Srbiji: iskustva, izazovi i potencijali*, (ur.) M. Stijović, Beograd: Centralni institut za konzervaciju, 61–77).

НаРДуС – Национални Репозиторијум Дисертација у Србији.
NaRDuS – Nacionalni Repozitorijum Disertacija u Srbiji.
https://nardus.mpn.gov.rs (accessed September 13th, 2021).

Нови Пазар – споменици културе.
Novi Pazar – spomenici kulture.
http://novipazarspomenici.mi.sanu.ac.rs/. (accessed July 28th, 2021).

Objedinjeni portal za pretragu kulturnog nasleđa Srbije (published May 26th, 2019). http://rtv.rs/sr_lat/kultura/objedinjeni-portal-za-pretragu-kulturnog-nasledja-srbije_1020397.html. (accessed July 20th, 2021).

OpenRefine. https://openrefine.org/. (accessed July 16th, 2021).

Платформа за отворену науку (усвојена 09. јула 2018).
Platforma za otvorenu nauku (accepted July 9th, 2018).
http://www.mpn.gov.rs/wp-content/uploads/2018/07/Platforma-za-otvorenu-nauku.pdf. (accessed July 22nd, 2021).

Портал отворене науке.
Portal otvorene nauke.
https://www.open.ac.rs/. (accessed July 22nd, 2021).

Портал отворених података.
Portal otvorenih podataka.
https://data.gov.rs/. (accessed July 14th, 2021).

ПОУ Србија – Партнерство за Отворену Управу.
POU Srbija – Partnerstvo za Otvorenu Upravu.
https://ogp.rs/. (accessed July 12th, 2021).

Правилник о ближим условима за дигитализацију културног наслеђа. Службени гласник РС*,* 76/2018.
Pravilnik o bližim uslovima za digitalizaciju kulturnog nasleđa. *Službeni glasnik RS*, 76/2018.
https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/ministarstva/pravilnik/2018/76/2/reg. (accessed July 13th, 2021).

Претраживач културног наслеђа.
Pretraživač kulturnog nasleđa.
https://kultura.rs/. (accessed July 14th, 2021).

Програм развоја електронске управе у Републици Србији за период од 2020. до 2022. године са Акционим планом за његово спровођење. Службени гласник РС*,* 85/2020.
Program razvoja elektronske uprave u Republici Srbiji za period od 2020. do 2022. godine sa Akcionim planom za njegovo sprovođenje. *Službeni*

glasnik RS, 85/2020.
https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/drugiakt/2020/85/1/reg. (accessed July 13th, 2021)

RCUB – Računarski centar Univerziteta u Beogradu. https://www.rcub.bg.ac.rs/. (accessed July 26th, 2021).

Smederevac, S., Pajić, D., Radovanović, S., Ghilezan, S., Čolović, P., Milosavljević, B. 2020. *Otvorena nauka: praksa i perspektive*. Novi Sad: Univerzitet u Novom Sadu.

Смернице за дигитализацију културног наслеђа РС (септембар 2017).
Smernice za digitalizaciju kulturnog nasleđa RS (septembar 2017).
https://www.kultura.gov.rs/extfile/sr/205/smernice-za-digitalizaciju-kulturnog-nasledja-u-republici-srbiji.pdf. (accessed July 14th, 2021).

Споменици културе у Србији.
Spomenici kulture u Srbiji.
http://spomenicikulture.mi.sanu.ac.rs/. (accessed July 29th, 2021)

Стратегија научног и технолошког развоја Републике Србије за период од 2016. до 2020. године – Истраживања за иновације. Службени гласник РС, 25/2016.
Strategija naučnog i tehnološkog razvoja Republike Srbije od 2016. do 2020. godine – Istraživanja za inovacije. *Službeni glasnik RS*, 25/2016.
https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/strategija/2016/25/1. (accessed July 22nd, 2021).
Стратегија научног и технолошког развоја Републике Србије за период од 2021. до 2025. године „Моћ знања". Службени гласник РС, 10/2021.
Strategija naučnog i tehnološkog razvoja Republike Srbije za period od 2021. do 2025. godine „Moć znanja". *Službeni glasnik RS*, 10/2021.
http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/strategija/2021/10/1/reg. (accessed July 22nd, 2021).

Стратегија развоја електронске управе у Републици Србији за период 2015–2018. године и Акциони план за спровођење Стратегије за период 2015–2016. године. Службени гласник РС, 107/2015.
Strategija razvoja elektronske uprave u Republici Srbiji za period 2015-2018. godine i Akcioni plan za sprovođenje Strategije za period 2015-2016. godine. *Službeni glasnik RS*, 107/2015.
https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/strategija/2015/107/1/reg. (accessed July 12th, 2021).

Šegan-Radonjić, M., Tapavički-Ilić, M. 2021. Digitisation and Data Management of Archaeological Heritage in Serbia (1991-2020). *Internet Archaeology*, 58.
doi: 10.11141/ia.58.15.

Уредба о начину рада Портала отворених података. Службени гласник РС, 104/2018.
Uredba o načinu rada Portala otvorenih podataka. *Službeni glasnik RS*, 104/2018.
http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/uredba/2018/104/4/reg. (accessed July 12th, 2021).

Фонд за науку Републике Србије.
Fond za nauku Republike Srbije.
http://fondzanauku.gov.rs/. (accessed July 23rd, 2021).

Церовић, И., Кривокапић, Ђ., Милошевић, Ф. 2019. Водич кроз отворене податке. Београд: ДУМ Адвертисинг.
Cerović, I., Krivokapić, Đ., Milošević, F. 2019. Vodič kroz otvorene podatke. Beograd: DUM Advertising.
https://www.rs.undp.org/content/dam/serbia/Publications%20and%20reports/Vodic%20kroz%20

otvorene%20podatke_serbian.pdf. (accessed July 12th, 2021).

Wikidata. https://www.wikidata.org/wiki/Wikidata:Main_Page. (accessed July 16th, 2021).

REZIME
RAZVOJ I SADRŽAJ ARHEOLOŠKIH BAZA PODATAKA U SRBIJI

KLJUČNE REČI: PODACI, ČUVANJE PODATAKA, SRBIJA, ARHEOLOGIJA, BAZA PODATAKA.

Usled pandemije COVID-19, tokom protekle godine se u celom svetu osetila nejednakost u različitim zemljama i društvima. Između ostalog, ova nejednakost se odnosila, a odnosi se još uvek, na pristup arheološkim podacima, kako fizički, tako i digitalno. Ljudi koji stvaraju arheološke baze podataka, kao i korisnici ovakvih baza, proveli su mnogo vremena radeći od svojih kuća, daleko od samih arheoloških nalaza i istraživačkih podataka. Sa druge strane, ovo je bio pravi trenutak da se spozna važnost toga da podaci postanu otvoreni i svima dostupni, kako na nacionalnom, tako i na međunarodnom nivou.

Autorke ovog priloga su zato odlučile da naprave pregled baza podataka iz različitih ustanova u čijoj su nadležnosti očuvanje i zaštita kulturnog nasleđa, sa ciljem da sagledaju njihova pravila koja se odnose na pristupačnost i upotrebu podataka kojima raspolažu. Ovaj proces je bio jednostavan i podrazumevao je posetu određenim veb-sajtovima ili bazama podataka. Pregledani su obim i sadržaj, ali i značaj predstavljenog arheološkog nasleđa. Nakon toga, autorke su procenjivale da li je nasleđe klasifikovano i opisano na zadovoljavajući način, kao i da li su ovi podaci dostupni na nekom stranom jeziku.

Bilo je potrebno steći uvid u to da li je moguće pristupiti digitalnim objektima (dokumentima i pripadajućim meta-podacima), da li je pristup omogućen svim korisnicima ili postoji određena hijerarhija, koja su pravila korišćenja, ponovne upotrebe i distribucije itd.

Nakon posete određenom broju veb-sajtova, autorke su sakupilo dovoljnu količinu da izvedu određene zaključke u vezi sa pristupačnošću i upotrebljivošću podataka o arheološkim veb bazama u Srbiji. Ustanovljeno je da, umesto modela potpune pristupačnosti i otvorenosti podacima, većina institutcija pribegava principu selektivne pristupačnosti. Deo ovde obrađenih baza podataka i veb-stranica pristupačan je samo korisnicima koji se služe srpskim jezikom, dok drugi nude samo mali broj ilustracija i šture opise arheološkog materijala. Neke veb-stranice čak predviđaju različite nivoe pristupačnosti za korisnike koji se služe srpskim i za one koji se služe npr. engleskim jezikom. Uopšteno gleajući, omogućen je javni pristup deskriptivnim meta-podacima i digitalnim objektima opisanim u okviru meta-podataka, ali ne postoji mogućnost da se podaci preuzmu, niti postoje informacije o njihovom ponovnom preuzimanju. Najzad, pristupačni podaci nisu povezani ni sa jednom postojećom bazom znanja.

* * *

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ARCHAEOLOGY WORKSHOPS AS AN EDUCATIONAL APPROACH IN COMMUNICATION WITH THE PUBLIC – CASE STUDY ROMAN GAMES IN PTUJ

ABSTRACT

The Roman Festival in Ptuj aims to connect the local community and visitors with the Roman heritage and present a part of Roman life that includes the army, gladiatorial fights, conflicts with the Barbarians, traditional Roman food, craftsmen, etc. Within the project "Sadike na prihodnost" supported by the Erasmus + programme, some educational activities were organised during the event. This was a good opportunity for the creation of specific and thematically defined archaeological workshops, which were used as a good educational approach in communication between professionals and the wider public. Visitors were also able to get acquainted with the skills required for the slingshot used by Roman soldiers, through a practical workshop that students prepared. In such a way it can be said that the project results contributed to a widening educational approach towards the Ptuj public and the local community.

KEYWORDS: ARCHAEOLOGY WORKSHOPS, EDUCATION, METHODOLOGY, TOOLS, PUBLIC ARCHAEOLOGY.

INTRODUCTION

In 2021, the Roman Games Festival in Ptuj, (Slovenia) were organised for the 14th time. In its history the festival has become renowned for various re-enactment shows, experimental archaeology and living history approaches. Most of all the Festival is the best known for the wide participation of the local community.

Within the project "Sadike na prihodnost", co-funded by the European Commission's ERASMUS+ programme, partners Society for Roman History and Culture (Društvo na rimsko zgodovino in kulturo Ptuj) and the Institute of Archaeology collaborated in the educational programme development and workshop design. The Institute of Archaeology provided scientific support to the project and invited students of archaeology to join the project in order to implement workshops. The long term collaboration between the Institute and the Archaeological student club from the Faculty of Philosophy again gave results. Among others,

the tasks of these workshops were to educate visitors in an interesting way from the archaeological perspective about the findings related to the Roman period and their significance in creating a story about the past. Visitors were also able to get acquainted with the skills required for the slingshot used by Roman soldiers, through a practical workshop that students prepared.

THE THEORETICAL AND METHODOLOGICAL FRAMEWORK FOR AN EDUCATIONAL APPROACH IN THE POPULARISATION OF ARCHAEOLOGY

The term *public archaeology* or *archaeology for the public* was used for the first time in 1972, in McGimsey's publication Public Archaeology. The very meaning of the term has changed over the years, depending on the needs of the scientific society at any particular time. In the beginning, this term was defined as a practice within the management of cultural heritage. The initial interest in the audience stemmed from the fact that it was understood that the unprofessional public could help provide the needs for the adequate protection and preservation of archaeological heritage (McGimsey 1972).

In the preface of the Public Archaeology Journal, public archaeology is defined as an independent discipline. The author himself, Neal Acherson, suggests that public archaeology deals with the problems that arose from the transition of archaeology to the real world of economic conflicts and political struggle. He also concludes that this area addresses the issue of professional ethics. In the second part of the preface, Acherson states that the domain of public archaeology includes topics related to illegal trade, illegal excavations, privatisation of archaeology, human rights in archaeology, and the representation of archaeology in fiction, film, television and other media (Acherson 2000: 2). Even though the discussion about public archaeology started over two decades ago, we are still battling with more or less the same issues. The sudden rise in a general disbelief in science together with the active (ab)use of the internet in the general public resulted in a lot of pseudoscientific (to be more precise pseudoarchaeology) narratives and adapting our approach of outreach to the general public can be a potential solution for overcoming or reducing that problem.

In addition to the fact that the meaning and comprehension of this term has changed over the years, we can say that different authors have defined and divided this term differently, depending on the way they understood the term, but also depending on the needs of their work. We will give examples of several authors. McManamon defined public archaeology as "the management of the national archaeological heritage in the public interest" as an academic discipline (Simpson and Williams 2008: 72). Gabriel Moshenska, who in the practice of public archaeology distinguishes several categories, also gave the definition of the archaeological education matrix that we used in this paper. He singled out archaeology for the public, archaeology with the public, archaeology conducted by the public and archaeological education on the basis of the manner of public engagement and on the basis of aspects of the discipline (Moshenska 2017: 9–10).

Finally, any research conducted by specialised institutions and individuals within them takes place and is evaluated within the research community itself, but also outside it.

While it is only natural to present our work to the members of our professional community, it should be no different when talking about presenting our work to the general public. Many results of scientific work become part of everyday life and those members of society who know nothing about the principles on which they are based will more or less consciously use the ultimate outcomes of this specialised knowledge. Archaeology, according to a large number of researchers such as Tilley Christopher (1989), has its full meaning only when the results of our research become publicly available.

Archaeological ethnography was used as a methodological framework for the process of engaging with the community and while writing this paper. In using this methodology, we agree with Zager and Pluckhahn, who argue that *archaeologists have increasingly turned to ethnography as a tool for understanding the contemporary social context of material culture, archaeological practice…* (Zager and Pluckhahn 2013: 48). Using eth-

nography along with storytelling, which has both didactic and reflexive benefits and is valuable for both its creators and their audience, we achieved outstanding outreach results. Archaeological storytelling is *the creation of prose, poetry, performance, song or other modes by an archaeologist that incorporates archaeological data, has a narrative structure, and transcends standard archaeological presentation,* as Praetzellis would describe it (Praetzellis 2014: 5135). This relationship between the archaeology (with or without a developed storytelling methodology) and the public is exactly among the four basic aims of archaeology as practiced: to learn about the past, to learn from the past, to manage the heritage of the past and to enable public engagement with the past (Henson 2017:45).

The key is to illustrate how a more dynamic environment for knowledge exchange, like themed festivals, can be more effective than some traditional (and mostly institutionalised) ways of establishing communication between academic knowledge and the general public (like museums, exhibitions and panel discussions). The ambience and dynamism of festivals motivate people to participate in previously designed activities that, in our case, were accomplished with a storytelling approach and were aimed at the popularisation of archaeology, encouraging discussion, and the sharing of knowledge about different aspects of this complex scientific field (Chipangura, Nyamashosho and Pasipanodya 2019: 16)

WORKSHOPS

Workshops within the project "Sadike na prihodnost" were designed, developed and conducted by the Institute of Archaeology and the Archaeological student club from the Faculty of Philosophy, with participation of students from different class levels (Bachelor through to PhD programme). Workshops were thematically divided between those with a more educational purpose and those that were oriented towards the general audience and the popularisation of archaeology as a science. Mladen Mladenović, Danica Grujić, Predrag Đerković, Mirjana Đorđević, Peđa Perić and Ivan Ilić participated in the first group of workshops.

Animal bones speak out! (Developed and led by Mladen Mladenović and Danica Grujić)

The main purpose of the archaeozoological workshop "Animal bones speak out" was to introduce the results of archaeofaunal analyses from archaeological sites in the territory of present-day Serbia to the scientific community and the general public in Ptuj. The workshop was designed in such a way that the introductory part was focused on the importance of archeozoological research, as well as on the methods archaeologists use to obtain data to reconstruct human-animal relationships in the past (e.g. Driesch 1976; Reitz, Wing 2008; Schmid 1972; Wilson et al. 1982). The next step of the workshop was to demonstrate which information can be gathered from animal remains, such as paleoenvironmental reconstructions, the diversity of animal species that occupied the region in the past, dietary patterns, and different economic aspects of human societies through time (Reitz, Wing 2008; Rusell 2011). Students have talked about the results of the archaeozoological analyses from the Early Palaeolithic (Dimitrijević 1996) to the Late Medieval period sites (Mladenović, Mladenović 2020), but in the spirit of the festival, the focus was on the Roman period (Marković 2018; Младеновић 2020; Vuković 2020). One of the fun facts about Roman dietary habits that was discussed is that in times of need they practiced consumption of equid and camel meat, which is suggested by the butchering marks inflicted by the metal butchering tools on bones of the indicated species (Marković 2018; Mladenović 2021; Vuković, Bogdanović 2013) (Fig. 1). Communicating with the audience through picture/video materials and motivating them to think critically and through a set of questions and answers (from both sides), are methods that have been included in the process of unravelling this piece of the past.

Roman Coinage: Pecunia non olet! (Developed and led by Peđa Perić)

For many years now, coins found on archaeological sites have been praised due to the high possibility of extracting valuable data from them. Not only are we able to date sites if we come across coins in certain contexts but we can also

Fig. 1 -- Proximal Humerus (caudolateral view) and Metatarsal bone (anterior view) with the anthropogenic traces (Vuković, Bogdanović 2013).

expand our knowledge on cultural customs, the ways in which rulers issued propaganda material and even some events that happened in the past that are not well documented in written records (Мирковић 2014). Roman coinage is not an exception. As a matter of fact, all sorts of data extracted throughout the years serves as a prime example of how useful the careful analysis and interpretation of coins can be. The purpose of our numismatic presentation was to introduce the general public to a fascinating history and the major importance of Roman coinage. The workshop was aptly named pecunia non olet, considering that it is relevant both to coinage itself and to the fact that the Roman emperor Vespasian, who allegedly said the line when asked by his son Titus about public restroom taxation, was proclaimed emperor by his legions in Ptuj (Suetonius, Vita Divi Vespasiani). Our story began with the earliest form of Roman proto-currency called aes rude. Essentially it was a non-standardised piece of bronze used for trading. A standardised form of Roman currency made of stamped bronze ingots known as aes signatum was also discussed, along with the first actual Roman coins, called aes grave (Burnett 1987; Crawford 1974). However, it is safe to say that our audience was most intrigued by republican and imperial coinage. Together, we explored various different types of coins and their value. Elaborate imperial iconography along with interesting reverse scenes depicting mighty gods, triumphant emperors and architectural wonders gave us an opportunity to incorporate many interesting stories about the Roman world, which

Fig 2. – Workshops and the audience.

gave an entertaining note to our workshop. Reading and understanding texts on imperial coins is of great importance, especially on the reverses. That is why we took a couple of comprehensible examples and had them translated by volunteers, with our assistance. All of them included a not so subtle political message aimed at Roman citizens. This illustrated how Roman emperors used coinage to spread messages of power, stability and hope throughout the vast empire, even though sometimes they were not supported by the status quo. Naturally, we could not miss a chance to talk about Roman mints in the territory of today's Serbia. Explaining abbreviations on Viminacium coinage along with the often unfortunate fates of the depicted emperors allowed us to talk about 3rd century Rome and the chaos that was raging at the time (Мирковић 2014). Our presentation ended with a story of coinage minted in the 4th century Sirmium, followed by a short introduction to monetary reforms executed by the emperors Aurelian, Diocletian and Constantine in order to fix late Roman currency. There is certainly much more than first meets the eye when it comes to the subject of ancient coins. This unique chance to indulge in a beautiful and well-planned festival and to hold an interactive numismatic presentation with an audience that truly enjoyed it as much as we did is exactly how communication between archaeologists and the public should be (Fig. 2).

Roman slings and slingers (Developed and executed by Ivan Ilić)

Ever since the Stone Age, slings were used all over the globe, both as hunting tools or weapons of war, and today they are used by experimental slingers in archaeological projects or for hobbies. The advantages of slings are that they are rather easy to make of simple materials and take a short amount of time to complete. Even if there are no proper projectiles, one could, for example use, any kind of stones found nearby.

Among Roman military troops, there were often slingers – either soldiers that had slings as their only weapon or those who carried slings as additional weapons. The soldiers who used slings as their only weapon were usually auxiliary troops. The best slingers were considered to come

Fig. 3 – Demonstration of slingshot skill.

from the Balearic Islands in modern Spain (Titus Livius "Ab urbe condita", The History of Rome, book 21, chapter 21).

It is believed that they were trained to use slings from the youngest age. It is also believed that Balearic mothers did not give their children food until they had shot bowls with their meals in them. Skilled slingers were said to be able to hit targets at a distance of up to 300 m.

The focus of this workshop was to theoretically and physically introduce the Roman slinging tradition to people who have never seen slinging before (Fig. 3). Visitors of this festival were given an opportunity to try making (braiding) their own slings, with assistance. The most exciting thing was teaching others how to use the sling. Although proper projectiles are made of stones, clay or lead, people who tried slinging during the Roman festival in Ptuj used tennis balls instead. This workshop was one of many ways we made strong connections with other participants, which resulted in a two-way exchange of knowledge. One particularly special event was a demonstration of a sling's reach and precision in hands of a skilled slinger who, during ancient times, fought on the Roman side.

Recognising mystery artefacts (Developed and led by Predrag Đerković)

Items of everyday use often attract the attention of visitors of museums and archaeological sites, something that especially applies to those artefacts that are similar to modern-day objects. It has often been noted that the general public is amazed by the idea that Romans used similar combs or jewellery to those we use today. That is why it was decided to amaze the audience from Ptuj in the same way.

This workshop consisted of several dozen photos, which were shown to the spectators. Starting from metal urns and ending with Roman fences, all the images were of unique artefacts found in modern-day Serbia. After seeing a photo of each object, visitors were asked to think about the purpose of the object, its dating and its meaning. After the initial minute of thinking, the spectators were encouraged to start a discussion among themselves regarding the purpose of the shown object. The final stage of the work consisted of the archaeologist's explanation of the image.

Fig. 4 – Students participating the fibulae making workshop.

Fig. 5 – Students in Museums' visits.

The students learned something new too!

