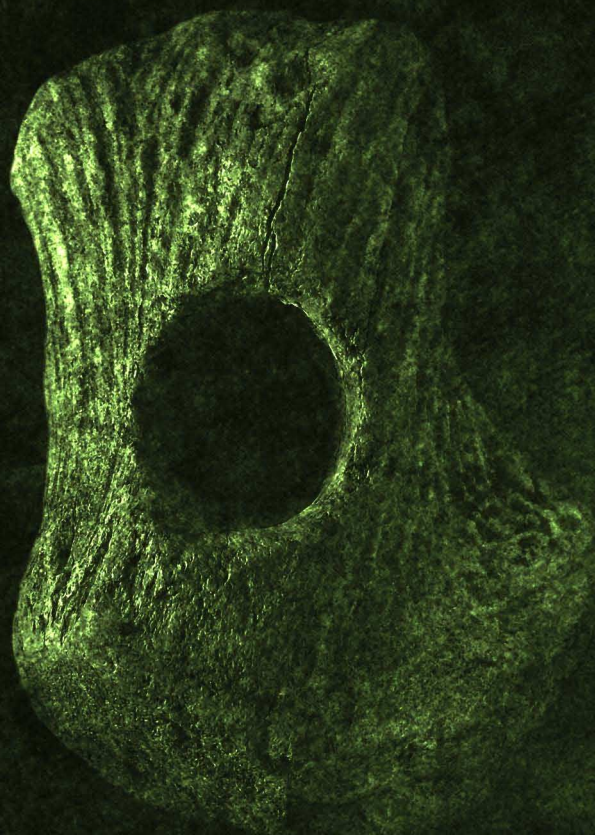


# ARCHAEOLOGY

*studying technology from prehistory  
to the Middle Ages*



**Editors**

*Selena Vitezović*

*Dragana Antonović*

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**ARHEOTEHNOLOGIJA:**  
**proučavanje tehnologije od praistorije**  
**do srednjeg veka**

**Urednici:**  
**Selena Vitezović**  
**Dragana Antonović**

**Beograd, 2014**

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## ARCHAEOLOGY: STUDYING TECHNOLOGY FROM PREHISTORY TO THE MIDDLE AGES

Technology is a fascinating material expression of human culture, commonly regarded as an evidence of human triumph over nature. The human past was seen as a constant progress from “primitive” to “technologically advanced”, and even classified after what is thought to be a dominating technique in a given period (e. g. Childe 1944, see also Greene 2006). Technological innovations were considered the main, if not the only driving forces that shape societies and cultures (cf. Pfaffenberger 1988).

Technology, as a conceptual approach to material culture studies, derived from the Greek word *τέχνη*, meaning skill, implies all human actions upon a matter (Inizan et al. 1995: 13). Everything is technological around us, and this includes not only artefacts, but all structures, buildings, and even nature modified by human hand (cf. Lemonnier 1992b, Greene 2006). The term technology includes a full range of topics from those related to individual level (body gestures, embodied knowledge in crafting) to social and cultural settings of production.

Archaeological studies are indistinguishable from studies of technology; material remains constitute the core of archaeological evidence, regardless of the period, region, methodological approaches or theoretical frameworks, and even studies in beliefs, religion, etc., rely on analyses of diverse artefacts. Artefacts represent our source for “reading” past lives – by studying them, we can make conclusion about people who made them and used them, what their meaning and value were, how they were used, reused and discarded. They may have both functional and symbolic roles, and a special meaning for the society or individuals within it, that may change and/or became more complex over time. During its lifetime, an object can be used in many different contexts and have diverse, even contradictory meanings and values. Objects can also be rare and luxury, or occasional, craft-produced objects, or common, functional, mass-produced industrial objects; furthermore, one class of artefacts may have examples of rare, crafted and mass-produced specimens (cf. Caple 2006, Miller 2007).

Ideas from social anthropology had an important influence on the theoretical advances in studies of technology. The work of Malinowski and Radcliffe-Brown, for example, showed that a complex social structure was invariably reflected within objects (cf. Caple 2006). Theories of a French anthropologist Marcel Mauss, who was interested in how *culture* (as opposed to nature) influences and shapes human behaviour, are particularly important as well. His starting point was that something generally per-





ceived as *natural* (for example, body posture, way of walking, etc.), was in fact *cultural*. The way a person eats, walks, sleeps, even holds and uses tools, differs, depends on their culture, age and sex. The accent of these studies is on the impact of a group on individuals, their relationships, as well as the questioning of the *cultural* and the *natural* in human behaviour (Deliège 2012 [2006]: 82-84, Lévi-Strauss 1982 [1973]: 13-15, cf. also Inizan *et al.* 1995: 14).