In addition to the workshops, one of the most interesting things in the camp was a workshop on making fibulae, organised by the Vespasian Cultural Association, from Ljubljana. The students were introduced to the appearance of different types of fibulae characteristic of the Roman pe-

riod and to the way in which omega fibulae were made (Fig. 4). The whole process of making requires patience and time, especially for beginners, but, in the end, it was worth it because the students took with them a beautiful souvenir that was made by themselves. During this workshop, the students also learned a lot of interesting information about fibulae, as well as about the work of the Vespasian Cultural Association and their activities.

In the camp, the students also had the opportunity to get acquainted, for example, with the method of making flutes, Roman instruments and music, as well as with various societies that presented their traditionally made products. They were also introduced to the cultural heritage of Ptuj by visiting sites and through the presentation of the local museum, which took place in the vicinity of the camp (Fig. 5).

While returning home, another stop was made, again aimed at enhancing the experience of the students and enriching their education (both archaeological and museological), at Krapina Museum (Croatia). Besides learning about Krapina Neanderthals, students were able to enjoy the modern and interactive exhibition dedicated to evolution.

CONCLUSION

Workshops conducted during the Roman Games in Ptuj confirmed an already known fact – archaeology is necessary in education. Archaeological knowledge is important, not only in formal education, but for non-formal ways of teaching young people and adults who are not necessarily intending to become archaeologists. In such a way, archaeology can be considered a bridging discipline between the past and present – archaeology can give people the knowledge and skills of archaeological practice, and help them to make links between the past and present and to see the value and complexity of heritage (Henson 2017: 43-45).

Most of the people who attended the workshop were younger than 18 and, although the initial expectations of our team were not big, they showed an unexpected knowledge about everyday life in the Balkan provinces of the Roman empire. While some of the participants actually knew the right answers, which was quite surprising considering their young age, others were completely involved in collective brainstorming. This led to them arriving at some interesting conclusions. It is also notable that around 15 visitors were present at the beginning, while the number at the end increased to around 50, with a group from Split also joining. The fact that none of the participants left the workshop before its very end is a positive result on its own, showing that this kind of interactive approach to presenting archaeological heritage can be found to be more than interesting in promoting the Roman past.

Unfortunately, it was only possible to show photos on a big screen, rather than presenting the actual artefacts from Viminacium as well as other Roman sites in Serbia. However, this can be a good starting point for some of the upcoming workshops, since it is generally noted that the public can relate to actual artefacts even better than images.

At this point, it is abundantly clear that the described workshops showed positive results and that this model could be useful at any occasion similar to the Roman festival in Ptuj. Finally, this kind of initiative has already been recognised by another Erasmus + project, TRAME (Tracce di memoria 2020-1-IT02-KA201-079794), in which best practices of non-formal and practical learning are presented, as well as an innovative methodological approach to cultural heritage as a basis in the educational process for youth (Анђелковић Грашар 2021: 85; Nochita 2021: 180-185).

BIBLIOGRAPHY

Sources:

Suetonius: The Lives of the Twelve Caesars; An English Translation, Augmented with the Biographies of Contemporary Statesmen, Orators, Poets, and Other Associates. Gebbie & Co. 1889.
Titus Livius „Ab urbe condita“ (The History of Rome, book 21, chapter 21).

Literature:

Acherson, N. 2000
Editorial, *Public Archaeology Journal*, 1:1-4.

Анђелковић Грашар, Ј. 2021
Интерпретација културног наслеђа и формално образовање: ‘’TRAME’’ Еразмус+ пројекат као пример добре праксе, Српско археолошко друштво XLIV скупштина и годишњи скуп, Параћин, 14. – 16. октобар 2021. године Програм, извештаји и апстракти, Параћин 2021, 98 (Anđelković Grašar, J. 2021
Interpretacija kulturnog nasleđa i formalno obrazovanje: ‘’TRAME’’ Erazmus+ projekat kao primer dobre prakse, Srpsko arheološko društvo XLIV skupština i godišnji skup, Paraćin, 14.–16. oktobar 2021. godine Program, izveštaji i apstrakti, Paraćin 2021, 98).

Burnett, A. 1987
Coinage in the Roman World. Numismatic Fine Arts Intl.

Dimitrijević, V. 1996
Upper Pleistocene mammals from cave deposits in Serbia, *Acta zoologica cracoviensia* 39 (1): 117–120.

Driesch, A. 1976
A guide to the measurement of animal bones from archaeological sites, Cambridge: Peabody Museum at Harvard University.

Henson, D., 2017
Archaeology and Education, in: Key Concepts in Public Archaeology, edited by Gabriel Moshenska, 1–13. London: University College London Press, 43-59.

Marković, N. 2018
Ekonomija ranovizantijske metropole Caričin grad: arheozoološki pristup, nepublikovana doktorska disertacija, Beograd: Filozofski fakultet, Univerzitet u Beogradu.

McGimsey, C. R. 1972
Public Archaeology, Seminar Press, New York – London.

Metcalf, William E. 2012
The Oxford Handbook of Greek and Roman Coinage. New York: Oxford University Press.

Michael H. Crawford 1974
Roman Republican Coinage. Cambridge University Press.

Мирковић, М. 2014
Историја Римске Државе, Београд: Службени гласник.
(Mirković, M. 2014
Istorija Rimske Države, Beograd: Službeni glasnik).

Младеновић, М. 2020
Исхрана становника утврђене палате Felix Romuliana – Гамзиград током касноантичког и рановизантијског периода: остаци животиња из куле 15, мастер теза, Београд: Филозофски факултет, Универзитет у Београду.
(Mladenović, M. 2020
Ishrana stanovnika utvrđene palate Felix Romuliana – Gamzigrad tokom kasnoantičkog i ranovizantijskog perioda: ostaci životinja iz kule 15, master teza, Beograd: Filozofski fakultet, Univerzitet u Beogradu).

Mladenović, M. 2021
Exploitation of beast of burden in the territory of present-day Serbia during the Late Antique and the Early Byzantine periods: a zooarchaeological perspective, in: Marković, D., Mladenović, T. (eds.), *9th PZAF Book of Abstracts*, Belgrade 25-27 June 2021, 36.

Mladenović, T., Mladenović, M. 2020
Animal Exploitation in the Territory of Present-Day Serbia During the Medieval Period: a Zooarchaeological Perspective, in: Marković, N., Bulatović, J. (eds), *Animal Husbandry and Hunting in Southeast Europe Through Time*, 167–186, Oxford: Archaeopress Publishing Ltd.

Moshenska, G. 2017
Introduction: Public Archaeology as Practice and Scholarship Where Archaeology Meets the World, in: Key Concepts in Public Archaeology, (ed.) Gabriel Moshenska, London: University College London Press, 1–13.

Nocita, M. 2021
TRAME antiche e moderne per un nuovo tessuto europeo, in: *Roma vocazione all’accoglienza e*

senso di comunita dalla storia al contamporaneo, Chiarilli, G. (ed.), Roma: Palombi editori.

Rakestraw, T., Reynolds, A. 2001
Archaeology and the Public: Exploring Popular Misconceptions, *Inquiry: The University of Arkansas Undergraduate Research Journal:* 2(1): 25-29.

Reitz, E., Wing, E. 2008
Zooarchaeology (2nd edition), Cambridge: Cambridge University Press.

Rusell, N. 2011
Social Zooarchaeology Humans and Animals in Prehistory, Cambridge: Cambridge University Press.

Simpson, F. and Howards W. 2008
Evaluating Community Archaeology in the UK, *Public Archaeology* 7. 2: 69-90.

Schmid, E. 1972
Atlas of Animal Bones: for prehistorians, archaeologists and quaternary geologists, New York: Elsevier.

Tilley, Ch. 1989
Archaeology as socio-political action in the present, *Critical traditions in contemporary archaeology*, V. Pinsky, A. Wylie (eds.), Cambridge, 104-116.

Tušek, I. 2019
Rimska Vojska v Republiki in Cesarstvu ter Rimski Vojaški Nagrobniki iz Petovione, Zgodovinsko društvo "Poetovio 69", Ptuj.

Vuković, S., Bogdanović, I. 2013
A Camel Skeleton from the Viminacium Amphitheatre, *Starinar* 63: 251-267.

Vuković, S. 2020
Animal Husbandry and Hunting in Roman Provinces in Serbia: a Zooarchaeological Overview, in: Marković, N., Bulatović, J. (eds.), *Animal Husbandry and Hunting in Southeast Europe Through Time*, Oxford: Archaeopress Publishing Ltd, 130–142.

Wilson, B., Grigson, C., Payne, S. (eds.) 1982
Aging and Sexing Animal Bones from Archaeological Sites, Oxford: Bar Publishing.

Zager, R.K., Pluckhahn, T.J. 2013
Assessing Methodologies in Archaeological Ethnography: a Case for Incorporating Ethnographic Training in Graduate Archaeology Curricula, *Public Archaeology* 12 (1): 48-63.

Links:
http://viminacium.org.rs/arheoloski-park/programi-za-decu/edukativne-drustvene-igre/

http://viminacium.org.rs/arheoloski-park/programi-za-decu/

REZIME
ARHEOLOŠKE RADIONICE KAO EDUKATIVNI PRISTUP U KOMUNIKACIJI SA JAVNOŠĆU – PRIMER RIMSKE IGRE U PTUJU

KLJUČNE REČI: ARHEOLOŠKE RADIONICE, EDUKACIJA, METODOLOGIJA, ALATI, JAVNA ARHEOLOGIJA.

Rimski festival u Ptuju ima za cilj da poveže lokalnu zajednicu i posetioce sa rimskim nasleđem i predstavi deo rimskog života koji uključuje vojsku, gladijatorske borbe, tehnike ratovanja, tradicionalnu rimsku hranu, zanatstvo itd. U okviru projekta „Sadike na prihodnost" uz podršku Erazmus+ programa neke od edukativnih aktivnosti organizovane su tokom događaja. Ovo je bila dobra prilika za kreiranje specifičnih i tematski definisanih arheoloških radionica, koje su korišćene kao dobar edukativni pristup u komunikaciji između stručne i šire javnosti. Posetioci su takođe mogli da se upoznaju sa veštinom gađanja iz praćke koju su koristili rimski vojnici kroz praktičnu radionicu koju su studenti pripremili. Na taj način se može reći da su rezultati projekta doprineli širenju edukativnog pristupa prema ptujskoj javnosti i lokalnoj zajednici. Radionice u okviru projekta „Sadike na prihodnost" iz Erazmus + programa sufinansiranog od strane Evropske Komisije osmislili su, razvili i sproveli Arheološki institut i Klub studenata Arheologije Filozofskog fakulteta Univerziteta u Beogradu. Radionice su tematski bile podeljene na edukativne i one koje su bile posvećene široj publici i popularizaciju arheologije kao nauke.

Radionice održane tokom Rimskih igara u Ptuju potvrdile su već poznatu činjenicu – arheologija je neophodna u obrazovanju. Arheološka znanja su važna ne samo u formalnom obrazovanju, već i za neformalno učenje mladih i odraslih koji ne žele nužno da postanu arheolozi. Na taj način arheologija se može smatrati disciplinom koja povezuje prošlost i sadašnjost – arheologija može ljudima dati znanja i veštine arheološke prakse, i pomoći im da naprave veze između prošlosti i sadašnjosti, kao i uvid u vrednost i složenost nasleđa (Henson 2017: 43-45).

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PATHS OF STORYTELLING FOCUSED ON ARCHAEOLOGY AND ITS OUTREACH POTENTIAL – CASE STUDY ROMAN GAMES IN PTUJ

ABSTRACT

This paper presents an example of good practice in the case of (re)presenting and the popularisation of heritage in cooperation with the local community. In addition to this kind of cooperation, the Roman Games in Ptuj is an event of an international character, reuniting the Western Balkan countries, which additionally helps the presentation of heritage and knowledge exchange and experience based learning. Via various activities and workshops, archaeological knowledge and finds related to the Roman period were used as the basis for creating a story about the past. In such a case, storytelling was based upon scientific data, but one of the important topics in student workshops was the stereotypes set by popular culture about archaeology and archaeologists. Based on the conducted activities and workshops, and primarily on the experience from the Roman Games, the paper will discuss how the concept of public archaeology has changed over time and how effective it is to have both professional and local communities involved in order to create a better storytelling narrative about the past that is later shared with the general public.

KEYWORDS: STORYTELLING, ARCHAEOLOGY, KNOWLEDGE, LOCAL COMMUNITY, ROMAN EVERYDAY LIFE, HERITAGE PRACTICES.

INTRODUCTION

Aspects of storytelling comprehend the oral or written way of sharing our stories with others, not as chronicles of what has happened but with some deeper meaning (McAdams 1993). The meaning of the past can, thus, be both subjective and liable to the choice of the individual/storytelling creator. In such a way, archaeology as an academic discipline considering hard facts, rational argument and identifiable sources, and storytelling related to fiction and entertainment seem to be opposite to each other (Tapavički-Ilić, Anđelković Grašar 2020: 132.). However, archaeologists are trained to imagine the past like the most detailed video series depicting various things such as dietary habits, closer ani-

Fig. 1a. Workshop Gaming in practice - Board game.

mal-human relations, monetary systems, warfare techniques, treating the body of a loved one and many more aspects of human everyday life. On the other hand, postmodern society and a general disbelief in sciences have not bypassed archaeology as a discipline either. The epidemic of fake news, knowledge and different types of conspiracy theories that surrounds us daily is just one of the (side) effects the internet has brought us in the last two decades. With the strong pseudoscience ideas that are widespread within the general public, we are facing many problematic events and, simultaneously, the destruction of cultural heritage.

Happily, in the last few decades, science has overcome the traditional methods of (mostly using plain text and photos with the exception in museums or other institutionalised settings; and old, but gold, school documentary series and video materials) knowledge transmission between the scientific community and the general public. That is why new disciplines, such as public archaeology or community archaeology, research and evaluate the methods in which archaeologists work with the public, referring to archaeological work conducted by professionals, which includes, by design, the provision of participation opportunities for members of the general public or of a specific community (Moshenska 2017: 1-13; Thomas 2017: 14-30).

One of the effective ways for this archaeological knowledge sharing is the storytelling methodology, based upon scientific data – archaeological information. Storytelling is one tool to make the past accessible to the present and it combines fictional stories with factual archaeological research (Tapavički-Ilić, Anđelković Grašar 2020: 132). In such a way, storytelling can be a good educational tool, which is not going only in the direction from professionals to public, but vice versa as well – stories could push archaeologists to ask new questions – questions about the heritage that are important to current residents and not just the researchers (Praetzellis 2014: Janesko 2018). The trend of interactive storytelling in

Fig. 1b. Workshop Gaming in practice - Board game.

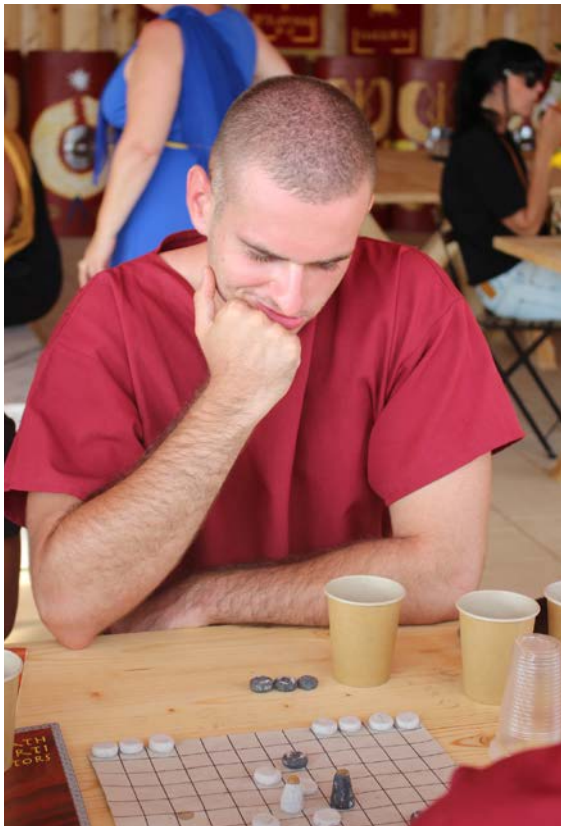

Fig. 1c. Workshop Gaming in practice - Board game.

a cultural setting can be achieved through (video) games as well, which can essentially provide an experiential, entertaining and interactive relationship (Malegiannaki and Daradoumis 2017:1) that can be used as a tool for educational purposes. An eternally interesting thing to people was, is and will be the past, and even if we live in an age that is obsessed with technology, people still enjoy and engage mindfully in events that try to authentically depict a part of the past.

This can bring us to the conclusion that storytelling can be a powerful means of communicating all sorts of human truths, social values and community traditions to the wider public (Tapavički-Ilić, Anđelković Grašar 2020: 132). By combining archaeology and storytelling, a new form of communication can be created that brings together academics and audiences in a shared experience of the human past (Given 2009: 33).

Within the project "Sadike na prihodnost", co-funded by the European Commission's ERASMUS+ programme , partners the Society for Ro-

Fig 2a. Workshop Roman Ceramics: More than lifeless fragments/fortune from the past!

man History and Culture (Društvo na rimsko zgodovino in kulturo Ptuj) and the Institute of Archaeology collaborated in the educational programme development and workshop design. The project included participation at the XIV Roman Games in Ptuj from 17th to 22nd of August, 2021.[1] The Institute of Archaeology, as a partner, invited students of archaeology (the Archaeological Student Club from the Faculty of Philosophy) to be involved in the creation of several workshops and the promotion of the ancient cultural heritage of Serbia. The festival is devoted to the ways of living during the Roman period and the heritage that overflows this city and region. It represents one of the rare examples showing how the local community can contribute and actively participate in the discourse about the past while learning about it and helping the local economy. The festival was a

1 About the Ptuj history in: Tušek 2019.

Fig 2b. Workshop Roman Ceramics: More than lifeless fragments/fortune from the past!

good opportunity to meet with Slovenian colleges, as well as many other associations that participated in the realisation of all the festival activities. The first-hand experience of the past is the reason why such festivals have such a high attendance rate (by contrast, at most archaeological conferences you can not find more than a handful people from the general public) and can be used as opportunities to share science-based and new archaeological research methods with the general public.

WORKSHOPS

Workshops within the project "Sadike na prihodnost" were designed, developed and conducted by the Institute of Archaeology and the Archaeological Student Club from the Faculty of Philosophy with participation of students from

Fig. 3a. Workshop Roman food and dining in triclinium

Fig. 3b. Workshop Roman food and dining in triclinium

different class levels (from Bachelor to PhD programmes). Workshops were thematically divided between those with a more educational purpose and those that were oriented towards the general audience and the popularisation of archaeology as a science. Kristina Bondzulić, Ana Gavrilović and Mirjana Đorđević guided the second group, whose results will be presented in this paper.

Archaeology beyond stereotypes of popular culture (Developed and led by Mirjana Đorđević and Ana Gavrilović)

As a result of the technological expansion through the end of the 20th century and the rise of creative industries, there are multiple virtual worlds that either simplify or fetishise certain aspects of disciplines such as archaeology. So far, the most complicated problem of stereotypical perceptions about archaeologists come from well known examples within popular culture like Indiana Jones, Lara Croft, World of Warcraft, Assassin's Creed, Conan the Barbarian, Asterix and Obelix (movies, games, graphic novels, etc.), and many many more.

The five key themes of the created picture about archaeologists in popular culture (according to Holtorf 2007) consider different and widespread misconceptions about archaeologists. Those five points describe the most obvious problem and that is- archaeologists are perceived as primarily adventurers and detectives, while making profound revelations about the past and taking care of ancient sites and finds (m)or(e like) destroying them.

Even though archaeology on screen has great characters and actors (Indiana Jones – the "daddy" of popular culture archaeology), women are also, although less often, portrayed as archaeologists. This is far removed from the current numbers of women and men employed in the field of studies and, hence, does not reflect the real internal dynamic of the archaeological community. As some of the most impressive examples of female archaeologists in fiction we single out, Dr Sydney Fox of "Relic Hunter", Vash of "Star Trek" and of course Lara Croft in Tomb Raider (Rakestraw, Reynolds 2001: 2), all of whom are important in the discussion about gender-related perceptions generated by popular culture.

Lara Croft is one example of how these women are portrayed. Even when the main character is a female archaeologist the hero and adventurer essence of general cinema (mis)conceptions are still reserved for men. When it comes to physical appearance, women are very often judged on the basis of their physical appearance and it appears that both the fictional and non-fictional worlds enjoy a Western standard of beauty (Holtfor 2007: 84). The sexual objectification of female bodies in popular culture is just one of the real-life patterns that are included in fictional worlds but a realistic perception of archaeology as a science and its knowledge is not. How the public as a passive consumer reacts to this and how it affects the observation of female archaeologists, since people already have a distorted image of archaeology as a profession, is one of the recently more discussed problems in the fields of archaeology and popular culture.

When it comes to the truly problematic perceptions of archaeologists, gender does not have an effective role. Like Indiana Jones, Sydney Fox, aka *Relic Hunter,* is a professor of archaeology and cultural anthropology, but at the same time she is presented as a treasure hunter. She is portrayed as a very intelligent person who, when she is not teaching at university, searches for stolen relics with the intention of returning them to their rightful owner or to a museum. One of the interesting facts about this series is that her assistant and companion on her adventures, Nigel, represents "weakened" European masculinity. Nigel's character in the series is very intelligent but extremely timid, so his fear of conflict highlights Sydney's qualities. (Derfoufi 2019: 11). The way in which these characters are presented is very interesting, so one can ask why the main character is

not a man, but a woman to whom stereotypically masculine traits are attributed, while the assistant is presented as a timid person who might be considered a stereotypical image of a woman. Maybe it is a change of roles that should attract the audience, or the authors of this series wanted to break the stereotypical images imposed on us by society. It should be said that these types of perceptions of archaeologists, as relic hunters, can only cause a larger problem with illegal excavations and treasure hunters, especially when talking about countries that have a low level of conscience and knowledge about cultural heritage.

One of the important topics the workshop initiated with the audience was the potential of merging the gaming industry with the cultural knowledge that we have, for the purpose of meaningful and engaging learning about the past. In that sense, students talked about how "games concentrated (on and) for cultural heritage differ from other games for education because they additionally manage to preserve, reproduce and allow the appreciation of cultural content which can be intangible or tangible" (Malegiannaki and Daradoumis 2017:1).

In some cases, great monuments of our time (re)present a part of cultural heritage, as is the situation of Notre Dame cathedral in Paris. In one of the many episodes within the Assassin's Creed storyline, the time and place of the action and mission are set in the 15th century in Paris, France. Following the most recent and devastating burning of this irreplaceable architectural piece in 2019, it came to the attention that one of the rare, and surprisingly very historically accurate 3D models of this monument exists in the previously mentioned games. In the context of heritage preservation and the different measures that it implies, we think it is important to emphasise the possibility of preserving cultural heritage through video games, as with the example of Notre Dame (Mochoki, 2021). These were the topics that the students actively engaged with the audience regarding how our favourite masterpieces of popular culture have shaped our perceptions of the real world we live in. Previous considerations indicate that video games have the potential to influence both players' perceptions of the past and their identities in the present, possibly to a much greater extent than through other, less interactive, encounters with the past. Crucial to the popularisation of archaeology in this way is the need for experts – archaeologists, to gain a better understanding of how to create and mediate the virtual past, which would lead to improved communication and knowledge of the past through virtual media and would democratise both the creation and experience of interactive views of the past.

Thus, we are facing a double-edged sword considering the popularisation of archaeology within projects that come from creative industries; on the one hand they are responsible for creating stereotypes about archaeologists and their beloved science of the past, while on the other hand they can be used as educational and outreach tools for overcoming our problem with the general public.

Gaming in practice - Board games (led by Kristina Bondžulić and executed by the entire team)[2]

Just as entertainment and games are a significant part of human life today and a moment of relaxation, board games were part of everyday life in Roman times as well. During their free time, the Romans indulged in entertainment, and archaeological finds are helpful in the reconstruction of those games that bear great importance because they shed light on moments that belonged to all inhabitants of the empire, regardless of their status, profession or religious beliefs (Janković 2007: 28). Some of the board games that were played in the Roman era are still played today in numerous different physical and digital formats.

2 Jelena Anđelković Grašar, Milica Tapavički-Ilić, Mladen Mladenović, Danica Grujić, Kristina Bondzulić, Ana Gavrilović, Predrag Đerković, Mirjana Đorđević, Peđa Perić and Ivan Ilić.

During the workshop (Fig 1a, b, c), students were able to exchange knowledge with the participants through two such games, while a third game was formerly made for the education and promotion of the archaeological site of Viminacium.[3] In the workshop, models were made of Roman cubes, which were originally made of animal bones and placed in the graves of the deceased at Viminacium, and whose primary role was to predict fate were included (Biro 1994: 61). Tossing the dice at our stand and seeing what number they got was a fun way for visitors to determine how lucky they are.

In terms of chip-based games (board games), visitors got the opportunity to learn about Ludus Latrunculorum, a game that is similar to today's "Nine-man Morris, Mill, and or Mills". The primary idea behind the game is to surround your opponent with chips so that he cannot move across the board, therefore eliminating him from the game. The winner of the game is subsequently given the title of "Emperor" (Janković 2007: 31).

The story of the game "The Mystery of the Emperor's Death" begins in the year 251, when Emperor Hostilian, a young man, died in Viminacium. Although historical accounts indicate that he died of the plague, the circumstances surrounding his death still remain unclear.[4] Following this introduction, the players set out to solve the mystery by moving across the fields on the board, gathering information from the inhabitants of the ancient city, falling into the hands of the Roman police, and visiting various buildings explored within the site, which also provide information. Visitors took on the role of detectives, and several of them became so engrossed in the game that they stayed behind our counter for hours. With the collaboration and assistance of their parents (who learned Serbian during the time of Yugoslavia), this fantastic team was able to overcome the language barrier with the younger population. We subsequently gave copies of the "Mystery of the Emperor's Death" to the most interested children so that they could enjoy the game at home, with friends who did not attend the Roman Games.

Roman Ceramics: More than lifeless fragments, a fortune from the past! - (Executed by the entire team[5])

Since the beginning of archaeology, ceramics have been identified as a type of archaeological find that is chronologically sensitive and, hence, valuable for dating, construction of relative-chronological schemes, and the consideration of status affiliation, migration, or spread of cultural influences (Orton & Huges 2013: 4; Vuković 2017: 686). At a site such as the ancient military camp and city of Viminacium, which is being excavated throughout the whole year, in the course of only one day of excavation, several enormous bags of ceramics can be discovered. Of the previously and detailed processed ceramic fragments that had been identified as a statistical surplus and were expendable, we were able to create unique fortune cookies. On those pieces of ceramics, during the workshop, students inscribed Latin quotations with English translations (Fig. 2a, b), with the intention of creating a game called "What fortune does your past tell you?".[6]

Through this game, participants of the Roman Games were able to have fun by selecting a random piece of pottery from a vessel full of fragments, from which they read aloud what the past had to say about them. The game's meaning

3 The game's name is Mystery of the Emperor's death and its creator is the archaeologist Nemanja Mrđić PhD in: Mrđić 2012, 126; Anđelković Grašar, Rogić, Nikolić 2013, 12.

4 Inspiration for the game's twist is taken from the storytelling developed for the interpretation of Viminacium, in: Mrđić 2012, 126.

5 Jelena Anđelković Grašar, Milica Tapavički-Ilić, Mladen Mladenović, Danica Grujić, Kristina Bondzulić, Ana Gavrilović, Predrag Đerković, Mirjana Đorđević, Peđa Perić and Ivan Ilić.

6 This is the "tool" usually used in the Viminacium presentation and interpretation, in: (Anđelković Grašar, Tapavički-Ilić 2014, 197).

also alluded to the significance of unique and irreplaceable Roman-era archaeological finds, all in the name of having a good time and making science more accessible to the general public. The participants loved this game, especially because they could take their pieces home with them as a momento. As a result, the ceramic remnants without context have taken on new meaning in the modern age, and now they can be found in the homes of our friends as a reminder of Viminacium and friendships in Ptuj.

Culina Romana – (executed by the entire team[7])

During the main day of the Festival, after the participants came back to the campus, the students, guided by experts from the Institute of Archaeology, started preparing a meal for the most important guests of the evening. A whole afternoon was spent in the kitchen, by the authentic Roman oven, heated by wood. Three meals were prepared according to the famous Apicius cookbook: libum, globi and savillum.[8] All students were taught culinary skills and recipes, while the public enjoyed the unique spectacle.

The food was served in the triclinium (3a, b). In the Roman world, the triclinium was a dining room that consisted of three couches (Keddie 64). It is defined as a hierarchical space where the focus was on the wealth, status and power of the host (Gavrilović, Anđelković Grašar 2020: 282-286). The triclinium, in the literal sense, consisted of three wide couches that were put in the shape of the Greek letter Pi. There was room on each couch for three people leaning on their left elbow and facing a central table attended by slaves (Keddie 67). The triclinium was visited by the most important guests of the Roman Games and, in addition, the food was served to the other visitors and participants. The food was served in ceramic vessels brought from Viminacium, and was accompanied by wine. The overall success of the meal was evident from the comments the team received and, therefore, this part of the games proved, once again, that Roman food never gets old!

An important part of the activities included a procession through the streets of Ptuj. During this walk, all participants in the Roman Games were dressed in Roman clothes and, as such, brought the city back to the past. This event was enthusiastically enjoyed by locals and tourists, and even some members of our team were a great inspiration to the photographers who came to record this event.

CONCLUSION

Sharing our research discoveries and knowledge about the past with the general public/local community is, or rather, should be one of the essentials of archaeological work. This festival is an fine example of good practice that has become an annual manifestation, encouraged and supported by the local community as well as the local authorities of Ptuj. Thanks to the members of the Ptuj Society for Roman History and Culture (Društvo za rimsko zgodovino in kulturo Ptuj), and the enormous engagement with and love towards the Roman past of its president Andrej Klasinc, a specific type of community archaeology has been spontaneously aroused in Ptuj. This can be considered an opportunity for the discipline, which can be enriched by seeing the archaeological remains in a new light and to think in new ways about how the past informs the present (Marshall 2002: 218).

In this paper our wish was to emphasise how important it is to collaborate and involve the local community within the whole discussion about

7 Jelena Anđelković Grašar, Milica Tapavički-Ilić, Mladen Mladenović, Danica Grujić, Kristina Bondzulić, Ana Gavrilović, Predrag Đerković, Mirjana Đorđević, Peđa Perić and Ivan Ilić.

8 Reconstruction of the famous Roman recipes are interpreted by archaeologist PhD Angelina Raičković Savić and adopted to regular Viminacium cuisine, while the most notable recipes are published as well, in: Korać, Raičković Savić 2014.

public and community archaeology, festivals, workshops and activities that are based on a scientific approach in the creation of storytelling. Gathering local and regional experts as well as amateur associations makes this festival a very unique experience for both professionals and the general public alike. The general conclusion can be that manifestations such as this that include science based storytelling methods and a re-vitalisation of the past in this form are one of the solutions for overcoming the problems of communication and knowledge transmission between the scientific community and the general public.

BIBLIOGRAPHY

Anđelković-Grašar, J., Rogić, D., Nikolić, E. 2013
Viminacium, Archaeological Park – Modern Code for Re-Reading the Past of the Roman City and Legionary Camp, in *Studies on Disasters*, *Catastrophes and the Ends of the World in Sources*, *Acta Archaeologica Pultuskiensia vol. IV,* (ed.) J. Popielska-Grzybowska, J. Iwaszczuk, Pułtusk, 9–15.

Anđelković Grašar, J. Tapavički – Ilić, M. 2014
Senior Visitors, Junior Enthusiasm: Analysis, of visitors' questionnaire*, Archaeology and Science* 9: 191–204.

Biro, M. 1994
The Bone Objects of the Roman Collection. Budapest: National Museum.

Gavrilović D., Anđelković Grašar J., 2020
Funeral Banquet, Procession or an Offering Scene – A Few Remarks on Roman Provincial Painting, *Banatica* 30/1: 271–296.

Derfoufi, M. 2019
Archaeology and the archaeologist on Screen. In: *"Masters" and "Natives": Digging the Others' Past*, (ed.) Gorshenina, S., Bornet, P., Fuchs, M. and Rapin, C., Berlin, Boston: De Gruyter, 255–288.

Given, M. 2009
Archaeology and Storytelling: Encounters with the Past in Scotland and Cyprus, *Historical Argyll* 2009: 33–41.

Holtorf, C. 2007
Archaeology is a brand! The meaning of archaeology in contemporary popular culture, New York: Routledge.

Janesko, S. 2018
Archaeology in the Community, Interactive learning, Online discussion, Social Events: http://www.archaeologyincommunity.com/historical-archaeology-and-storytelling/ (accessed Nov. 26th 2018).

Janković, M. 2007
Rimske igre na teritoriji Srbije, *Antropologija, Petničkesveske 62* Valjevo: ISP: 28–33.

Keddie G. Anthony. 2020
Triclinium Trialectics: The Triclinium as Contested Space in Early Roman Palestine, *Harvard Theological Review* 113 (1): 63–88.

Korać, M., Raičković Savić, A. 2014
Culina Romana (Rimska kuhinja, Roman Cuisine), Beograd: Centar za nove tehnologije Viminacium, Arheološki institut: Beograd.

Malegiannaki, I., Daradoumis, T. 2017
Analyzing the educational design, use and effect of spatial games for cultural heritage: a Literature Review. Computers & Education: 108.

Marshall, Y. 2002
What Is Community Archaeology? World Archaeology, Oct., 2002, Vol. 34, No. 2, *Community Archaeology*: 211–219.

McAdams, D. P. 1997
The Stories We Live By. The Stories We Live By Personal Myths and the Making of the Self, New York: The Guilford Press (1993).

Mochocki M. 2021
Heritage Sites and Video-Games: Questions of Authenticity and Immersion, *Games and culture* vol.0: 1–27.

Moshenska, G. 2017
Introduction: Public Archaeology as Practice and Scholarship Where Archaeology Meets the World, in: *Key Concepts in Public Archaeology*, (ed.) Gabriel Moshenska, London: University College London Press, 1–13.

Mrđić, N. 2012
Roman cultural heritage as a tourist and educational resource, in: Archaeological Heritage: Methods of Education and Popularization, (eds.) Chowaniec, R. and Więckowski, W., BAR International Series 2443, Oxford 121–127.

Orton, C., Huges, M. 2013
Pottery in archaeology. Cambridge: Cambridge University Press.

Praetzellis A. 2014
Narrative and Storytelling for Archaeological Education in: *Encyclopedia of Global Archaeology*, Clare Smith (eds.), Springer New York, 5135–5138.

Rakestraw, T., Reynolds, A. 2001
Archaeology and the Public: Exploring Popular Misconceptions, *Inquiry: The University of Arkansas Undergraduate Research Journal* 2(1): 25–29.

Tapavički-Ilić, M. Anđelković Grašar, J. 2020
Storytelling. Is there a better method of archaeological site interpretation?, *Proceedings From the 6th Scientific Conference Methodology and Archaeometry*, Zagreb 6-7 December 2018, (ed.) Ina Miloglav, Faculty of Humanities and Social Sciences, University of Zagreb, Zagreb 2020, 125 – 133.

Thomas S. 2017
Community archaeology, in: Key Concepts in Public Archaeology, (ed.) by G. Moshenska, London: University College London Press, 1–13.

Tušek, I. 2019
Rimska Vojska v Republiki in Cesarstvu ter Rimski Vojaški Nagrobniki iz Petovione, Ptuj: Zgodovinsko društvo "Poetovio 69".

Vuković, J. 2017
Keramičke studije i arheometrija: između analiza prirodnih nauka i arheološke interpretacije, *Etnoantropološki problemi* 12/3: 685-701.

Links:

http://viminacium.org.rs/arheoloski-park/programi-za-decu/edukativne-drustvene-igre/

http://viminacium.org.rs/arheoloski-park/programi-za-decu/

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REZIME
RAZNOVRSNOSTI NARATIVA BAZIRANIH NA ARHEOLOGIJI I POTENCIJAL ZA NJENO ŠIRENJE U JAVNOSTI – PRIMER RIMSKE IGRE U PTUJU

KLJUČNE REČI: STORITELING/NARATIV, ARHEOLOGIJA, ZNANJE, LOKALNA ZAJEDNICA, RIMSKI SVAKODNEVNI ŽIVOT, PRAKSE U NASLEĐU.

Ovaj članak predstavlja primer festivala Rimske igre u Ptuju (Slovenija) kao dobru praksu popularizacije nasleđa, kroz saradnju sa lokalnom zajednicom. Ovo je događaj međunarodnog karaktera koji okuplja zemlje Zapadnog Balkana, što dodatno pomaže u prezentaciji nasleđa i razmeni znanja i iskustava na ovom prostoru. Kroz različite aktivnosti i radionice arheološka znanja i nalazi vezani za rimski period korišćeni su kao osnova za stvaranje narativa o prošlosti. Ovaj narativ razvijan je na naučnim podacima, a jedna od važnijih tema u studentskim radionicama bili su stereotipi koje postavlja popularna kultura o arheologiji i arheolozima. Radionice u okviru projekta „Sadike na prihodnost“ iz Erazmus + programa sufinansiranog od strane Evropske Komisije osmislili su, razvili i sproveli Arheološki institut i Klub studenata Arheologije Filozofskog fakulteta Univerziteta u Beogradu. Radionice su tematski bile podeljene na edukativne i one koje su bile posvećene široj publici i popularizaciju arheologije kao nauke.

Deljenje rezultata istraživanja i znanja o prošlosti sa širom javnošću jeste i trebalo bi da bude suština arheološke nauke. Festival Rimske igre u Ptuju postao je godišnja manifestacija koju podstiče i podržava lokalna zajednica, ali i lokalne vlasti Ptuja. Iz tog razloga ovim radom želeli smo da istaknemo koliko je važno sarađivati i uključiti lokalnu zajednicu u čitavu diskusiju o javnoj i društvenoj arheologiji, festivalima, radionicama i aktivnostima koje se zasnivaju na naučnom pristupu u kreiranju pripovedanja/narativa o prošlosti. Okupljanje lokalnih i regionalnih stručnjaka kao i amaterskih udruženja čini ovaj festival jedinstvenim iskustvom kako za profesionalnu tako i za širu javnost. Opšti zaključak može biti da su ovakve manifestacije koje uključuju metode pripovedanja i revitalizaciju prošlosti u ovom obliku jedno od rešenja za prevazilaženje problema komunikacije i prenošenja znanja između naučne zajednice i šire javnosti.

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CHALLENGES BROUGHT ON BY ARTIFICIAL INTELLIGENCE

ABSTRACT

The wide-spread use of artificial intelligence places in front of us numerous challenges, from those regarding individuals or pose a threat to human rights or cause algorithmic discrimination, to those that interfere with the obligations and legal security of producers of artificial intelligence systems, and even those that compromise the digital sovereignty of countries. A response to these challenges is the creation of mechanisms at a national and international level that would provide for the safe and controlled use of artificial intelligence systems. The proposal of the EU Artificial Intelligence Act, from April 2021, is a good example of how high-risk artificial intelligence systems can be controlled and safely managed.

KEYWORDS: ARTIFICIAL INTELLIGENCE, EUROPEAN UNION, HIGH-RISK ARTIFICIAL INTELLIGENCE SYSTEMS, HUMAN RIGHTS, ALGORITHMIC DISCRIMINATION.

Artificial intelligence represents a new step in the technological and scientific development that will have a huge influence on the manner in which the world as we know it functions (Andonović 2020: 142). Thanks to the great progress in terms of computer power, increasingly more sophisticated algorithms and the unprecedented amount of data, artificial intelligence has begun to create significant economic value. Due to the algorithms that perform predictions on the basis of large amounts of data, artificial intelligence, according to some estimates, contributes ca 2 billion dollars to today's global economy, and it can be expected that it will reach 16 trillion dollars by 2030, accounting for more than 10 percent of the gross world product (Stanton *et al*. 2019). Artificial intelligence systems comprehend software whose task is to generate output results, for a given set of goals, determined by human input, such as content, predictions, recommendations or decisions that affect the environment that the system is interacting with, either in a physical or digital dimension. They can be designed so as to work on different autonomy levels and be used independently or as an integral part of a given product, regardless of whether it is a system physically integrated into a product (built-in) or if it performs the function of a product without being integrated in it (not built-in). The software is developed on the basis of machine learning methods, or methods based on logics or knowledge, or on the basis of statistical approaches, a Bayes estimator, and

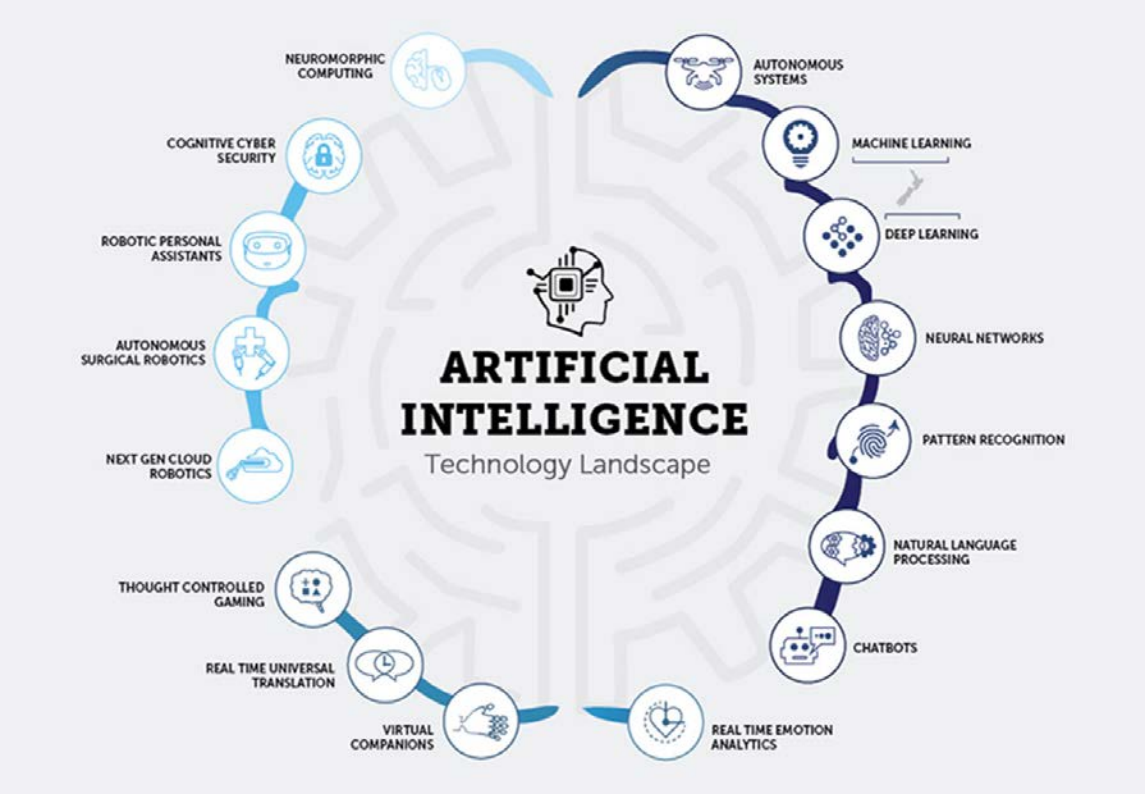

Fig. 1 Artificial Intelligence Technology Landscape (Ahmed N. A. 2021, What is Artificial Intelligence?, AI Time Journal, https://www.aitimejournal.com/@nisha.arya.ahmed/what-is-artificial-intelligence-ai)

search and optimisation methods.

Artificial intelligence systems can also be defined as algorithmic models that perform cognitive or perceptual functions (reasonable interpretation) that used to be reserved for thinking, judging and reasoning performed exclusively by humans (Leslie 2020: 8).