A wider concept of technology, which goes beyond artefact analyses, which regards technology as a *practice*, as ways of doing or making something, which also includes social and cultural components into the studies, is more and more accepted by many researchers. Henry Hodges (1976) distinguished technology from the study of stylistic details of artefacts, implying that technology was about the *process* of production rather than the endpoint (objects).

Ursula Franklin (1992) understood technology as ways of *doing* something rather than simply ways of making (creating) something (an object), so that there are technologies of prayer and of storytelling as well as of pottery production and weaving, while for Robert Merrill (1977: vi) technology is “the culture surrounding the actions or activities involved in making or doing things”. For M.-A. Dobres and C. Hoffman (1999) technology is “an ever unfolding *process*”, and their view of technology “stresses the dynamic, ongoing and socially constituted nature of sociotechnical activities” (Dobres & Hoffman 1999: 3).

Heather Miller, in her book dealing with archaeological approaches to technology, defined it as a “set of actions and relationships: from production itself, to the organization of the production process, to the entire cultural system of processes and practices associated with production and consumption” (Miller 2007: 4). Furthermore, she defines the production as “the actual process of fabrication or creation, including both the material objects and the techniques and gestures used”, organization of production as “the organizational arrangement within which production takes place”, and the technological system as an active system of interconnections between people and objects during the creation of an object, its distribution, and to some extent its use and disposal. In other words, technology or technological systems can be roughly described as processes and practices associated with production and consumption, from design to discard (Miller 2007: 5).

Diverse concepts have been developed, and probably the most important contribution to the study of technology was the work of André Leroi-Gourhan (1964, 1965, 1971), who created the concept of *chaîne opératoire*.

*toire* (see also Lemonnier 1992a). This is an analytical tool for studying the mode of creating, using and discarding an artefact, starting with raw material acquisition, mode of manufacture, final form, use (including caching, breaking and repairing) up to final discarding, with the main goal of reconstructing the organization of a technological system and of describing and understanding all cultural transformations that a specific raw material had had to go through. It is a chronological segmentation of actions and mental processes required in the manufacture of an artefact and its maintenance in the technical system of a prehistoric group (Inizan *et al.* 1995: 14, cf. also Sellet 1993). The concept is not only about reconstructing the algorithmic sequence of operations in creating one object, but it is a complex analysis of operational chain within one society, which includes the analysis of technological choices. The analyses of technologies today include a variety of different approaches, most of them putting the emphasis on cultural and social aspects of technology.

Methodology also went through significant changes, especially in the field of interdisciplinary and experimental work. Studies of diverse artefacts, such as stone, flint or metal, cannot be imagined without careful identification and detailed analyses of raw material origin. Interdisciplinary researches became particularly emphasized by the processual archaeology since the 1960s, and today they constitute an integral part of almost every archaeological research, regardless of the chronological period. They are irreplaceable for the determination of raw material origins and can also contribute to identifying diverse transformative processes certain raw material had undergone.

Experimental and ethnoarchaeological studies also constitute a very important segment of technological studies. Although present in archaeological research since its early days (e.g., Martin 1910), they are more diverse, more common and more scientifically based since the mid-20<sup>th</sup> century. Again, processual archaeology and its demands for scientific rigor contributed greatly in developing new methods, but the work of soviet archaeologist Sergei A. Semenov has the most prominent place in the history of experimental archaeology, due to the diversity of research questions he dealt with and the wide range of chronological periods and materials he covered (Семенов 1957, 1968, Semenov 1976; cf. Korobkova 2008 for an overview, also Skakun & Longo eds. 2008 for an overview of current research in this field).

Most archaeological technology studies focus on an individual technology – flint knapping, metallurgy, etc. Archaeologists usually classify technologies into “crafts” or “industries” based on material or end-product

type: clay (pottery) production, metal working, basket making, stone object (lithics) production, woodworking, textile manufacture. Such material groupings are very useful from both the theoretical as well as a practical perspective, however, they may be counterproductive sometimes (cf. Miller 2007), or better put, the study should not end with analyses of a single technology only. Although this is necessary for a deeper understanding of particular technologies, given the complexity of the topics, a wider approach is needed, namely a multiple technologies perspective (Lemonnier 1992b, 1993, see also Inizan et al. 1995).

All techniques in a given society refer to one another – they can share the same resources, same knowledge, same tools, same actors. Moreover, some techniques use the products of others, as well as the existence of operational sequences or technical principles in common, creating multiple relations of interdependence, which gives them a systemic character. All technologies have systemic aspects, and we can talk about technological systems in the same way as, for example, ethnologists talk about kinship systems. Technological systems can be analysed on three levels. Firstly, we can discuss how these five components interact with each other to form a technology. Secondly, if we consider all the technologies of a given society, we can analyse how they are interrelated. And finally, the third level of discussion is the relation between technologies and other social phenomena. Analyses of multiple technologies, therefore, can expand the range of studied cultural phenomena and at the same time provide a better understanding of a given culture and society (Lemonnier 1992b, 1993).