One of the more important traits of most artificial intelligence systems is that a large amount of data is needed to construct and run them. These large sets of data require large volumes of memory, and are used for revealing patterns and trends. The data can be numbers, words or images, and can be structured or unstructured. A specific science on data exists that deals with the manner of processing and analysing data and includes elements from different disciplines, such as informatics, mathematics, statistics, and social sciences.

The process of creating an artificial intelligence system comprehends several phases: planning, defining problems, data provision, data analysis, preliminary data processing, selecting models, testing models, implementation, users training, monitoring and controlling, and updating and correcting (Leslie 2020: 10–12). In the first phase of planning an artificial intelligence system, when the goals of the project are being defined, it is necessary to consider, aside from technical and economic issues, both ethical and legal issues as well. In the problem defining phase, a definition is made for the necessary input data, for what purpose it will be used and what the consequences of its use will be, including both the ethical and legal implications. Data provision is the phase in which the data is obtained via extraction from the internet, surveys, or by utilising already collected large amounts of data, by way of a contract with the owner of the data. Once the data has been provided, it must be analysed in detail in order to establish whether it is complete, whether there are discrepancies in terms of unexpected data, unbalanced data or missing data, and correlations must be established between the various pieces of data. In the phase of preliminary data processing, data cleansing, data transformation, the removal of incomplete data, and the conversion of data into formats suitable for use within the model are performed. The choice of artificial intelligence

Fig. 2 The Machine Learning Value Change
(Stanton C, et al. 2019, *What the Machine Learning Value Chain Means for Geopolitics,* https://carnegieendowment.org/2019/08/05/what-machine-learning-value-chain-means-for-geopolitics-pub-79631)

system models depends on the complexity of the problem that is to be solved, the type of data to be used, the amount and availability of data, whether it should be adapted and to what extent, etc. The testing of models is necessary in order to adapt them, since many models are based on learning, hence, it is necessary to verify the parameters within which the model learns are managed. For example, if models learn from earlier decisions that have caused discrimination based on gender, then new decisions will also cause that same discrimination. Control of the elements of the model architecture is also performed in this phase, so that they can be changed, if necessary, and the performance of the model itself can be improved. i.e. so that the number of errors is reduced. After the testing of an artificial intelligence model, and before it is implemented, it is necessary to evaluate the working of the model and to assess its impact, from its performance when working, to the risks that might occur, and it is necessary to carefully document it all. The next phase of the life cycle of an artificial intelligence system is its implementation, on the basis of new data, in order to achieve the purpose for which it was created. Users of artificial intelligence system have to be trained in order to understand the logic of the functioning of the system, so that they are able to autonomously assess and measure the quality and reliability of the results provided by the system. They should evaluate the system and indicate the qualities and shortcomings or dangers that can arise from its use. After the implementation of an artificial intelligence system, it must be further monitored in order to establish if it serves the desired purpose, if it is used in a responsible manner and to determine how it reacts to newly created conditions of use. The use of artificial intelligence systems can indicate the need for significant changes, at which time it may be necessary to perform additional designing, model changes, analyses, testing and controls.

The complexity of the life cycle of creating an artificial intelligence system is also followed by a large number of participants in the value chain of artificial intelligence. This chain comprehends all the participants who work together in order to meet the demand on the market for a particular product or service. At the bottom of this chain there are large amounts of data from which artificial intelligence systems are developed. Fast processing of this data requires powerful computers, with extremely fast chips and complex online platforms, which provide the necessary resources to producers of artificial intelligence systems so that they can test and verify their algorithms. At the end of the artificial intelligence chain there are companies that will distribute the artificial intelligence systems, in a commercial or non-commercial manner, and countries, which will create, individually or in cooperation with other countries, a safe environment for the application and control of artificial intelligence systems that are in use.

Products and services based on artificial intel-

ligence are in mass use today: autonomous vehicles, different types of robots, systems for biometric identification and categorisation of individuals, systems for traffic management, water supply, electricity supply, gas supply, heating, educational systems for grading and marking, systems for assessing credit ratings for individuals, artificial intelligence systems for hiring and managing workers, systems intended for public authorities for the approval of various services and forms of assistance, systems for judiciary and criminal prosecution authorities, systems for emergency services, systems for public authorities for controlling travel documents, visas, asylums, migrants, systems intended for democratic processes (electronic voting et al.), and many others. Their use provides optimisation of operations, better allocation of resources, improved predictions, personalisation of services provided, positive effects on the preservation of human lives and health, environmental protection, etc. The use of autonomous vehicles controlled by artificial intelligence will almost eliminate traffic accidents and human casualties in the future. These numerous positive effects brought about by the use of artificial intelligence are also accompanied by numerous challenges that affect individuals and pose a threat to human rights or cause algorithmic discrimination to users of these systems, threaten the legal security of producers of artificial intelligence systems, and can even pose a threat to the digital sovereignty of countries. The use of artificial intelligence systems can threaten the rights of individuals to dignity, respect for private life, data protection, non-discrimination, equality between women and men, freedom of expression and assembly, as well as the right to an effective legal remedy, fair trial and presumption of innocence, the right to good administration, fair and just working conditions, consumer rights, children's and persons with disabilities rights, and the right to environmental protection and to human health and safety.

The use of artificial intelligence systems in the judiciary can have a negative effect on the right to a fair trial if the decision is made using an algorithm, particularly if the judicial staff do not have a sufficiently high level of understanding of artificial intelligence to ensure that any decisions made with the use of it are non-discriminatory. Biometric face and voice recognition systems can threaten the right of individuals to privacy. Artificial intelligence systems that collect and analyse a large amount of data on individuals can potentially predict their behaviour, cause changes in their behaviour, and can compromise their privacy by revealing, for example, their facial expressions, emotional state, heart rate, physical location, etc. Biometric face recognition systems can prevent citizens from exercising their right to the freedom of expression, assembly and association and, thus, have a negative effect on social solidarity and participation in democratic processes. Chatbot activities and the creation of undoubtedly falsified content (Deep Fake) by a system based on an algorithm and artificial intelligence can affect the ability of individuals to form attitudes on reliable information, i.e. individuals can be manipulated and their right to be informed jeopardised, which is necessary in order for them to be able to take part in democratic decision making processes. Artificial intelligence systems based on biased information can cause algorithmic discrimination, i.e. discriminatory algorithmic decisions or behaviour. If an artificial intelligence system learns on the basis of preliminary data based on discriminatory decisions, then it can also, on the basis of "feedback loops", make discriminatory decisions, that is to say, it can threaten human rights.

Artificial intelligence systems intended for monitoring the behaviour of employees and making decisions using an algorithm can have negative effects on the realisation of the social and economic rights of employees. Employees can subsequently face errors committed by artificial intelligence systems, the consequence of which can be unjustly lower pay, unpaid holiday allowance, inadequate reassignment, etc. The consequence of an algorithm managing work processes can be dehumanisation and endangering the rights of the employees. All these reasons require serious consideration of the question of banning the use of certain artificial intelligence systems and controlling the more high-risk artificial intelligence systems.

International acts protecting human rights are first and foremost the UN Universal Declaration of Human Rights, from 1948; the European Convention on Human Rights, from 1950; the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social

and Cultural Rights of the UN, from 1966; the *Charter* of *Fundamental Rights* of *the EU, from* 2009, etc.

On the basis of these legal regulations, mechanisms have been created on a regional and national level that ensure the safe and controlled use of artificial intelligence systems. The proposal of the Artificial Intelligence Act of the EU, from April 2021, is a good example of how to safely manage and control high-risk artificial intelligence systems. The EU's approach to challenges originating from the use of artificial intelligence is based on the special treatment of high-risk artificial intelligence systems compared to those that do not fall into this category. Special rules and mechanisms for enforcing rules are established for those high-risk systems that pose a high risk to the health, safety and fundamental rights of individuals. The rules establish legal requirements regarding data and data management, documentation and record keeping, transparency and informing of users, human control, resilience, accuracy and safety regarding producers, importers, distributors, authorised representatives and users. It is foreseen that a European Committee on Artificial Intelligence be founded at the European Union level, and at the level of individual countries – bodies that would determine compliance with the requirements of the Act and appoint supervisory bodies.

The European Committee on Artificial Intelligence will consist of representatives of the member countries and the European Commission. National compliance assessment bodies will designate a competent national body, which will assess compliance with reliable quality management and risk management systems. Also, artificial intelligence systems will be monitored after reaching the market and certificates will be issued on their compliance with the requirements of the Act. The competent national body will control the application and heavily penalise producers who do not adhere to the prescribed provisions, with fines of up to 30 million Euros, or up to 6% of the total annual turnover of the given company worldwide for the previous fiscal year. In addition to these binding legal norms, the proposed mechanism of legal regulation foresees the creation of a code of conduct that would be voluntarily adhered to by the producers of high-risk artificial intelligence systems, as well as producers of artificial intelligence systems that are not in the high-risk group. The annexes of the proposal of the EU Artificial Intelligence Act define techniques and methods for harmonising artificial intelligence systems with regulations, list high-risk artificial intelligence systems, define obligations regarding technical documentation, as well as list the elements of the EU declaration of conformity. They also include the compliance assessment procedures on the basis of internal control, evaluation of the quality management system and evaluation of technical documentation. Additionally, the set of data that has to be submitted when registering high-risk artificial intelligence systems in the EU database managed by the European Commission is defined. In order to encourage innovation in the field of artificial intelligence, a controlled environment will be created for experimenting and testing in the development phase, before the artificial intelligence systems are placed on the market. The proposal of the EU Artificial Intelligence Act envisions the establishment of common rules for isolated environments for artificial intelligence with a special legal regime, first and foremost to aid small and medium sized companies and newly founded (start-up) companies. This way, a legal basis would be established for the use of personal data collected in order to develop specific AI systems of public interest in an isolated environment.

At a national level, member countries of the EU will be obliged to harmonise their legislation with the provisions of the Artificial Intelligence Act once it has been passed. It is expected that the Act will be passed at some point next year, in 2022, and its implementation is expected to begin in 2024. Countries aiming to become members of the EU are also expected to harmonise their legislation with the provisions of the Act and build mechanisms that will enable the safe use of high-risk artificial intelligence systems and ensure legal security. The complex legal framework requires the enactment of new regulations and amendments of existing regulations that have binding effects as well as those that do not. The first category will certainly include a special law on artificial intelligence with a strict sanctions mechanism, which will ensure efficient implementation. The experience with the General Data Protection Regulation (GDPR) has shown that sanctions with a high monetary value strongly influence the adher-

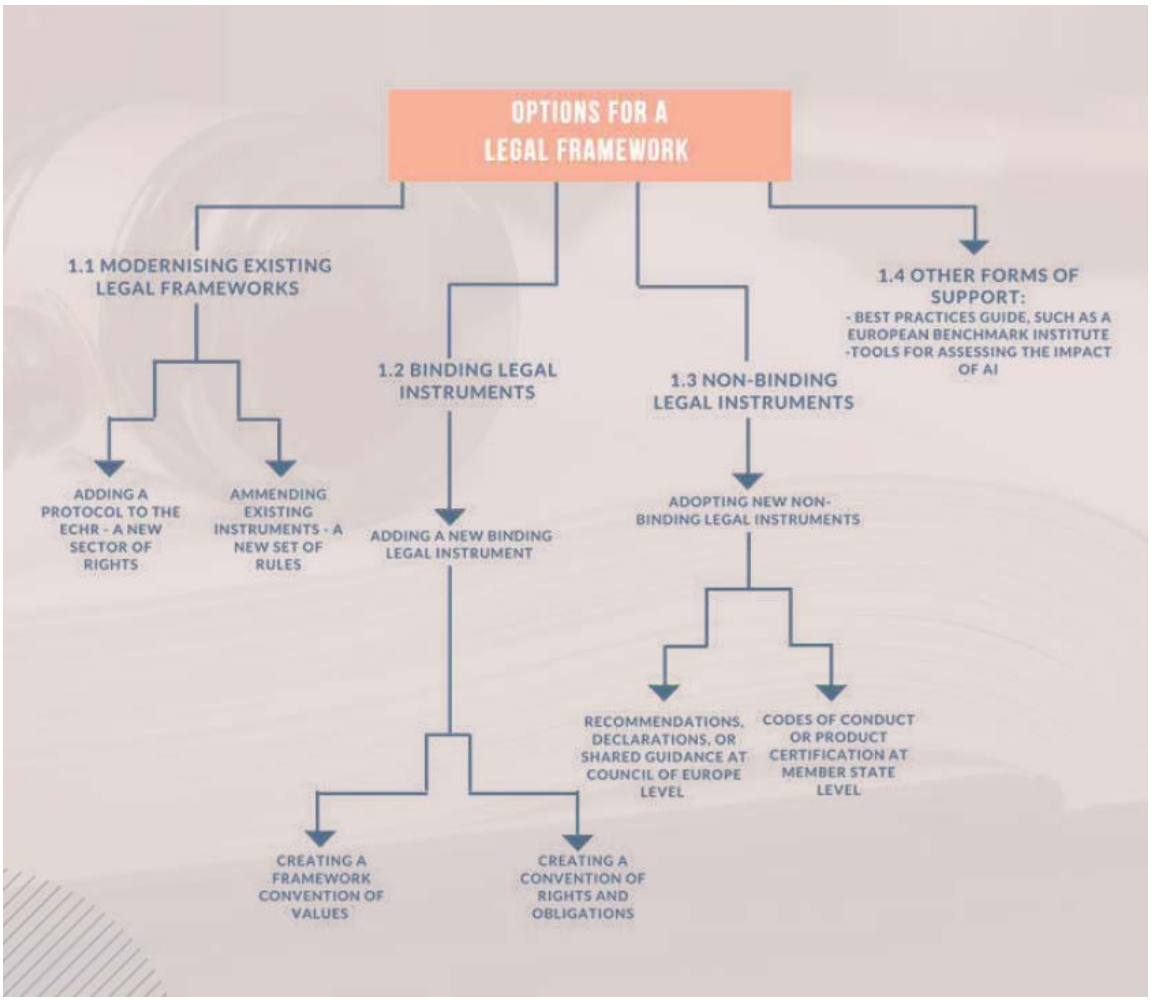

Fig. 3 Options for a Legal Framework
(Leslie, D. et al. 2021, Artificial Intelligence, Human Rights, Democracy, and Rule of Law: a Primer, The Council of Europe, https://rm.coe.int/primer-en-new-cover-pages-coe-english-compressed-2754-7186-0228-v-1/1680a2fd4a)

ence to legal regulations (Andonović i Prlja 2020: 120). The second category, that of non-binding regulations, includes professional codes of conduct at a national level and recommendations and declarations, primarily from international organisations such as the Council of Europe.

Artificial intelligence has and will have, without a shadow of doubt, a huge impact on the development of economy and society and all individuals as well. It brings numerous positive effects, but also dangers and risks as well. We must face this challenge by creating mechanisms for controlling high-risk artificial intelligence systems and ensuring their efficient application. The proposed EU Artificial Intelligence Act is certainly a positive step in this direction.

BIBLIOGRAPHY

Andonović, S. 2020
Normativni aspekti veštačke inteligencije u radu organa uprave u Republici Srbiji, u: *Usklađivanje pravnog sistema Srbije sa standardima EU*, ur. S. Soković, Kragujevac: Pravni fakultet, 142-154.

Andonović, S. i Prlja D. 2020
Osnovi prava zaštite podataka o ličnosti, Beograd: Institut za uporedno pravo.

Artificial Intelligence Act, 2021
Proposal for a Regulation of the European Parliamentandof the Council Laying Down Harmonised Ruleson Artificial Intelligence (Artificial intelligence Act) and Amendung CertainUnion

Legislative Acts, Brussels: European Commission, https://eur-lex.europa.eu/resource.html?uri=cellar:e0649735-a372-11eb-9585-01aa75ed71a1.0001.02/DOC_1&format=PDF

Leslie, D. et al. 2021
Artificial Intelligence, Human Rights, Democracy, and Rule of Law: a Primer, The Council of Europe, https://rm.coe.int/primer-en-new-cover-pages-coe-english-compressed-2754-7186-0228-v-1/1680a2fd4a

Stanton C, et al. 2019
What the Machine Learning Value Chain Means for Geopolitics, https://carnegieendowment.org/2019/08/05/what-machine-learning-value-chain-means-for-geopolitics-pub-79631

REZIME
IZAZOVI KOJE DONOSI VEŠTAČKA INTELIGENCIJA

KLJUČNE REČI: VEŠTAČKA INTELIGENCIJA, EVROPSKA UNIJA, VISOKORIZIČNI SISTEMI VEŠTAČK INTELIGENCIJA, LJUDSKA PRAVA, ALGORITAMSKA DISKRIMINACIJA

Raširena upotrebe veštačke inteligencije stavlja nas pred mnogobrojne izazove, od onih koji se odnose na pojedince i predstavljaju ugrožavanje ljudskih prava ili izazivaju algoritamsku diskriminaciju do onih koji zadiru u obaveze i pravnu sigurnost proizvođača sistema veštačke inteligencije, pa čak i do onih koji ugrožavaju digitalni suverenitet država. Odgovor ovim izazovima je stvaranje mehanizma na nacionalnom i međunarodnim nivou koji će obezbediti bezbednu i kontrolisanu upotrebu sistema veštačke inteligencije. Predlog Uredbe EU o veštačkoj inteligenciji iz aprila 2021. godine dobar je primer kako da se visokorizični sistemi veštačke inteligencije kontrolišu i bezbedno upotrebljavaju.

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TECHNOLOGICAL ASPECT OF THE GLOBAL ARCHITECTURE OF THE SECURITY OPERATION CENTRE OF AN ORGANISATION

ABSTRACT

The global architecture of the Security Operation Centre within an organisation comprehends the implementation of all modules and systems that generate security events, collect security events, store security events and analyse and react in the case of detected incidents. This paper highlights the pre-requisites for the correct implementation of the Security Operation Centre of an organisation.

KEYWORDS: SOC, SECURITY OPERATION CENTRE, INFORMATION SECURITY.

A prerequisite for the correct implementation of the architecture (its modules and systems) of a SOC (Security Operation Centre, or Organisation Security Management Centre) is to monitor the entire IT infrastructure or to monitor the part that an organisation wants to protect in the best manner possible. Therefore, we will follow the functional steps so as to adequately describe the purpose and concepts of each separate part of the architecture, which can be seen in the figure below.

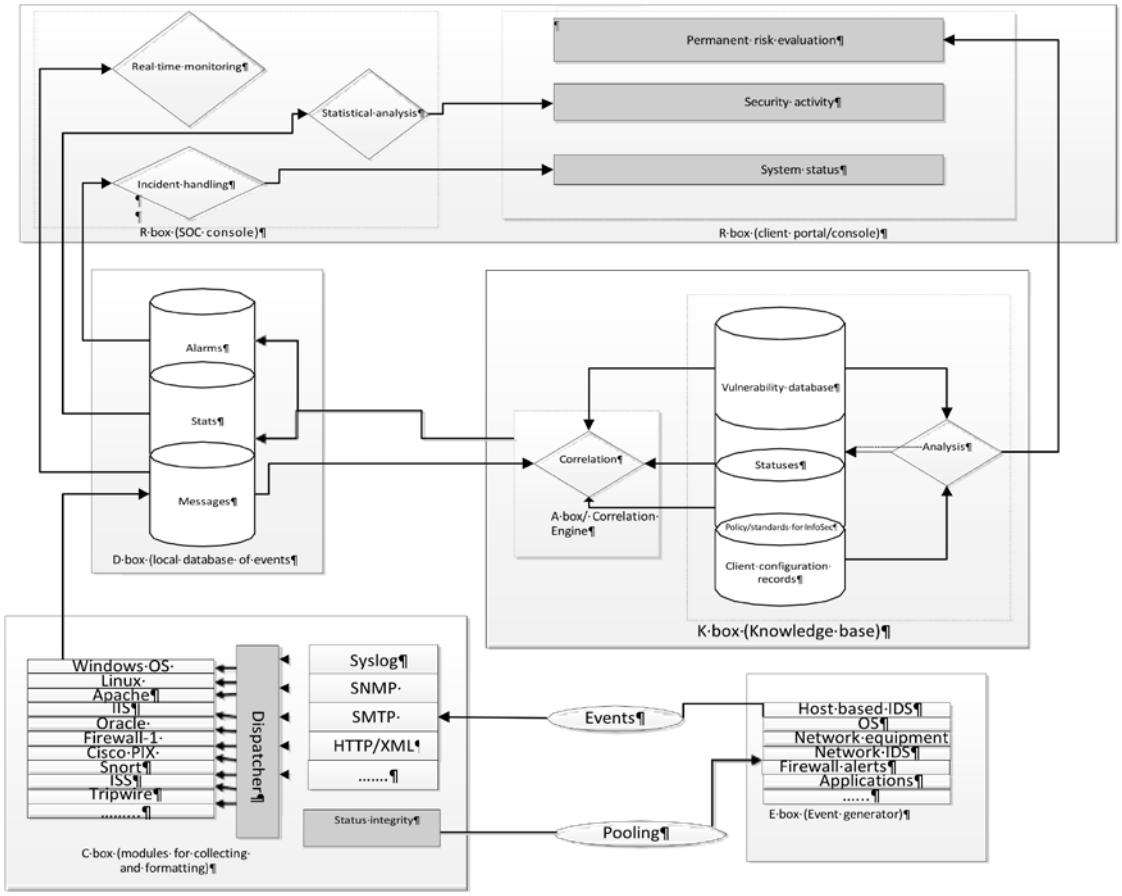
Before setting up sensors and designing correlation or analysis rules, it is necessary to assess the overall security level of the IT infrastructure that is to be monitored. This will enable us to establish whether an intrusion path can effectively lead to an intrusion into the desired system and to also establish all the potential critical points linked to such an intrusion attempt. Primarily, this comprehends the assessment of risks for the entire infrastructure, which represents the basis for defining all necessary activities for protection and. hence, the basis of the monitoring system as well (*Ganame, Bourgeois, Bidou and Spies 2006*). Additionally, a security policy should be defined regarding access clearance and allowed operations.

TECHNICAL AND ORGANISATIONAL INVENTORY

The evaluation of the security level can be divided into two parts, namely:

vulnerability assessment.

assessment of the system criticality level.



SOC architecture (Ganame, Bourgeois, Bidou and Spies 2006)

These two assessments must be performed before defining the actual level of collection of system records from a device. Also, after the collecting is finished, these two types of information should be included in some form of documentation. In our case, this type of documentation represents a knowledge base. In this implementation, this type of record is found in the SOC segment called *Client Configuration Record* (CCR). The collecting of this data can be performed in two ways, namely:

by using the Black box approach.

by using the White box approach.

The source of data for the first method of data collection is penetration testing without knowledge of the client infrastructure. This type of approach is widely used and gives results very quickly. The second method is, however, more appropriate if exhaustive data collection with a detailed list of monitored systems is desired and a detailed intrusion path generation is provided.

System criticality should be defined in accordance with the relative consequences that may occur should the system be penetrated. In order to reduce the subjectivity of such an operation, it is necessary to use standard taxonomy when determining attacks on information systems, as well as classification in accordance with valid scales, defined within the company, and if the company in question has no developed mechanisms, examples from accepted practice should be used.

SYSTEM VULNERABILITY DATABASE

The vulnerability database contains information on detected breaches in information systems, as well as data on insecure behaviour that could affect or does affect the overall security level, i.e. those that an attacker could use for an intrusion (*Ganame, Bourgeois, Bidou and Spies 2006*). The format of the database must enable the inclusion of the following vulnerability types:

Structural vulnerabilities, i.e. vulnerabilities that are specific to a given piece of software, such as buffer overflow, format string, etc. This part of the database is, obviously, the easiest one to implement, fill in and maintain. Most of these processes can be scripted, since the information is available from public sources, such as public mailing lists, recommendations for software setup and web locations. However, the level of validation and correlation (if multiple sources are used) should be mandatory, and it is necessary that a professional team should do it.

Functional vulnerabilities that depend on the configuration, operational behaviour, users, etc. These vulnerabilities differ from the previous ones because they are deeply dependant on their environment. For example, an NFS mount should be considered a functional vulnerability, since an intruder could access an account/host, which would enable him to mount a file system. Therefore, it will be assumed that many such vulnerabilities are present in systems, but they can be considered "inactive" as long as at least one of the required conditions is not met with.

Topology-based vulnerabilities, including the impact of networking and their consequences. This part of the database includes network vulnerabilities (sniffing, spoofing, etc.), as well as the impact of filters on the intrusion path. Such vulnerabilities cannot be included in the vulnerability database unless the IT infrastructure topology itself is taken into consideration.

It is necessary to emphasise here that we have considered vulnerabilities solely in terms of the technical/technological aspect of the organisation of the IT infrastructure, and not vulnerabilities in terms of the formal functioning (security policies and procedures applied within an organisation) (Škundrić *2017*).

SECURITY POLICIES

The next step in the implementation or control of the monitored system inventory is organisational, or, more precisely, the implementation and overview of the aspects of security policies that would affect the creation of events and/or report processes, or responses (*Ganame, Bourgeois, Bidou and Spies 2006*).

Policy aspects that have to be reviewed, or properly configured are the following:

authorisation process.

the process of testing and reviewing procedures.

These two aspects will provide information regarding the behaviour that sensors should send to event collectors. On the basis of this, we can conclude that events such as access to the systems by an administrator, scanning ports on the network and network segments etc., depending on the policy itself, can be treated as events important for monitoring the overall security level of the information system of a company. Aside from the above mentioned, policies can be used to prevent some employees from accessing certain system resources, and should such an attempt be made, an alarm can be raised.

All the mentioned or similar examples are part of predefined rules that must be contained within the knowledge base.

STATUS EVALUATION

The last, but not the least important part of the knowledge base is the level of security of the system that is being monitored. In the status evaluation itself, an actual event is correlated with predefined vulnerabilities defined in the system vulnerability database, as well as limitations linked to security policies. This mechanism should perform an analysis of vulnerability by system, i.e. a list of vulnerabilities that every system is exposed to, their relative impact, or criticality of the detected system vulnerabilities, as well as possible attack paths that could be used.

GENERATING EVENTS

E-boxes are responsible for creating events, in the form of system events. These boxes should be set up to generate the largest possible amount of information, or records, without affecting their normal operation. These records can be sent in real time or stored for a given period of time before being sent to C-boxes, which collect all the events generated by E-boxes. A general recommendation is that all the records be sent to the central records management system, in our case, C-boxes, in order to avoid all manner of threats.

C-boxes contain mechanisms for correlating system records (event correlation is a technique for giving meaning to a very large number of events and giving priority to specific events that are very important within that mass of information), and this is achieved by searching and analysing relationships between events. On the basis of this, we can conclude that C-boxes are responsible for the qualification and removal of unnecessary content from system records. Nevertheless, this theoretical approach to the activities of C-boxes should be accepted with caution, since it is completely or partially inapplicable in certain cases, especially in terms of system performance. A typical example of the impossibility of application would be the analysis of system records for applications, or records generated by operating systems. Unlike the previously mentioned cases, this approach can be used in the management of records created by IDS devices/systems.

The best option is filtering records at the very source of information, system records, i.e. at the E-box itself. This form of filtering would significantly reduce the number of records that would be forwarded to the C-boxes. In order to perform this activity in a successful manner, the E-box events should be qualified before generating each record. The qualification of these events is determined by two factors:

- Structural specification; in this case, some of the events will not be created if they concern some system components that are not present on the system that is being monitored. This type of filtering is typically implemented on IDS systems and firewall devices, i.e. devices used for filtering network traffic.
- Polices based on security policies; these filters are set up with the goal of avoiding the generation of events that are in accordance with the security policies of the company. A typical example are commands that can be allowed to certain users at a certain time, that is to say, ports scanning activities from certain network devices, IP addresses, etc.

Even though filtering in advance of the C-boxes reduces the number of system records that need to be processed, this approach also has several important drawbacks. C-boxes are used for collecting system records from different sensors and translating them into a standard format that can be comprehended by the system (Škundrić, Korać and Davidovac 2020: 233)

The first of the drawbacks is the very difficult maintenance of filters distributed in this manner. The consequence of this method of traffic filtering is the existence of very strict procedures that manage changes on the system, in which it must be defined that every change on the system also requires the evaluation of filters. On top of all this,

most filters are created at the application level, hence, they use a large number of different configuration files, which significantly increases the complexity of their management.

The second drawback is the real risk of cancelling certain alarms and security records.

The conclusion is that filtering systems records can result in the loss of records with which it is possible to perform an adequate forensic analysis in the case of detected problems, i.e. there is a real danger that certain system records that are not important in one moment can become of utmost importance in another.

GATHERING AND STORAGE DATA COLLECTING

The real value of gathering, collecting and analysing data, or system records, is in finding within the forest of data actual data that can have a certain value for the organisation itself (Škundrić*, Korać and Davidovac 2020: 238*).

Collecting data from heterogeneous sources comprehends the existence of two types of agents: protocol agents and those in charge of applications. The first ones gather information from E-boxes, while the others parse information in order to store it in a "pseudo-standard" format. These two modules are connected by a dispatcher. Such an architecture allows for a high level of availability and even load balancing of the system, which can be set at any level within the infrastructure.

PROTOCOL AGENTS

Basic functions

Protocol agents are designed to receive information from specific transport protocols, such as syslog, snmp, smtp, html, etc. They function as server applications and their sole purpose is to listen to the connections, i.e. the traffic coming from E-boxes and to collect data that will be available to the dispatcher.

The simplicity of such agents makes them easy to apply and maintain.

Data in its original format is most commonly stored in the form of simple files, even though direct transmission to the dispatcher via named pipes, sockets or shared memory provides better performance.

Performance and availability

An interesting part of this approach is the ease with which a large number of agents can be distributed, since they represent simple applications that do not share information between themselves. Therefore, it is possible for very large systems, even server farms, to be connected via syslog or snmp, to the SOC and to be serviced by standard HA and LB equipment. Cluster architecture is also one of the options.

The goal is to ensure a data collecting platform that can be scaled according to needs and also have high availability, regardless of which data collection protocol is applied.

Security

From the security point of view, the most important thing is to ensure the integrity of data collected by the agents. This is especially important if the data will be transmitted to the final processing point via a shared network or a network that is considered to be insecure.

By looking at the TCP/IP protocol architecture, we can conclude that most data collection protocols rely on the UDP layer of this protocol.

It seems that it is necessary to encapsulate such data into secure channels in order to ensure that it will reach the data collection agent unaltered or compromised in any other way (the CIA approach should be applied – *Confidentiality, Integrity, Availability*). Therefore, it is necessary that all three conditions are met in order to ensure security quality, but it is also necessary to

find the optimal balance, without compromising the functioning of the organisation itself (*Korać, Prlja and Diligenski 2016*). This final reason also concerns the data sent via TCP (the same as that sent via smtp or http). However, in order to maintain a high performance level and enable a better functioning of the HA and LB, it would be wise to perform data encryption operations on appropriate equipment, on both sides of the communication line (Škundrić *2017*).

DISPATCHER AND APPLICATION AGENTS

The purpose of dispatchers is to determine the form, i.e. the type of source event, and then to forward the original message to the appropriate application agent. In this case, the implementation is relatively simple when a specific pattern is found for every type of source from which the data could have been obtained.

Autonomous operations performed by a dispatcher are as follows:

listening to incoming channels from protocol agents, such as sockets, named pipes, V-system message queues (*mqueue*), etc.,

verifying pattern matching against a pattern database, which should be incorporated into the system previously so as to prevent the endangerment of system performance. This database contains patterns that are specific to each pair (E-box type, Xmit protocol), because numerous event creators use messages in different formats, depending on the transmission protocol, and

sending the original message to the agent for specific E-box applications via suitable outgoing channels.

APPLICATION AGENTS

Application agents are specific to each pair (E-box, Xmit protocol). They format messages so that they match the generic model from the message database (Škundrić *2017*).

Autonomous operations performed by agents for applying collected data are as follows:

listening to incoming channels from protocol agents, such as sockets, named pipes, V-system message queues, etc.,

parsing the original message into standard fields, and

transmitting the formatted message to the appropriate D-boxes. Any type of channels can be used here, depending on the nature of the D-box (database, connected indicators, etc.).

DATA FORMATTING AND STORAGE

Two types of data have to be formatted in a "standard" manner (i.e. homogenous and comprehensible to any SOC module): host entries and collected messages.

Host (client) entries

Unique client identification

The need for a standardised structure of client data appears in the following cases:

sensors can transmit client information in the IP address or FQDN (*Full Qualified Domain Name*) format,

multi-homing techniques provide the possibility of multiple IP addresses for the same physical system,

virtual client techniques provide the possibility of multiple FQDNs for the same physical system, and

HA and LB systems can disguise the existence of multiple systems behind a single IP address or FQDN.

The identification of clients by either their IP address or FQDN does not appear to be reliable. Moreover, in the constant need for performance, a reverse DNS lookup cannot be performed for every new (IP address) FQDN that is detected in

records.

Furthermore, it is necessary to rely on independent identification, which does not depend on the IP address or FQDN. As the only acceptable solution, a host/client token is identified.

Data analysis and reporting

Basic operations that result in the creation of alarms are:

- correlation,
- structural analysis,
- intrusion path analysis, and
- behaviour analysis.

Correlation represents a stand-alone activity that leads to the creation of contexts for records so as to conduct certain analyses later and establish whether characteristics of attacks or any malicious behaviour can be found in the records.

Structural analysis can be compared to an advanced method of matching patterns, used to determine which possible events have led or could lead to the compromising of the security of an information system. Examining the method of intrusion is the next step, the result of which is information on the exposure of the monitored system to a given attack or type of attacks, if the generic analysis is used. After that, behaviour analysis will integrate elements of the security policy with the goal of determining whether a given attack is possible or allowed.

The purpose of the listed activities is to generate alarms that are activated only in cases of oversights being found in the structure that allow certain types of intrusions (e.g.: scanning, fingerprinting, exploitation, backdooring or deleting an attack history), but also take into account defined security policies, and the criticality of the targeted systems.

Interfaces

When it comes to the SOC, there are two basic types of consoles:

SOC console,

end user port.

SOC console

The SOC console, i.e. the R-box, is primarily intended for internal analysis and usually represents unformatted data from different parts of the SOC system, such as the K-box. There are three interfaces within the SOC console:

Real-time monitoring interface, which provides data in its original form, obtained from the message process within the K-box. This approach enables the basic function of cleansing records, such as the egrep function, in order to extract certain messages that can be used for debugging, in-depth analysis or, in case of an event, re-creation.

The incident management interface represents an internal mechanism for generating and managing incident related tickets, as well as incident management. This mechanism provides quality alarms, as well as a certain amount of data that can be used in the process of debugging, i.e. control points of the information security incident management process.

The statistical analysis interface provides data in its original format that can be used for statistical purposes at a predefined interval. This interface is usually used as an input parameter for a graphic representation of specific information.

End user port

The end user port provides visual communication with the monitored information system. It is designed with the purpose of displaying different levels of reports in a format that is readable for end users, as well as complexities, depending on the person for whom the report is intended (as

opposed to the SOC console, which is intended exclusively for experts to use in cases of troubleshooting the system itself). Information that can be found at the end user port is intended for all parties involved, from the manager, the engineer, and up to the people who deal exclusively with information security. The console itself is divided into three basic parts:

Permanent risk evaluation interface – provides information on the current security levels of monitored configurations and versions of the system software. It provides information on the overall security level, vulnerability and criticality characteristics and descriptions, intrusion scenarios and patch and configuration details.

Security activity – medium-term or long-term reporting that provides general data on the type of intrusion, frequency, sources and consequences on the monitored system. At a lower level, it is used in order to determine movement and identify specific details, such as recurring attack sources or most frequently attacked services that should be monitored.

System status – represents the interface in "pseudo-real time" for the end user, which allows direct tracking of open incidents, systems that are being attacked and intrusion paths activated by intruders.

CONCLUSION

Proper responses to attacks most commonly depend on the organisation and the procedures applied by the attack response teams. The responses vary in the range from passive monitoring and collecting information up to the emergency shutdown of the attacked system by reporting the incident to the appropriate CERT (*Computer Emergency Response Team* – a team that completely resolves the problem in terms of communication with all stakeholders, as well as technical-technological changes on the system with the goal of removing the consequences. CERTs can be local and global and, depending on the organisation, they act globally or locally, with more or less technically oriented activities). Naturally, an appropriate response should be determined before an attack occurs, procedures must be validated, and then safely stored (primarily in terms of integrity) and made available to monitoring teams.

Simply put, a certain level of escalation must be defined in the SOC in order to ensure a quick and efficient response, in parallel with the use of appropriate human resources.

The first level should be those referred to as agents, i.e. technical intermediary staff that are capable of spotting events created by A-boxes. The second level should be a team of technical experts. They are responsible for analysing intrusion events which have not been defined *a priori.* Their priority is to qualify events by using the SOC console interface and to provide a temporary solution for the first level agents to apply. The third level should be a "laboratory" in which suspicious packages, system operations etc. should be re-examined so as to determine the nature of the unknown attack and to provide a fully qualified response procedure. The laboratory should also be responsible for contacting the vendors of operating systems, applications, hardware, etc. in order to design patches and/or to apply them. In its primary form, a "laboratory" represents one of the sandbox solutions.

BIBLIOGRAPHY

Ganame, A., Bourgeois, J., Bidou, R., Spies, F., 2006
Evaluation of the intrusion detection capabilities and performance of a security operation center, SECRYPT 2006, *Proceedings of the International Conference on Security and Cryptography, Setúbal, Portugal,* August 7-10, 2006.

Škundrić, P., 2017
Koncepti i implementacija Centra za upravljanje bezbednošću kompanija, Ibis instruments, Beograd.

Škundrić, P., Korać, V., Davidovac, Z., 2020
Process management within the security operation centre of an organization, Archaeology and Science 16, Centar za nove tehnologije Viminacium Arheološki institut Beograd, ISSN 1452-7448, UDK 007:004.056.5, 659.23:004.056.5, COBISS. SR-ID 29189385, p. 237-242 Beograd, 2020.

Škundrić, P., Korać, V., Davidovac, Z., 2020
Security Operation Centre Modules – Technological aspect, Archaeology and Science 16, Centar za nove tehnologije Viminacium Arheološki institut Beograd, ISSN 1452-7448, UDK 007:004.056.5, 659.23:004.056.5, COBISS.SR-ID 29249545, p. 231-235, Beograd.

Korać, V., Prlja, D. and Diligenski, A. 2016
Digitalna forenzika, Centar za nove tehnologije Viminacium, Arheološki Institut, Institut za uporednopravo: Beograd.

REZIME
TEHNOLOŠKI ASPEKT GLOBALNE ARHITEKTURE CENTRA ZA UPRAVLJANJE BEZBEDNOŠĆU ORGANIZACIJE

KLJUČNE REĆI: SOC, CENTAR ZA UPRAVLJANJE BEZBEDNOŠĆU ORGSNIZACIJE, BEZBEDNOST INFORMACIJA.

Globalnom arhitekturom centra za upravljanje bezbednošću u okviru organizacije podrazumeva se implementiranje svih modula i sistema kojima se vrši generisanje sigurnosnih događaja, prikupljanje sigurnosnih događaja, skladištenje sigurnosnih događaja i analiza i reakcija u slučaju detektovanih incidenata. Određeni nivo eskalacije mora se definisati u SOC-u kako bi se osigurala brza i efikasna reakcija, paralelno s korišćenjem odgovarajućih ljudskih resursa U radu su istaknuti preduslovi pravilne implementacije Centra za upravljanje bezbednošću organizacije.

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PRIKAZI - REVIEWS

Smilja Jović, Julijana Pešić, Vladimir Stojanović, Vladimir Stevanović, ARHEOLOŠKA NALAZIŠTA NA TERITORIJI OPŠTINE BOJNIK, izdanje Narodni muzej Leskovac, Biblioteka Kulturno-istorijska baština, knjiga br. 8, Leskovac 2020. Publikacija sadrži 286 stranica (uvodni deo, pet tematskih celina, katalog lokaliteta i nalaza, zaključak i bibliografiju).

Autorski tim arheologa Narodnog muzej Leskovac, u sastavu Smilja Jović, Julijana Pešić, Vladimir Stojanović i Vladimir Stevanović, priredio je monografiju pod nazivom *Arheološka nalazišta na teritoriji opštine Bojnik*. Publikacija predstavlja rezultate istraživačkog projekta *Arheološko rekognosciranje opštine Bojnik*, sprovedenog 2019. godine uz podršku Ministarstva kulture i informisanja Republike Srbije.

Leskovački arheolozi, nastavljajući praksu zapaženih projekata, predstavljaju nam arheološko nasleđe relativno malog geografskog prostora, sa značajnim brojem lokaliteta iz praistorijskog, antičkog i srednjovekovnog perioda. Preciznim brojkama rečeno, monografija predstavlja 146 nalazišta, od kojih se 66 po prvi put navodi na stranicama stručne literature.

U uvodnom poglavlju autori pružaju osnovne podatke, kako o monografiji, tako i o projektu čija realizacija je inicirala publikovanje štampanog izdanja. Motiv za osmišljavanje i realizaciju projekta ležeo je u izazovu koji je pružala teritorija bojničke opštine, arheološki najslabije istraženog prostora u Leskovčkoj kotlini. Dodatni, neželjeni, povod ležao je u činjenici da je na navedenom prostoru zabeležena velika depopulacija stanovništva. Jednu od negativnih posledica ovog procesa predstavlja i opasnost da u doglednoj budućnosti više neće biti meštana koji bi mogli da skrenu pažnju na postojanje lokaliteta, niti da prenesu nezabeležene legende o arheološkim nalazištima. Reči *Uvoda* izražavaju zahvalnost svim ustanovama i pojedincima koji su pomogli realizaciju poduhvata, pri čemu se izdvajaju imena Aleksandra Bulatovića (Arheološki institut, Beograd), stručnog konsultanta na realizaciji projekta, kao i Slobodana Fidanovskog, uz kolegu Bulatovića, recenzenta monografije.

Prvo poglavlje nosi naslov *Arheološka istraživanja u oblasti Puste Reke* i predstavlja pregled istraživanja kulturno-istorijskih spomenika na prostoru navedenom u naslovu, ali i leskovačkog kraja u celini. Istraživanja ovog prostora započela su u drugoj polovini 19. veka, kao deo proučavanja novooslobođenih srpskih krajeva. Tako se navodi da je državni službenik, M. Rakić, u delu *Iz nove Srbije,* nastalom kao rezultat službene misije, zabeležio i podatke o arheološkim nalazima. Dalje se naglašava doprinos koji su istraživanjima pružili F. Kanic, M. Vasić i S. Trojanović. Terenska istraživanja stvorila su osnove za započinjanje sistematskih arheoloških iskopavanja Caričinog grada 1912. godine. Na žalost, ratna dešavanja onemogućila su kontinuitet ovih istraživanja.

Nova stranica proučavanja otvorena je 1948. godine, sa osnivanjem tadašnjeg Gradskog muzeja Leskovac. Počev od tada, leskovački arheolozi ostvaruju značajne rezultate na istraživanjima arheološkog nasleđa. Autori posebno ističu značaj saradnje sa Arheološkim institutom, koja je dovela do rekognosciranja i arheoloških iskopavanja čiji rezultati su publikovani na stranicama *Leskovačkog zbornika,* ali i specijalizovanih publikacija o arheologiji ovog dela Srbije. Naglašen je i značaj etnografskih, sociooloških i istoriografskih istraživanja oblasti Puste Reke.

Stranice poglavlja *Geografske karakteristike opštine Bojnik* predstavljaju područje na jugozapadu leskovačke kotline, u basenu Puste reke, poznato i kao *pustorečki kraj*. U sastav Opštine ulazi 36 naselja. Navedena oblast predstavlja jedinstvenu geografsku i istorijsku celinu, počev od najstarijih vremena. Autori, u osnovnim crtama, opisuju zemljište, reljef, vode i klimu ove geografske celine.

Teritorija opštine Bojnik u praistoriji obrađena je u narednom poglavlju monografije. Zabeleženi podaci i materijal iz Narodnog muzeja Leskovac ukazuju da je istraživano područje bilo naseljeno tokom epohe srednjeg i mlađeg neolita, odnosno perioda starčevačke i vinčanske kulture. Ukazuje se i na mogućnost da se u neposrednoj blizini, na teritoriji Opštine Lebane, nalaze paleolitski lokaliteti u selima Lalinovac i Sakicol.

Autori nas tekstom vode kroz praistorijske periode, ukazujući na karakteristike svake epohe vezane za način života i predmete koji je obeležavaju. Skladno uklopljeni u širu priču o epohi, navode se i evidentirani arheološki lokaliteti. Slojevi starčevačke kulture utvrđeni su na pet lokaliteta, topografski neujednačenih, jer se nalaze i u ravničarskim i u brdskim predelima. Reč je o ravničarskim lokalitetima Selište u Lapotincu i Jezero-Ašanke u Pridvorici i brdskim Crkvište i Duboki Potok u Gornjem Brestovcu. Sva navedena nalazišta su višeslojna. Brdskim lokalitetima treba pridodati i slučajne starčevačke nalaze iz sela Obilić. Za sve lokalitete navedeni su istorijat istraživanja i karakteristike nalaza, što je princip koga će se autori pridržavati i na narednim stranicama monografije.

Epohom mlađeg neolita u bojničkom kraju dominira, očekivano, vinčanska kultura, i to njena mlađa faza koja lagano prelazi u rani eneolit. U većini slučajeva reč je o ravničarskim lokalitetima, dok je samo jedan, Loše Ploče u Stubli, smešten na teško dostupnom strateškom mestu. Ravničarska naselja registrovana su na trinaest lokaliteta: Cunga u Gornjem Brijanju, Crkvište i Sorce u Đinđuši, Duboki dol u Kosančiću, Vrtača-Marjanovo jezero i Crkvište/Bunarište u Lapotincu, Okućnica Kazimira Mihailovića, Imanje Vasića, Voćnjak Dalibora Mihailovića i nepoznati lokalitet u Mijajlici, Jezero-Ašanke u Pridvorici, Okućnica Tomaševića u Savinu, Kod škole i Loše ploče u Stubli. Posebno se skreće pažnja na značaj novopronađenog lokaliteta Imanje Vasića u Mijajlici.

Iz perioda eneolita registrovano je šest lokaliteta ─ nepoznati lokalitet u Gornjem Brijanju, Rid u Gornjem Brestovcu, Duboki dol u Kosančiću, Biljurski rid u Lozanu, Imanje Vasića u Mijajlici i Jezero-Ašanke u Pridvorici. Zanimljivo je da nisu registrovana naselja gradinskog tipa. Sva navedena nalazišta, izuzev nepoznatog lokaliteta u Gornjem Brijanju, uklapaju se u karakteristike ravničarskih eneolitskih naselja smeštenih na ravnim kosama, padinama ili obalama reka. Autori smatraju da arheološki nalazi ukazuju da na ovom prostoru, od V do polovine III milenijuma pre nove ere, nije dolazilo do većih promena u načinu života u odnosu na period neolita.

Bronzanom dobu pripadaju četiri lokaliteta, hronološki opredeljena u završnu fazu epohe ─ pozno bronzano doba. Lokalitet Kamenički rid nosi karakteristike gradina smeštenih na dominantnom položaju, što ukazuje na novostvorene okolnosti koje su prouzrokovale potrebe za podizanjem zaštićenih naselja. Lokalitet Trska u Oranu, zabeležen na osnovu kazivanja meštana, okarakterisan je kao nekropola. Tipu ravničarskih naselja pripadaju nalazišta Glišine njive u Lozanama i Duboki dol u Kosančiću.

Novi period, starije gvozdeno doba, dovodi do velikih promena u načinu života, o čemu svedoče i nalazi iz bojničkog kraja. Lokalitet Sorce u Đinđuši okarakterisan je kao nekropola sa danas slabo vidljivim tumulima. Nekropola sa spaljenim pokojnicima registrovana je na mestu Marjanovo jezero-Vrtače u Lapotincu. Postojanje arheološkog materijala iz starijeg gvozdenog doba utvrđeno je u Dubokom dolu u Kosančiću i Mahala Vlasinci u Oranima. Za sada nisu poznati nalazi i lokaliteti iz perioda latena.

Naredno poglavlje monografije posvećeno je prošlosti Bojnika tokom rimskog perioda. Autori predstavljaju podatke vezane za tokove rimskog zauzimanja ovog prostora, procese urbanizacije, izgradnju puteva, utvrđenja i akvadukta, postojanju antičkih kultova i ranog hrišćanstva, razvoj rudarstva, zemljoradnje i zanatstva.

Predstavljene su moguće trase antičkih puteva, kojima se bojnički kraj povezivao sa velikim saobraćajnicama svoga vremena. Pomenute saobraćajnice dodatno dobijaju na značaju tokom velikih graditeljskih poduhvata cara Justinijana u VI veku. Za navedenu delatnost verovatno se može vezati i obnova utvrđenja Kale u Gornjem Brijanju, na čije postojanje u antičkom periodu ukazuju arheološki i numizmatički nalazi.

Na teritoriji Opštine Bojnik konstatovano je sedamnaest rimskih naselja: Vujanovo, lokalitet Okućnica Anđelkovića; Gornje Konjuvce, lokaliteti Livade i Crkvište; Gornji Brestovac, lokaliteti Rid i Jezero; Donje Konjuvce, lokalitet Rebnica; Kacabać, lokaliteti Rosulja, Ključ, Grad daljni/Lativovo; Kosančić, lokalitet Duboki dol (naselje ili vila); Lozane, lokalitet Glišine njive; Mrveš, lokalitet Drenjak; Orane, lokaliteti Šebekove livade i Barice; Rečica, lokalitet Kućne livade: Stubla, lokaliteti Ćopino lojze i Jorgovan; Turjane, lokalitet Pitome/Velike livade i Crkvica, lokalitet Loinje.

Autori iznose pretpostavku da se u Turjanu, na lokalitetu nazvanom Terme, pored Rimljanskog potoka, nalazilo rimsko kupatilo. Arheološka literatura potvrđuje postojanje rimske vile na lokalitetu Direktorovo u Bojniku, sa koga potiču i reprezentativni pokretni nalazi. Indicije o postojanju vila vezuju se i za lokalitete Crkvište u Gornjem Brijanju, Padina u Obiliću i Nišavište u Slavniku (moguće je da su se na navedenim mestima nalazili i kultni objekti). Na teritoriji Opštine Bojnik utvrđen je i deo trase akvadukta za dopremanje vode do Justinijane Prime, dok su registrovani i tragovi manjih vodovoda za snabdevanje lokalnih naselja i vila.

Dosadašnja istraživanja nisu pouzdano pokazala postojanje nijednog ostatka svetilišta, kao ni nalaza povezanih sa kultovima antičkih božanstava. Takođe, nisu dokumentovani tragovi prisustva prvih hrišćana. Nema ni sigurnih tragova rimskih nekropola. Poznat je sarkofag sa lokaliteta Selište u samom Bojniku, dok je u selu Vujanovu zabeleženo postojanje grobnice od opeka. Buduća istraživanja verovatno će pružiti jasniju sliku o navedenim pitanjima.

Rekognosciranja su pokazala postojanje tragova rudarske aktivnosti u Ivanju (lokaliteti Sokolove livade i Ćumurana). Pomenuti lokaliteti, najverovatnije, predstavljaju delove velikog kompleksa koji se širi u pravcu nalazišta Kalkadžije u ataru sela Dobre Vode. U istom naselju pronađeni su nalazi zgure i kovačkog alata na lokalitetu Izvor. Autori su predstavili i uslove za razvoje zemljoradnje, stočarstva i vinogradarstva, uz navođenje nalaza povezanih sa navedenim delatnostima.

Teritorija opštine Bojnik u srednjem veku je naslov i tematika sledećeg poglavlja. Priča započinje osvrtom na istorijske prilike u periodu od 7. do 15. veka, sa naglaskom na dešavanja direktno povezana sa leskovačkim krajem.

Prvi osvrt pružen je na srednjovekovne lokalitete, čije egzistiranje potiče iz perioda kada je ova oblast bila gusto naseljena. Pronađeni su ostaci naselja, kultnih objekata i utvrđenja, kao i dokazi o rudarenju i preradi rude.

Na teritoriji koja predstavlja predmet monografije postoje indicije o postojanju 27 srednjovekovnih naselja. Autori iznose stav da su sva naselja bila seoskog tipa, budući da nema materijalnih dokaza, kao ni pisanih tragova, o postojanju gradova. Arheološki nalazi potvrđuju ostatke manjih građevinskih objekata, zidanih od kamena u suhozidu. Ostaci ovog tipa građevina zabeležani su na lokalitetu Izvor u Dobroj Vodi, kao i na mestima Gorun i Aljavi Gorun u Obraždi. Srednjovekovni arheološki materijal svedoči o naseljima na lokalitetima Rebnica u Donjem Konjuvcu; Centar sela u Oranu; Rid u Gornjem Brestovcu; Peskana u Kosančiću; Crkvište u Đinđuši; Okućnica Kazimira Mihajlovića i Livada Dalibora Jo-

vanovića u Mijajlici; Tupanke njive u Lozanama; Selište u Lapotincu; Drenjak u Mrvešu; Loinje u Crkvici; Jergovan u Stubli i Breg u Plavcu. Ostala naselja zabeležena su na osnovu starije literature i kazivanja meštana.

Postoje beleške o postojanju vodenica na lokalitetima Izvor u Dobroj Vodi i Livade u Gornjim Konjuvcima. Materijalni dokazi o rudarskoj proizvodnji pronađeni su na lokalitetima Ćumurana i Sokolove livade u Ivanju, gde se moglo nalaziti naselje specijalizovano za poslove povezane sa topljenjem i obradom gvožđa.

Na istraživanom području registrovani su ostaci samo jednog utvrđenja. Reč je o lokalitetu Mali kamen u Dobroj Vodi. Verovatno se radi o manjem utvrđenju iz ranovizantijskog perioda, potom obnovljenom tokom srednjeg veka.

Može se pretpostaviti postojanje sedamnaest srednjovekovnih srpskih crkava. Otkriveni ostaci hrišćanske sakralne arhitekture, u najvećem broju, potiču iz 13─14. veka. Većina ih je podignuta na temeljima ranovizantijskih bazilika. Crkve predstavljaju jednobrodne građevine manjih dimenzija, sa polukružnom apsidom, dok pojedine imaju pripratu i naos. Izuzetak predstavljaju crkve u Mijajlici i Ivanju, kod kojih je apsida, sa spoljašnje strane, trostrana. Autori pružaju sve vrste podataka o mestima moguće lokacije sakralnih objekata.

Do sada je registrovana četrnaest srednjovekovnih nekropola na prostoru teme monografije. Okvirno su datovane u period 13─16. veka. Navedene su tri nekropole u Gornjem Brestovcu: Staro, Tursko i Rimsko groblje. Ostale nekropole zabeležene su na lokalitetima Crkvište u Vujanovu; Crkvište i Staro groblje u Dobroj vodi; Crkvište u Obraždi; Crnci u Mijajlici; Staro groblje u Borincima; Staro groblje u Kacabaću; Tursko groblje u Lapotincu; Tursko groblje u Slavniku; Staro groblje u Pridvorici i Crkvište u Gornjem Brijanju. Na lokalitetu Staro/Arnautsko groblje u Stubli otkrivena je nadgrobna ploča popa Radivoja iz 15. veka, danas čuvana u Muzeju u Leskovcu.

Autori iznose stav da veliki broj srednovekovnih crkava, nekropola i ostataka naselja svedoči o gustoj naseljenosti ove oblasti srpskim stanovništvom, kako u ranom, tako i u poznom srednjem veku.

Iscrpni (na gotovo dve stotine stranica) *Katalog lokaliteta i nalaza u Bojniku* predstavlja sve karakteristike lokaliteta i arheoloških nalaza sa 146 nalazišta, registrovana na teritoriji 33 naselja u Opštini Bojnik.

Završni deo monografije čine *Zaključak* (štampan dvojezično, na srpskom i engleskom jeziku) i *Bibliografija* sa iscrpnim spiskom korišćene stručne literature.

Arheolozi leskovačkog muzeja su, putem predstavljene monografije, prikazali rezultate istraživanja oblasti koja je, u najvećoj meri, predstavljala „belu mrlju“ na arheološkoj karti Srbije. Projekat rekognosciranja teritorije Opštine Bojnik, zajedno sa brzim publikovanjem rezultata u specijalizovanoj publikaciji, predstavlja primer uspešne realizacije postavljenih zadataka i putokaz za buduća istraživanja (i prezentaciju dobijenih rezultata) drugih arheološki nedovoljno ispitanih područja. Naravno, brojna nalazišta koja su navedena u monografiji, zaslužuju da budu sistematski istražena u narednom periodu za šta, izvesno, planove pripremaju arheolozi Narodnog muzeja Leskovac.

Ljubiša VASILJEVIĆ

Religião na Grécia e Roma Antigas: Contatos, Encontros e trocas / Religion in Ancient Greece and Rome: Contacts, Encounters and Exchanges, História: Questões & Debates, ano 38, volume 69, n. 1, jan./jun. 2021, Publicação semestral do Programa de Pós-Graduação em História da UFPR e da Associação Paranaense de História (APAH), Published in Brasil, Curitiba 2021. Publikacija sadrži 364 stranice ─ uvodni tekst posvećen tematici ovog broja časopisa i trinaest članaka (deset tekstova predstavljaju predmet prikaza).

Brazilski časopis *História: Questões & Debates* je broj 69 tematski posvetio pitanjima vezanim za antičku religiju, sa posebnim naglaskom na okolnosti vezane za njeno rasprostiranje i prožimanje do koga je dolazilo duž obala Mediterana. U prikazu će biti predstavljeno deset članaka posvećenih ovoj tematici, posvećenim do sada retko postavljanim pitanjima iz antičke prošlosti.

Erica Angliker, Lorena Lopes da Costa, *Religião na Grécia e Roma Antigas: contatos, encontros e trocas / Religion in Ancient Greece and Rome: contacts, encounters and exchanges* (str. 7─16).

Reč je o uvodnom tekstu, štampanom dvojezično, na portugalskom i engleskom jeziku. Autorke, uz korišćenje naučnog aparata, predstavljaju tematiku časopisa, uz osvrt na dosadašnja dostignuća proučavanja kulturnog diverziteta i prožimanja religijskih elemenata, do kojih je dolazilo širom Mediterana tokom antičke epohe. Ukratko su predstavljeni i članci publikovani u časopisu, smatrani za studije slučaja sa novim pogledima na kulturne i religijske povezanosti koje su doprinosile progresu Sredozemlja i širenju grčke i rimske kulture. Prvih pet tekstova predstavljaju proučavanja direktno povezana sa klasičnom arheologijom, dok su preostala četira rada tematski više povezana sa antičkom istorijom i književnošću.

Yannos Kourayos, Kornilia Daifa Despótiko, *Escavações e restauração de um Santuário de Apolo / Excavation and Restoration of the Sanctuary of Apollo* (str. 18─46).

Prvi stručni članak u časopisu posvećen je arheološkim iskopavanjima sprovedenim na Despotiku (središte Kikladskog arhipelaga, danas nenastanjeno ostrvo, zapadno od Antiparosa). Istraživanja su dovela do jednog od najznačajnijih otkrića u grčkoj arheologiji tokom poslednje decenije. Utvrđeno je postojanje Apolonovog svetilišta, nezabeleženog u poznatim istorijskim izvorima, tako da se o njemu može suditi samo na osnovu arheoloških otkrića. Reč je o drugom po veličini sakralnom prostoru posvećen Apolonu na Kikladima, većem i od slavnog svetilišta na Delosu. Začetak svetilišta potiče iz ranog arhajskog perioda. Otkriveni građevinski objekti i pokretni nalazi pružaju dragocena svedočanstva o antičkom kultu i religiji na Kikladima i okolnom mediteranskom području. Članak prezentuje kompletnu sliku svetilišta, sa posebnim naglaskom na reprezentativne građevine u okviru kompleksa. Prikazan je i model pretpostavljenog izgleda hrama sa temenosom, uz osvrt na planove za rekonstrukciju najznačajnijijh građevinskih objekata.

Elena Korka, Aspasia Gioka, Antonio Corso, Konstantinos Lagos, Ioannis Christidis e Argyro Pissa, *Myths and cults of ancient Tenea / Mitos e cultos na antiga Tenea* (str. 47─80).

Stručni tim, pod rukovodstvom Elene Korke, predstavio je rezultate arheoloških istraživanja koja se, počev od 2013. godine, sprovode na lokalitetu Hiliomodi, nedaleko od Korinta. Na ovom mestu ranije je bilo poznato postojanje grobnih mesta iz arhajskog, helenističkog i rimskog perioda. Rezultati istraživanja pokazali su da je reč o lokaciji antičkog grada Teneje. Pre istraživanja, Teneja je bila poznata samo iz pisanih izvora, koji su pružali podatke vezane za topografiju lokali-

teta i mitološku tradiciju. Prema mitologiji, grad je povezivan sa pričama iz trojanskog ciklusa i mitom o Edipu. Dela antičkih autora sačuvala su podatak da je zaštitnik Teneje bio Apolon. Arheološka istraživanja pružila su značajne podatke o religijskom životu u antičkoj Teneji, uključujući i najverovatniju potvrdu o Apolonovom patronatu nad gradom. U radu su, po prvi put, publikovana saznanja o nekim građevinskim objektima, otkrivenim u okviru naselja.

Michael Anthony Fowler, *Of Human Sacrifice and Barbarity: A Case Study of the Late Archaic Tumulus XVII at Istros / Sobre o sacrifício humano e a barbárie: Um estudo de caso do Tumulus XVII da Era Arcaica Tardia em Istros* (str. 81─120).

Članak sadrži detaljnu analizu pogrebnih običaja iz arhajskog perioda, registrovanih u okviru severne nekropole Istrosa. Tokom arheoloških iskopavanja, sprovedenih u šestoj deceniji dvadesetog veka, istražena su četiri nadgrobna obeležja u vidu tumula. Istraživanja Tumula XVII (datovanog u period 550─525. godine pre nove ere) pokazala su karakteristike koje se mogu povezati sa epskim opisima kremacije iz herojskog doba (prvenstveno sa sahranom Patrokla, o kojoj govore stihovi Homerove *Ilijade*). Autor posebno skreće pažnju na otkrivene ostatke tri pokojnika, što smatra dovoljnim za otvaranje diskusije o mogućem prinošenju ljudskih žrtvi. Prve naučne interpretacije Tumula XVII, iznošene neposredno nakon otkrića, glasile su da je reč o negrčkom, odnosno tračkom spomeniku. Na ovaj zaključak navodilo je prvenstveno prisustvo ljudskih žrtava, što je smatrano za varvarski običaj (premda ga epovi određuju kao helensku karakteristiku). Autor iznosi teoriju da je reč o pogrebnom običaju praktikovanom od strane elite u okviru grčke kolonijalne zajednice, kojom se ona izdvajala u odnosu na većinsko starosedelačko stanovništvo.

Dora Katsonopoulou, *The Cult of Poseidon Helikonios: From Helike of Achaea to Asia Minor and the Black Sea / O culto de Poseidon Helikonios. Da Helike da Acaia à Ásia Menor e ao Mar Negro* (str. 121─135).

Kult Posejdona Helikeoniosa povezan je sa izvornim religijskim funkcijama božanstva voda i zemljotresa. Najstarije mesto poštovanja ovog božanstva, zasnovano još u mikensko doba, nalazilo se u Helikeu u Ahaji. Lokalitet je smešten na jugozapadnim obalama Korintskog zaliva, mestu koje još Homer navodi kao centar Posejdonovog kulta. Svetilište u Helikeu predstavljalo je najznačajnije kultno mesto za sve Jonjane. Kada su Jonjani proterani iz Helikea, od strane Ahajaca na kraju mikenskog doba, sa sobom su, na prostore Male Azije, preneli i kult Posejdona Helikeoniosa. Autorka, koja rukovodi arheološkim istraživanjima Helikea, putem literarnih izvora i arheoloških i numizmatičkih podataka, prati rasprostiranje kulta sve do kolonija na obalama Crnog mora.

Lilian de Angelo Laky, *Crotona e suas conexões religiosas e políticas com Olímpia nos séculos VI, V e IV a.C.: As evidęncias das imagens monetárias de águias e raios / Crotone and its religious and political connections with Olympia in the sixth, fifth and fourth centuries BC: the coin types evidences of eagles and thunderbolts* (str. 136─162).

Ideja članka je da ukaže na mogućnosti koje pruža proučavanje numizmatičkih nalaza u kontekstu istraživanja kulturne povezanosti grčkih naseobina na Mediteranu. Zajedničke ikonografske karakteristike prikazane na različitim edicijama novca (poput orlova i munja, kao Zevsovih atributa), kovanih u Krotoneu u Velikoj Grčkoj i Olimpiji na Peloponezu, svedoče o značaju najznačajnijeg panhelenskog svetilišta olimpijskog Zevsa, koje je svoj uticaj, i putem simbola prikazanih na novcu, rasprostiralo širem grčkog sveta u razdoblju dužem od tri veka.

Pierre Ellinger, *Enlèvements de statues divines en bord de mer : de l'Artémis Taurique à Héra Reine / Abduction of divine statues on the sea-shore: from Taurian Artemis to Hera the Queen* (str. 163─182).

Rad ima za cilj da izvrši poređenje nekoliko grčkih mitskih priča vezanih za krađe skulptura božanstava iz prekomorskih svetilišta: priču o statui Artemide sa Tauride (prvenstveno Euripidovu verziju, uz uključivanje i drugih antičkih legendi istoga motiva sa mediteranskog područja), neuspelu krađu skulpture Here sa Samosa i tradiciju vezanu za osnivanje grada Liktosa na Kritu. Autor smatra da se, kroz analizu ovih mitova, može doći do značajnih podataka vezanih za sve aspekte antičkog pomorstva, počev od trgovine, pa sve do piraterije i talasokratije, uz neizbežne priloge značajne za proučavanje nedovoljno ispitanog kulta Artemide sa Tauride, ali i drugih aspekata drevne grčke religije.

Lucio Maria Valletta, *Héraclès et les Scythes dans la mémoire des Grecs de la mer Noire. Quelques réflexions sur Hérodote, IV, 8-10 / Herakles and the Scythians in the Greek memories on the Black Sea region. Thoughts about Herodotus, IV, 8-10* (str. 183─211).

Tekst je posvećen kultovima na crnomorskom prostoru. Za osnovu istraživanja uzeta su književna dela. Pored brojnih drugih teorija vezanih za poreklo Skita, Herodot nam predočava i verziju nastalu kod pontskih Grka, u kojoj je glavni protagonist Herakle. Osnovna autorova ideja je da prikaže zajedničke motive u mitologiji svih naroda sa mediteranskog područja (primer je zajednica sa bićem koje poseduje nadljudske moći), počev od *Epa o Gilgamešu*, pa sve do *Odiseje*.

Júlia Batista Castilho de Avellar, *Os deuses no exílio: rituais religiosos e cultos romanos na poesia de Ovídio The Gods in Exile: Religious Rituals and Roman Cults in Ovid's Poetry* (str. 183─211).

Tematiku rada predstavljaju rimski kultovi i verski festivali iz perioda ranog Carstva, zabeleženi u delima pesnika Ovidija. Posebna pažnja posvećena je odnosu između privatnih kultova i javnih festivala, na način na koji ih pesnik predstavlja u stihovima dela *Fasti* i *Tužaljke*. Autor smatra da u ovim slučajevima imamo primere Ovidijevih pesničkih aluzija, putem kojih, putem korišćenja religijskih motiva, poeta ukazuje na raspodelu moći u raslojenom antičkom društvu.

Rafael Guimarães Tavares da Silva e Teodoro Rennó Assunção, *Archiloque et Dionysos autour de l'Égée: Le dithyrambe archaïque, le festival et le komos Arquíloco e Dioniso em torno do Egeu: o ditirambo arcaico, o festival e o komos* (str. 241─270).

Autori, uzevši za polaznu tačku ditirambe pripisane pesniku Arhilohu, razrađuju pretpostavku o povezanosti kulta Dionisa sa širenjem ovog vida poezije širom egejskog prostora. U fragmentu broj 120, najverovatnije Arhiloh navodi da su ditirambi „omiljena pesma gospodara Dionisa". U radu se razmatra mogućnost da se popularnost ditiramba u helenskom svetu razvijala paralelno sa trgovinskim putevima kojima su distribuirani vino i keramički proizvodi.

Navedeni radovi predstavljaju tematski deo časopisa posvećen antičkoj religiji. Sledeća celina, naslovljena jednostavno *Artigos* („Članci"), sadrži tri teksta koji nisu povezani sa arheološkom tematikom, zbog čega ih ne obrađujemo u okviru ovog prikaza.

Tematski deo predstavljenog broja časopisa *História: Questões & Debates* sadrži članke koji ukazuju na razvoj i prožimanje antičkih religija na prostoru Mediterana i Ponta. Publikacija predstavlja značajan prilog proučavanju grčke i rimske arheologije, istorije i umetnosti.

Ljubiša Vasiljević

UREĐIVAČKA POLITIKA ČASOPISA ARHEOLOGIJA I PRIRODNE NAUKE

Časopis ***Arheologija i prirodne nauke*** posvećen je temama iz naučnih oblasti: arheologije, istorije arhitekture, istorije umetnosti, antropologije, arheozoologije, arheobotanike, geofizike, računarskog inženjerstva i ostalih srodnih disciplina.

Časopis ***Arheologija i prirodne nauke*** je kao samostalno izdanje počeo da izlazi 2005. godine kao glasilo Centra za nove tehnologije Viminacium i Arheološkog instituta iz Beograda.

Časopis ***Arheologija i prirodne nauke*** objavljuje originalne, prethodno neobjavljene radove: originalne naučne radove, pregledne radove, izveštaje sa iskopavanja, kritike i prikaze.

Časopis ***Arheologija i prirodne nauke*** je dostupan u režimu otvorenog pristupa.

Jezici na kojima se mogu predati članci su engleski, nemački ili francuski. Ukoliko je rad napisan na engleskom jeziku, rezime može biti na srpskom (za domaće autore) ili engleskom (za strane autore), dok kod članaka predatih na nemačkom ili francuskom, rezimei moraju biti na engleskom jeziku.

Rukopisi za štampanje u časopisu predaju se sekretaru redakcije, a prema Uputstvu za autore o načinu pripreme članka.

Časopis ***Arheologija i prirodne nauke*** izlazi jedanput godišnje.

OBAVEZE UREDNIKA I REDAKCIJE

Redakcija časopisa ***Arheologija i prirodne nauke*** donosi konačnu odluku o tome koji će se rukopisi objaviti. Prilikom donošenja odluke redakcija se rukovodi uređivačkom politikom vodeći računa o zakonskim propisima koji se odnose na klevetu, kršenja autorskih prava i plagiranje.

Redakcija zadržava diskreciono pravo da primljene rukopise proceni i ne objavi, ukoliko utvrdi da ne odgovaraju propisanim sadržinskim i formalnim kriterijumima. U redovnim okolnostima, redakcija obaveštava autora o tome da li je prihvatila tekst najduže u roku od 120 dana od datuma prijema rukopisa.

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Predloženi recenzenti od strane redakcije, dobijaju recenzentski obrazac koji sadrži niz pitanja na koja treba odgovoriti, a koja recenzentima ukazuju koji su to aspekti koje treba obuhvatiti kako bi se donela odluka o sudbini jednog rukopisa. U završnom delu obrasca, recenzenti moraju da navedu svoja zapažanja i predloge kako da se podneti rukopis poboljša. Identitet recenzenata ostaje nepoznat autorima pre, tokom i nakon postupka recenzije. Autorima se preporučuje da prilikom pisanja radova izbegavaju formulacije koje bi mogle otkriti njihov identitet. Redakcija garantuje da će pre slanja rukopisa na recenziju iz njega biti uklonjeni lični podaci autora (pre svega, ime i afilijacija) i da će se preduzeti sve razumne mere kako bi identitet autora ostao nepoznat recenzentima do okončanja postupka recenzije.

Izbor recenzenata spada u diskreciona prava redakcije. Recenzenti moraju da raspolažu relevantnim znanjima u vezi sa oblašću kojom se rukopis bavi i poželjno je da to ne budu autori koji su u skorije vreme objavljivali publikacije zajedno (kao koautori) sa bilo kojim od autora podnesenog rada.

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Tokom postupka recenzije urednik može da zahteva od autora da dostave dodatne informacije, ako su one potrebne za donošenje suda o naučnom doprinosu rukopisa. Urednik i recenzenti moraju da čuvaju takve informacije kao poverljive i ne smeju ih koristiti za sticanje lične koristi.

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RAZREŠAVANJE SPORNIH SITUACIJA

Svaki pojedinac ili institucija mogu u bilo kom trenutku da uredniku i/ili redakciji prijave saznanja o kršenju etičkih standarda i drugim nepravilnostima i da o tome dostave neophodne informacije/dokaze.

Provera iznesenih navoda i dokaza

- Urednik će u dogovoru sa redakcijom odlučiti o pokretanju postupka koji ima za cilj proveru iznesenih navoda i dokaza.
- Tokom tog postupka svi izneseni dokazi smatraće se poverljivim materijalom i biće predočeni samo onim licima koja su direktno uključena u postupak.
- Licima za koja se sumnja da su prekršila etičke standarde biće data mogućnost da odgovore na optužbe iznesene protiv njih.
- Ako se ustanovi da je zaista došlo do nepravilnosti, proceniće se da li ih treba okarakterisati ako manji prekršaj ili grubo kršenje etičkih standarda.

Manji prekršaj

Situacije okarakterisane kao manji prekršaj rešavaće se u direktnoj komunickaciji sa licima koja su prekršaj učinila, bez uključivanja trećih lica, npr.:

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- pismo upozorenja autoru/recenzentu koji je učnio manji prekršaj.

Grubo kršenje etičkih standarda

Odluke u vezi sa grubim kršenjem etičkih standarda donosi urednik u saradnji sa redakcijom i, ako je to potrebno, malom grupom stručnjaka. Mere koje će preduzeti mogu biti sledeće (i mogu se primenjivati pojedinačno ili istovremeno):

- objavljivanje saopštenja ili uvodnika u kom se opisuje slučaj kršenja etičkih standarda;
- slanje službenog obaveštenja rukovodiocima ili poslodavcima autora/recenzenta;
- povlačenje objavljenog rada u skladu sa procedurom opisanom pod *Povlačenje već objavljenih radova*;
- autorima će biti zabranjeno da tokom određenog perioda šalju radove u časopis;
- upoznavanje relevantnih stručnih organizacija ili nadležnih organa sa slučajem kako bi mogli da preduzmu odgovarajuće mere.

Prilikom razrešavanja spornih situacija redakcija časopisa se rukovodi smernicama i preporukama Odbora za etiku u izdavaštvu (Committee on Publication Ethics – COPE): http://publicationethics.org/resources/.

POVLAČENJE VEĆ OBJAVLJENIH RADOVA

U slučaju kršenja prava izdavača, nosilaca autorskih prava ili autora, povrede profesionalnih etičkih kodeksa, tj. u slučaju slanja istog rukopisa u više časopisa u isto vreme, lažne tvrdnje o autorstvu, plagijata, manipulacije podacima u cilju prevare, kao i u svim drugim slučajevima grubog kršenja etikih standarda, objavljeni rad se mora povući. U nekim slučajevima već objavljeni rad se može povući i kako bi se ispravile naknadno uočene greške.

Standardi za razrešavanje situacija kada mora doći do povlačenja rada definisani su od strane bi-

blioteka i naučnih tela, a ista praksa je usvojena i od strane časopisa ***Arheologija i prirodne nauke***: u elektronskoj verziji izvornog članka (onog koji se povlači) uspostavlja se veza (HTML link) sa obaveštenjem o povlačenju. Povučeni članak se čuva u izvornoj formi, ali sa vodenim žigom na PDF dokumentu, na svakoj stranici, koji ukazuje da je članak povučen (RETRACTED).

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Postupak predavanja rukopisa, recenzija i objavljivanje radova su besplatni.

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Kada je rukopis prihvaćen za objavljivanje, autori prenose autorska prava na izdavača.

Na izdavača se prenose sledeća prava na rukopis, uključujući i dodatne materijale, i sve delove, izvode ili elemente rukopisa:

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UPUTSTVO AUTORIMA O NAČINU PRIPREME ČLANKA ZA ČASOPIS ARHEOLOGIJA I PRIRODNE NAUKE

Redakcija časopisa ***Arheologija i prirodne nauke*** odlučila je da primenom *Akta o uređivanju naučnih časopisa* Ministarstva za nauku i tehnološki razvoj Republike Srbije, kojim se uređuje opremanje naučnih časopisa u celini, unapredi dosadašnji kvalitet časopisa i na taj način doprinese njegovom potpunijem uključivanju u međunarodni sistem razmene naučnih informacija.

Časopis ***Arheologija i prirodne nauke*** posvećen je temama iz naučnih oblasti arheologije, istorije arhitekture, istorije umetnosti, antropologije, arheozoologije, arheobotanike, geofizike, računarskog inženjerstva i ostalih naučnih disciplina i tehnika.

Časopis ***Arheologija i prirodne nauke*** objavljuje originalne, prethodno neobjavljene radove: originalne naučne radove, pregledne radove, izveštaje sa iskopavanja, kritike i prikaze.

Jezici na kojima se mogu predati članci su engleski, nemački ili francuski. Ukoliko je rad napisan na engleskom jeziku, rezime može biti na srpskom (za domaće autore) ili engleskom (za strane autore), dok kod članaka predatih na nemačkom ili francuskom, rezimei moraju biti na engleskom jeziku.

Članci koji se predaju redakciji časopisa ***Arheologija i prirodne nauke*** moraju biti opremljeni na standardni način. Svaki tekst koji se predaje treba da sadrži: naslov; ime autora; naziv ustanove (afilijacija); apstrakt; ključne reči; osnovni tekst; rezime; grafičke priloge sa listom ilustracija; bibliografiju; kontakt podatke.

1. Naslov treba da bude kratak i jasan, i da što vernije opiše sadržaj članka. U naslovu treba da se koriste reči prikladne za indeksiranje i pretraživanje. Ako takvih reči nema u naslovu, poželjno je da se naslovu pridoda podnaslov. Naslov se piše u petom ili šestom redu ispod gornje margine velikim masnim (bold) slovima veličine 14 (pts).

2. Autor ili autori članka treba da navedu svoje puno ime i prezime.

3. Autor ili autori treba da navedu zvaničan naziv i sedište ustanove u kojoj su zaposleni, a eventualno naziv i sedište ustanove u kojoj su obavili istraživanja čije rezultate sada objavljuju. Kod složenih intstitucija navodi se ukupan naziv (na pr.: Univerzitet u Beogradu, Filozofski fakultet, Odeljenje za arheologiju, Beograd).

4. Apstrakt je kratak prikaz sadržaja članka (100-250 reči). Poželjno je da sadrže termine koji se često koriste za indeksiranje i pretraživanje članaka. Apstrakt treba da pruži podatke o cilju istraživanja, metodi, rezultatima istraživanja i zaključku. Apstrakte treba priložiti dvojezično (na srpskom jeziku, engleskom ili nekom drugom jeziku raširene upotrebe). Za sažetke na stranim jezicima nužno je obezbediti kvalifikovanu lekturu, odnosno gramatičku i pravopisnu ispravnost.

5. Ključne reči treba da budu termini koji najbolje opisuju sadržaj članka za potrebe indeksiranja i pretraživanja. Treba ih navoditi na osnovu nekog međunarodnog izvora (popisa, rečnika, tezaurusa) koji je najšire prihvaćen, kao što je lista ključnih reči Web of Science. Broj ključnih reči ne treba da bude veći od 10.

6. Članci ne bi trebalo da prelaze dva autorska tabaka (32 strane), u formatu A4 uključujući napomene i ilustrativni deo. Tekst treba uraditi kompjuterski u fontu Times New Roman ili Arial (12 pts), MS Office Word 97 ili novijim, sa proredom 1,5 i marginama 2,54cm. Osnovni tekst ne sme da sadrži ilustracije, već se one se predaju kao posebni fajlovi.

7. Rukopisi se predaju isključivo na srpskom jeziku u ćiriličnoj verziji pisma (sa podrškom Serbian (Cyrillic). Ukoliko autor želi da rad pisan na srpskom jeziku preda za štampu u verziji prevedenoj na engleski ili neki drugi jezik raširene upotrebe u međunarodnoj komunikaciji, dužan je da navede ime prevodioca, odnosno lektora koji je tekst priredio za štampu na stranom jeziku. Pored toga, radu pisanom na nekom od stranih jezika treba dodati apstrakt i rezime na srpskom jeziku. Reči, navodi i naslovi pisani na nekom od stranih jezika treba da budu napisani u svom izvornom obliku.

Napomene mogu biti sastavni deo osnovnog teksta. Treba da sadrže manje važne podatke ili odgovarajuća objašnjenja. One nisu zamena za citiranu literaturu. (Poseban odeljak ovog Uputstva govori o načinu citiranja koji treba primenjivati prilikom pisanja tekstova).

8. Rezime treba da sadrži isto što i apstrakt, ali u proširenom obimu koji ne bi smeo da prelazi 1/10 obima osnovnog teksta. Posebno je poželjno

da rezime bude u strukturalnom obliku. Za tekstove predate na engleskom jeziku, rezimei treba da budu predati na srpskom jeziku. Za tekstove predate na nemačkom ili francuskom, predati rezimei treba da budu na engleskom jeziku. Pored samog teksta rezimea na odgovarajućem jeziku treba predati naslov rada, ključne reči, kao i afilijaciju autora.

9. Grafički prilozi (fotografije, table, skice, grafikoni itd.) treba da budu dati na jednoobrazan način. Skenirane priloge treba priložiti u rezoluciji 600 dpi/inch, a fotografije u rezoluciji najmanje 300 dpi/inch u formatima TIFF, PSD ili JPG. Grafički prilozi se predaju kao poseban deo rada i ne treba da budu u sastavu osnovnog teksta. Naslove i tekstualne sadržaje ilustrativnih priloga treba priložiti dvojezično (na jeziku rada, na engleskom ili nekom drugom jeziku raširene upotrebe).

10. Citirirana literatura obuhvata bibliografske izvore (članke, monografije itd.) i u radu se navodi u vidu referenci u fusnotama i spiska literature / bibliografije na kraju teksta. Ona je je sastavni deo svakog naučnog rada, sa precizno navedenim bibliografskim jedinicama (referencama) koje su citirane. Literatura se navodi na dosledan način, redosledom koji zavisi od standarda navođenja u tekstu i koji je preciziran ovim uputstvom. Literatura se u bibliografiji ispisuje na jeziku i pismu na kome je objavljena. U slučajevima kada je publikacija štampana dvojezično, sve podatke treba navesti dvojezično takođe, ili ukoliko je rezime štampan na drugom jeziku, onda navesti naslov rezimea na tom jeziku.

Način navođenja u bibliografiji:

Popović, I. 2009

Gilt Fibula with Christogram from Imperial Palace in Sirmium (Резиме: Позлаћена фибула са христограмом из царске палате у Сирмијуму) *Starinar* LVII (2007): 101-112.

Publikacije štampane ćiriličnim, grčkim ili bilo kojim drugim nelatiničnim pismom, transkribuju se na latinicu u skladu sa standardima Američkog bibliotečkog društva i Kongresne biblioteke SAD (http://www.loc.gov/catdir/cpso/roman.html), npr:

Citat u tekstu/fusnoti: (Поповић 1988: 67)

Način navođenja u bibliografiji:

Поповић, И. 1988

Античко оруђе од гвожђа у Србији, Београд: Народни музеј.

(Popović, I. 1988

Antičko oruđe od gvožđa u Srbiji, Beograd: Narodni muzej).

11. Sastavni delovi bibliografskih jedinica (autorska imena, naslov rada, izvor itd.) navode se u skladu sa usvojenom formom navođenja. Redakcija časopisa ***Arheologija i prirodne nauke*** prihvatila je preporuku Ministarstva za nauku i tehnološki razvoj i odlučila da autori treba dosledno da primenjuju pravila citiranja i navođenja literature prema uzoru na sistem koji navodimo u daljem delu teksta.

U primerima koji slede navedene su najčeće citirane vrste refererenci:

I KNJIGE (MONOGRAFIJE)

1. Autorizovane knjige

a. jedan autor

u tekstu: (Popović 2006)

u literaturi:

Prezime, Inicijal imena. Godina

***Naslov monografije* (*u kurzivu),* Mesto izdanja: Izdavač.**

Popović, I. 2006

Roma aeterna inter Savum et Danubium, Works of Roman Art from the Petrović-Vasić Collection, Belgrade: Archaeological Institute.

- Potrebno je navesti i naziv serije i broj:

Mirković, M. 1968

Rimski gradovi na Dunavu u Gornjoj Meziji, Dissertationes 6, Beograd: Arheološko društvo Jugoslavije.

Papazoglu, F.1969

Srednjobalkanska plemena u predrimsko doba (Tribali, Autarijati, Dardanci, Skordisci i Mezi), Djela 30, Centar za balkanološka ispitivanja 1, Sarajevo: Akademija nauka i umjetnosti Bosne i Hercegovine.

b. dva ili tri autora

Između imena prvog i drugog autora, ili drugog i trećeg u bibliografskoj jedinici na srpskom jeziku treba da stoji veznik **i (**ćiriličnim pismom, ako je bibliografska jedinica na ćirilici, a latiničnim **i,** ako je na latinici). Ako je rad naveden u literaturi na engleskom ili nekom drugom stranom jeziku, treba da stoji (bez obzira na korišćeni jezik) engleski veznik and.

u tekstu: (Popović i Borić-Brešković 1994: 16-18)
u Literaturi:
Popović, I. i Borić-Brešković B. 1994
Ostava iz Bele Reke, Arheološke monografije 7, Beograd: Narodni muzej.
Ivanišević, V., Kazanski, M. and Mastykova, A. 2006
Les necropoles de Viminacium a l'Epoque des Grandes Migrations, Monographies 22, Paris: Association des Amis du Centre d'Histoire et Civilisation de Byzance.

c. četiri i više autora
Za knjige štampane ćirilicom koje imaju četiri i više autora, u osnovnom tekstu navodi se samo ime prvog autora i dodaje se u nastavku **i dr.** Za knjige štampane latinicom koristi se u nastavku skraćenica ***et al*.** Skraćenica ***etc*.** koristi se u slučajevima kada ima više od tri suizdavača ili mesta izdanja.

2. Autorizovane knjige sa pridodatim imenom urednika

u tekstu: (Jeremić 2009: 40)
u Literaturi:
Jeremić, G. 2009
Saldum, Roman and Early Byzantine Fortification, ed. S. Perić, Cahiers des Portes de Fer, Monographies 6, Belgrade: Institute of Archaeology.

3. Priređene knjige (umesto autora - urednik, priređivač, prevodilac) - (ur.), (ed., eds.), (prev.).

u tekstu: (Поповић 1994)
u Literaturi:
Поповић, И. (ur.) 1994
Античко сребро у Србији, Београд: Народни музеј.
u tekstu: (Morris 2002)
u Literaturi:
Morris, I. (ed.) 2002
C*lassical Greece-Ancient Histories and Modern Archaeologies*, Cambridge: Cambridge University Press.
u tekstu: (Hurst and Owen 2005)
u Literaturi
Hurst, H. and Owen. S.(eds) 2005
Ancient Colonizations-Analogy, Similarity and Difference, London: Duckworth.
u tekstu: (Радојчић 1960)
u Literaturi:
Радојчић, Н. (prev.) 1960
Законик цара Стефана Душана 1349. и 1354, Београд: Српска академија наука и уметности.

4. Knjiga bez naznačenog autora
u tekstu: (Anon. 1985)
u Literaturi:
Anon. 1985
Anonymi Peri strategias, The Anonymous Byzantine Treatise on Strategy, *Three Byzantine Military Treatise* (trans. G.T. Dennis), Washington DC.

5. Istovremeno citiranje i navođenje više knjiga istog autora

a. pisanih različitim pismom
u tekstu: (Поповић 2002: 23-26; Popović 2006: 33)
u Literaturi:
Поповић, И. 2002
Накит са Јухора, остава или сакрални тезаурус, Археолошке монографије 14, Посебна издања 36, Београд: Народни музеј и Археолошки институт.
Popović, I. 2006
Roma Aeterna inter Savum et Danubium, Works of Roman Art from the Petrović-Vasić Collection, Belgrade: Archaeological Institute.

b. pisanih iste godine
u tekstu: (Dawkins 1996a; Dawkins 1996b)
u Literaturi:
Dawkins, R. 1996a
Climbing Mount Improbale, London: Viking.
Dawkins, R. 1996b
River out of Eden, London: Pfoenix.

6. Citiranje i navođenja poglavlja i odeljka u knjizi (zborniku radova)
u tekstu: (Петровић 1997: 87-90)
u Literaturi:
Петровић, Б. 1997
Накит, у: *Античка бронза Сингидунума,* ур. С. Крунић, Београд: Музеј града, 85-117.
u tekstu: (Samson 1970: 44-68)
u Literaturi:
Samson, C. 1970
Problems of information studies in history, in: *Humanities information research*, S. Stone, ed., Sheffield: CRUS, 44-68.

7. Prevedene knjige
u Literaturi:
Bajron, Dž. G. 2005 (1812)
Čajld Harold, predgovor Z. Paunović, prevod i predgovor N. Tučev, Beograd: Zavod za udžbenike i nastavna sredstva.
8. Knjige i članci objavljeni u elektronskom obliku
u tekstu: (Fishman 2005: 11)
u Literaturi:
Fishman, R. 2005
The rise and fall of suburbia, [e-book], Chester: Casle Press. Available through Anglia Ruskin University Library. http://libweb.anglia.ac.uk>[pristupljeno 5 juna 2005].

II RADOVI OBJAVLJENI U ZBORNICIMA, AKTIMA KONGRESA I SLIČNO

Prezime, Inicijal imena. Godina
Naslov rada, *Naslov zbornika (kurziv)*, ur. Inicijal imena. Prezime, Mesto izdanja: Izdavač, broj strane.

Брукнер, О. 1987
Импортована и панонска керамичка продукција са аспекта друштвено-економских промена, у: *Почеци романизације у југоисточном делу провинције Паноније*, ур. М. Стојанов: Нови Сад: Матица српска, 25-44.

Potrebno je navesti i podatke o seriji:
Петровић, П. 1997
Римљани на Тимоку, у: *Археологија источне Србије* (Научни скуп Археологија источне Србије, Београд-Доњи Милановац, децембар 1995*)*, ур. М. Лазић, Центар за археолошка истраживања 18: Београд: Филозофски факултет, 115-131.

III PERIODIKA

Prezime, Inicijal imena. Godina
Naslov rada, *Naziv časopisa (*kurziv) broj časopisa: broj strane.

Бајаловић-Хаџи-Пешић, М. 2001
Налази хабанске и постхабанске керамике у Србији, *Годишњак града Београда* 47-48 (2000-2001): 107–121.
- Za časopise čiji su nazivi slični, iza naziva časopisa u zagradi treba navesti mesto izdanja:
Анђелковић, Б. 1988
Праисторијски налази са локалитета Јелица-Градина, *Зборник радова Народног музеја* (Чачак) 18: 81–85.
Анђелковић, Б. 1994
Први резултати анализе мумије из Народног музеја у Београду, *Зборник Народног музеја* (Београд) 15-1: 153–159.

- *Старинар* se, zavisno od godine izdanja, navodi punim nazivom:
godine 1884-1895 *Старинар Српског археолошког друштва*
godine 1906-1914 [novog reda] *Старинар* (н.р.)
godine 1922-1942 [treća serija] *Старинар* (т.с.)
godine 1950-2010 [nova serija] *Старинар* (т.с.)

- Ukoliko se godina izlaženja i godina za koju časopis izlazi razlikuju, navesti i drugu godinu u zagradi:
Жеравица, З., и Жеравица, Л. 1979
Средњовековно насеље у Поповици код Неготина, *Старинар* (н.с.) 28-29 (1977-1978): 201–211.

Rad u štampi / u pripremi
- (u štampi), u tekstu na engleskom jeziku (in press)
- (u pripremi), u tekstu na engleskom jeziku (forthcoming).

u tekstu: (Јовановић, u štampi)
u literaturi:
Јовановић, А. (u štampi)
Бор и околина у античком периоду, у: *Бор и околина у праисторији, антици и средњем веку*, ур. М. Лазић, Бор и Београд: Музеј рударства и металургије и Филозофски факултет.

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V Doktorske disertacije i magistarske teze
Umesto mesta izdanja i izdavača navodi se naziv fakulteta/univerziteta gde je teza odbranjena.
u literaturi:
Ilić, O. 2005
Ranohrišćanski pokretni nalazi na području dijeceze Dakije od IV do početka VII veka, Magistarski rad, Filozofski fakultet, Univerzitet u Beogradu.
Patch, D. C. 1991
The Origin and Early Development of Urbanism in Ancient Egypt: A regional Study, Ph.D thesis, University of Pennsylvania.

VI Popularni magazini/časopisi i novinski članci
u tekstu: Кашанин, М. 1929
u literaturi:
Кашанин, М. 1929
Музеј савремене уметности, *Политика, 23. јул, 7-8.*

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ARHEOLOGIJA I PRIRODNE NAUKE

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The journal ***Arheologija i prirodne nauke* (*Archaeology and Science*)** publishes original papers that have not been published previously: original scientific articles, scientific reviews, excavation reports, book reviews, critical reviews.

Articles can be submitted in English, German or French. If the paper is written in English, summary can be in Serbian (for authors from Serbia) or English (for international authors), while articles submitted in German or French need to have a summary in English.

Papers submitted to the editorial staff of the periodical ***Arheologija i prirodne nauke* (*Archaeology and Science*)** must be formed in a standard way. Each paper submitted has to contain: title; author's name; name of the institution (affiliation); abstract; key words; main text; resume; illustrations with captions; bibliography; contact address.

1. Titles need to be short and clear, describing content in the best possible way. Words used in titles should be apropriate for indexing and web-searching. If there are no such words withing titles, it is advised to add a subtitle. Titles are to be written in the fifth or sixth line, under the top margin, bold and with font size 14 (pts).

2. Author(s) should give their full name(s), including first name, surname and middle initial.

3. Autor(s) need to state official names and addresses of their employees, including names and addresses of employees which conducted research that lead to the results published. With complex institutions, complete title is to be named (ex.: Belgrade University, Faculty of Philisophy, Archaeological Department, Belgrade).

4. Abstract, consisting of 100-250 words, describes shortly content of the paper. Within abstracts, it is advised to use terms convenient for indexing and web-searching. Abstracts should offer data about aims, methods, results and conclusions

of the research. Abstracts should be bilingual (in Serbian, English or some other foreign language). Abstracts in foreign languages need to be adequatly lectured, i.e. posses correct grammar and spelling.

5. Key words need to be terms which describe paper's content in a best way, suitable for indexing and web-searching. They should be named according to a widely accepted international source (lists, indexes, dictionary, thesaurus), like list of key-words Web of Science. The number of keywords should not exceed ten words.

6. The lenght of papers should not exceed 32 pages, DIN A4, including footnotes and illustrations. The main text should be written in Times New Roman or Arial (12 pts), MS Office Word 97 or later, line-spacing 1,5 and with margins 2,54 cm. Main text should not contain illustrations. They are to be submitted as separate files.

7. Apart from Serbian, manuscripts can be submitted in one of worldwide languages (English, German, French). Names of translators, if any, should be stated. Papers submitted should have an abstract and a resume written in some other language. If a paper is submitted in a language other than Serbian, there should be an abstract and a resume written in Serbian language. Words, quotations and titles written in some other language should be written in their original form.

Footnotes can be incorporated within the main text. They should contain less important data or apropriate explanations. They are not to be replaced with quoted literature. (An appendix to these Instructions explains the way of quoting to be applied).

8. The summary must have the same content as the abstract, only expanded, but not longer than 1/10 of the paper's overall size. It is strongly advised to write the summary in a structural form. Papers submitted in English must have the summary in Serbian (for Serbian authors) or English (for foreign authors). Papers in German or French must have the summary in English. As well as the summary text, the title of the paper, the key words and the author's affiliation should be written in the appropriate language.

9. Illustrations (photographs, tables, drawings, graphs etc.) should be submitted in a proposed manner. Scanned illustrations should be submitted in a 600 dpi resolution, while photographs are to be submitted in a resolution of at least 300 dpi, in formats TIFF, PSD or JPG. Illustrations are to be submitted as separate files and should not be incorporated into the main text. Captions should be submitted bilingually (using the language in which the manuscript was written and in English or some other of the proposed languages).

10. The bibliography should include bibliographic sources (articles, monographs etc.). Within the paper it should be quoted with references in the footnotes and as a list of literature/ bibliography at the end of the manuscript. The bibliography represents a part of every scientific paper, with precisely quoted bibliographical references. The list of used sources should follow a unique pattern, in a sequence based on the quoting standards determined by these instructions. The bibliography must be presented in the language and alphabet in which each source has been published. In cases when the publication is published bilingually, all data should also be written bilingually. In cases where the summary is written in another language, then the title of the summary should be written in the same language.

In the list of references: **Popović, I. 2009**

Gilt Fibula with Christogram from the Imperial Palace in Sirmium (Резиме: Позлаћена фибула са христограмом из царске палате у Сирмијуму) *Starinar* LVII (2007): 101-112.

Publications published in Cyrillic, Greek or any other non Latin alphabet should be transliterated into the Latin alphabet in accordance with the standards of The American Library Association and The Library of Congress of the United States (http://www.loc.gov/catdir/cpso/roman.html), for example:

Quotation within a footnote: (Поповић 1988: 67)

In the list of references: **Поповић, И. 1988**

Античко оруђе од гвожђа у Србији, Београд: Народни музеј.

(Popović, I. 1988

Antičko oruđe od gvožđa u Srbiji, Beograd: Narodni muzej).

11. Bibliography's structural elements (author's name, title of work, source etc.) should be written according to standard forms of quoting. Editorial staff of the periodical accepted the reccomendation of the Ministry of science and technological development and decided that authors should precisely follow quotation rules named below.

The following examples describe the most frequently quoted kinds of references:

I BOOKS (monograPHS)

1. Author's books
a. single author
within main text: (Popović 2006)
in bibliography:
Surname, name's initial. Year of publishing *Title of book* (*italic),* Place: Editor.

Popović, I. 2006
Roma aeterna inter Savum et Danubium, Works of Roman Art from the Petrović-Vasić Collection, Belgrade: Archaeological Institute.

- Series' name and number is also needed:
Mirković, M. 1968
Rimski gradovi na Dunavu u Gornjoj Meziji, Dissertationes 6, Beograd: Arheološko društvo Jugoslavije.
Papazoglu, F.1969
Srednjobalkanska plemena u predrimsko doba (Tribali, Autarijati, Dardanci, Skordisci i Mezi), Djela 30, Centar za balkanološka ispitivanja 1, Sarajevo: Akademija nauka i umjetnosti Bosne i Hercegovine.

b. two or three authors
Between the names of the first and the second author, or the second and the third author, "and" should be written, no matter what the main language of the publication.

within main text: (Popović i Borić-Brešković 1994)
in bibliography:
Popović, I. i Borić-Brešković B. 1994
Ostava iz Bele Reke, Arheološke monografije 7, Beograd: Narodni muzej.

Ivanišević, V., Kazanski, M. and Mastykova, A. 2006
Les necropoles de Viminacium a l'Epoque des Grandes Migrations, Monographies 22, Paris: Association des Amis du Centre d'Histoire et Civilisation de Byzance.

c. four or more authors
Books written by four or more authors, within the main text and in Serbian cyrillic, only the first name is written and **i dr.** is added. Books printed in Lati alphabet, the abbrevation ***et al.*** is applied. The abbrevation ***etc.*** is used in cases when there are more than three editors or places of editing.

2. Author's books with added name of the editor

within main text: (Jeremić 2009: 40)
in bibliography:
Jeremić, G. 2009
Saldum, Roman and Early Byzantine Fortification, S. Perić (ed.), Cahiers des Portes de Fer, Monographies 6, Belgrade: Institute of Archaeology.
3. Edited books (instead of the author – editor, translator) - (ed., eds.), (trans.).

within main text: (Поповић 1994)
in bibliography:
Поповић, И. (ур.) 1994
Античко сребро у Србији, Београд: Народни музеј.
within main text: (Morris 2002)
in bibliography:
Morris, I. (ed.) 2002
C*lassical Greece-Ancient Histories and Modern Archaeologies*, Cambridge: Cambridge University Press.
within main text: (Hurst and Owen 2005)
in bibliography:
Hurst, H. and Owen. S.(eds) 2005
Ancient Colonizations-Analogy, Similarity and Difference, London: Duckworth.
within main text: (Радојчић 1960)
in bibliography:
Радојчић, Н. (prev.) 1960
Законик цара Стефана Душана 1349. и 1354., Београд: Српска академија наука и уметности.

4.Way of quoting books without author's name
within main text: (Anon. 1985)
in bibliography:
Anon. 1985
Anonymi Peri strategias, The Anonymous Byzantine Treatise on Strategy, *Three Byzantine Military Treatise* (trans. G.T. Dennis), Washington DC.

5. Simultaneous quoting of several books of the same author

a. written in different alphabets
within main text: (Поповић 2002, Popović 2006)
in bibliography:
Поповић, И. 2002
Накит са Јухора, остава или сакрални тезаурус, Археолошке монографије 14, Посебна издања 36, Београд: Народни музеј и Археолошки институт.
Popović, I. 2006
Roma Aeterna inter Savum et Danubium, Works of Roman Art from the Petrović-Vasić Collection, Belgrade: Archaeological Institute.

b. written in the same year
within main text: (Dawkins 1996a, Dawkins 1996b)
in bibliography:
Dawkins, R. 1996a
Climbing Mount Improbale, London: Viking.
Dawkins, R. 1996b
River out of Eden, London: Pfoenix.

6. Quoting chapters in books (acta)
within main text: (Петровић 1997: 87-90)
in bibliography:
Петровић, Б. 1997
Накит, у: *Античка бронза Сингидунума,* С. Крунић (ур.), Београд: Музеј града, 85-117.

within main text: (Samson 1970: 44-68)
in bibliography:
Samson, C. 1970
Problems of information studies in history, in: *Humanities information research*, S. Stone, (ed.), Sheffield: CRUS, 44-68.

7. Translated books
in bibliography:
Bajron, DŽ. G. 2005 (1812)
Čajld Harold, Z. Paunović (predgovor), N. Tučev (prevod), Beograd: Zavod za udžbenike i nastavna sredstva.

8. Books and articles published in electronic form
within main text: (Fishman 2005: 11)
in bibliography:
Fishman, R. 2005
The rise and fall of suburbia, [e-book], Chester: Casle Press. Available through Anglia Ruskin University Library. http://libweb.anglia.ac.uk>[pristupljeno 5 juna 2005].

II PAPERS PUBLISHED IN PERIODICALS, CONGRESS ACTA AND SIMILAR

within main text: (Vasić 2008: 69, fig.3)
in bibliography:
Surname, name's initial. Year
Title, *Title of the acta (italic)*, Name's initial. Surname, (ed.), Place of editing: Editor, page numbers.
Vasić, M. 2006. Stibadium in Romuliana and Mediana. *Felix Romvliana 50 years of archaeological excavations.* M**.** Vasić (ed.). October, 27-29 2003, Zaječar, Serbia. Belgrade: Institut of Arhcaeology, Committee on Archaeology of Serbian Academy of Sciences and Arts, and Zaječar: National Museum, 69-75.

Series' data are also needed:

Петровић, П. 1997
Римљани на Тимоку, у: *Археологија источне Србије* (Научни скуп Археологија источне Србије, Београд-Доњи Милановац, децембар 1995*)*, М. Лазић (ур.), Центар за археолошка истраживања 18, Београд: Филозофски факултет, 115-131.

III PERIODICALS

within main text: (Бајаловић-Хаџи-Пешић, 2001: 108)

Surname, Name's initial. Year
Title, *Name of the periodical (italic*) number of the periodical: page number.

Бајаловић-Хаџи-Пешић, М. 2001
Налази хабанске и постхабанске керамике у Србији, *Годишњак града Београда* 47-48 (2000-2001): 107–121.

- For periodicals with similar titles, behind the name of the periodical, place of publishing should be stated in brackets:
Анђелковић, Б. 1988
Праисторијски налази са локалитета Јелица-Градина, *Зборник радова Народног музеја* (Чачак) 18: 81–85.
Анђелковић, Б. 1994
Први резултати анализе мумије из Народног музеја у Београду, *Зборник Народног музеја* (Београд) 15-1: 153–159.

- Depending on the year of publishing *Старинар* is named in its full title:
years 1884-1895 *Старинар Српског археолошког друштва* years
1906-1914 [novog reda] *Старинар* (н.р.)
years 1922-1942 [treća serija] *Старинар* (т.с.)
years 1950-2010 [nova serija] *Старинар* (н.с.)
- If there is a difference between the year of actual printing and the year of publishing, the second is stated in brackets:
Жеравица, З., и Жеравица, Л. 1979, Средњовековно насеље у Поповици код Неготина, *Старинар* (н.с.) XXVIII-XXIX, (1977-1978): 201–211.

Paper in print / forthcoming
- (in print), within papers written in English (in print)
- (forthcoming), within papers written in English (forthcoming).

within main text: (Јовановић, in print)
in bibliography:
Јовановић, А. (in print)
Бор и околина у античком периоду, у: *Бор и околина у праисторији, антици и средњем веку*, ур. М. Лазић, Бор и Београд: Музеј рударства и металургије и Филозофски факултет.

Papers overtaken from the internet, from electronic periodicals, are quoted in the same way as printed papers, only there is a full web-address written at the end with http://...

V Doctoral and master theses
Instead of place of editing and editor, the full name of faculty/university is given, where the thesis was conducted.

within main text: (Ilić, 2005)
in bibliography:
Ilić, O. 2005
Ranohrišćanski pokretni nalazi na području dijeceze Dakije od IV do početka VII veka, Magistarska teza, Filozofski fakultet, Univerzitet u Beogradu.

within main text: (Patch, 1991)
in bibliography:
Patch, D. C. 1991
The Origin and Early Development of Urbanism in Ancient Egypt: A regional Study, Ph.D thesis, University of Pennsylvania.

VI Articles from newspapers
within main text: (Кашанин, 1929)
in bibliography:
Кашанин, М. 1929, Музеј савремене уметности, *Политика, 23. јул, 7-8.*

Main text
Quoting bibliography in the main text according to the pattern (author's surname and year: page number, footnote, figure, table):
(Papazoglu 1969: 52, sl. 4/1, T. 18-4-6)
(Babović 1984: 68; Moritz 1978: 68, figs. 40-41; Tasić 1997: 84, sl. 21)
- Additional data within brackets can be written after a dash:
(Swoboda-Milanović 1958: 55, Taf. 18/24 – olovne pločice).
- The same work of the same author in the next quotation can be quoted abbrevated *ibidem* (*ibid.*: page number).
- The second work of the same author in the next quoting, if there are no quotations in between, is quoted as (*idem* year: page number): (Faltings 1998a: 367; *idem* 1998b: 31–32).
- In papers written in Serbian language, the transcribed exact pronounciation of a foreign author's name is written within the main text, without brackets, but the original name is written in quotation: ...Vencel (Wenzel 1965: T. HS/4).
- If the author, work and page number are the same as in the previous quotation, they are quoted as *loc. cit.* (lat. *loco citato)* – quoted place.
- Abbrevation *cf.* (lat. *confer*) - compare
- Abbrevation *e.g.* (lat. *exempli gratia*) - for example
- Abbrevation *i.e.* (lat. *id est*) - actually.

12. All of the quoted referrences are listed after alphabetic order, if written in English or some other foreign language, initial's order withing author's surname or the initial letter within the quoted title (if the author or editor are not stated).

SUBMITTING PAPERS

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14. Each of the submitted papers will be forwarded to anonymous reviewers by the editorial board. For further information concerning the peer review process and the editorial board's, reviewer's and author's obligations and duties, authors can refer to the EDITORIAL POLICY of the *Arheologija i prirodne nauke (Archaeology and Science)* journal.

15. Manuscripts accepted for printing should be submitted to the editorial secretary. Apart from printed version, papers should be submitted in electronic form, on a CD.

- Printed version should be written as follows: 1. title of work; 2. name, middle initial and surname of the author; 3. author's affiliation; 4. abstract; 5. key words; 6. text body; 7. resume; 8. bibliography; 9. illustrations; 10. captions; 11. author's address (address or e-mail address).

- Digital version should be divided into several files: 1. Word file with the first six parts of paper (1. title; 2. author's name, middle initial and surname; 3. author's affiliation; 4. abstract; 5. key words; 6. text body); 2. Word file with resume; 3. Word file with quoted bibliography; 4. Folder with graphic illustrations; 5. Word file with captions (billingual, Serbian and English or some other language); 6. Word file with author's address.

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