\* \* \*

This book is a result of a session organized at the XXXVI Annual meeting of the Serbian Archaeological Society, held in Novi Sad, from 30<sup>th</sup> May to 1<sup>st</sup> June 2013. The aim of the session was to promote the technological perspective on different aspects of material culture and to encourage multiple technology studies. Papers include studies on artefacts from stone (M. Lopičić, D. Antonović, D. Rajković et al., V. Dimitrovska), bone (C. Beldiman et al., D.-M. Sztancs et al., S. Vitezović), clay (I. Atanasova, J. Vuković, V. Bikić) and metal (M. Radivojević et al.), but also include more complex technologies, such as constructions of thermic structures (A. Đuričić), the making of mosaic substructures (G. Jeremić) and water supply systems (T. Mihailović). Also, studies cover a large time span, from Late Palaeolithic/Mesolithic to the Middle Ages.

We would like to thank all the participants of the session and the audience as well, the contributors of the book, reviewers, and, last but not least, to Jelena Vitezović and Ivan Bugarski for their help with English translations and proofreading.

Selena Vitezović,  
Dragana Antonović

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# THE TECHNOLOGY OF MAKING FLOOR MOSAIC SUBSTRUCTURES IN LATE ANTIQUITY IN PROVINCES OF DACIA MEDITERRANEA AND DACIA RIPENSIS

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**Abstract:** Floor mosaics that were placed in public and private buildings on the territory of Late Antique provinces of *Dacia mediterranea* and *Dacia ripensis*, represent an important testimony on the richness of both communities and individual citizens. This paper will deal with substructures on which mosaics were placed, their structure and methods of placing within the buildings. The type and composition of the substructure depended on the finishing of the mosaic floor, i. e., from motives and mosaic pavement technique that was applied. The substructures were made from packed clay, broken stones, pebbles, plaster with admixtures (sand, triturated bricks or marble dust), bricks, as well as marble plates. Late Antique standards, visible on these examples, suggest that with time some layers or their thickness were reduced. The question of their preservation, which also depended on the soil stability, will be considered.

**Key words:** floor mosaic, *opus tesellatum*, *opus vermiculatum*, *sectilia pavimenta*, mosaic substructure, manufacturing technique, *Dacia mediterranea*, *Dacia ripensis*, Late Antiquity.

**Apstrakt:** Podni mozaici, postavljeni u javnim i privatnim građevinama na tlu kasnoantičkih provincija Priobalne i Sredozemne Dakije, predstavljaju značajno svedočanstvo o bogatstvu stanovnika i zajednica. U ovom prilogu bavićemo se podlogama na kojima su mozaici počivali, njihovom strukturom i načinima njihovog postavljanja unutar objekata. Vrsta i sastav podloge zavisio je od završne obrade samog mozaičkog poda, odnosno motiva ili mozaičke tehnike koji je primenjen. Podloge su izrađivane od nabijene gline, lomljenog kamena, oblutaka, maltera sa agregatima (pesak, mrvljena opeka ili mermerni prah), opeka, kao i lomljenih mermernih pločica. Kasnoantički standardi, koji se ogledaju na ovim primerima, ukazuju da je tokom vekova došlo do redukovanja određenih slojeva ili njihovih debljina. Pitanje njihove očuvanosti, koja je zavisila od stabilnosti tla, takođe će biti razmatrano u ovom prilogu.

**Ključne reči:** podni mozaik, *opus tesellatum*, *opus vermiculatum*, *sectilia pavimenta*, mozaička podloga, tehnike izrade, *Dacia mediterranea*, *Dacia ripensis*, kasna antika.



## Introduction

In the Roman world, mosaics were an expensive and valued product, available only to a narrow circle of privileged, rich citizens, sometimes the emperors themselves, and to *collegia*, state, municipal, religious and other communities. From the manufacture aspect, mosaics were not a spontaneous artistic work, but a work with a firm and strict framework, made according to technical rules, which were getting perfected with time. In the Roman period, the main function of mosaics – transposed from Greek and Hellenistic times, was to demonstrate the power and influence of the owner, to impress the visitors, to have the guests admire, perhaps even envy, and spread words about it to their friends, and also write about it in chronicles. Through chosen motives, the taste and richness of the owner were presented, as well as the skills of the mosaic craftsman that was hired. Apart from the aesthetical, mosaics also had a symbolic function – to show the philosophical or religious beliefs of the customer, even his superstition – by invoking good luck and bringing protection from negative influences in their home.

To make a mosaic floor a lasting artistic or craftwork piece, with a practical role of being a walking surface at the same time, a good substructure on which it would be laid was mandatory. The level of preservation of the mosaic depended on the quality of the substructure.

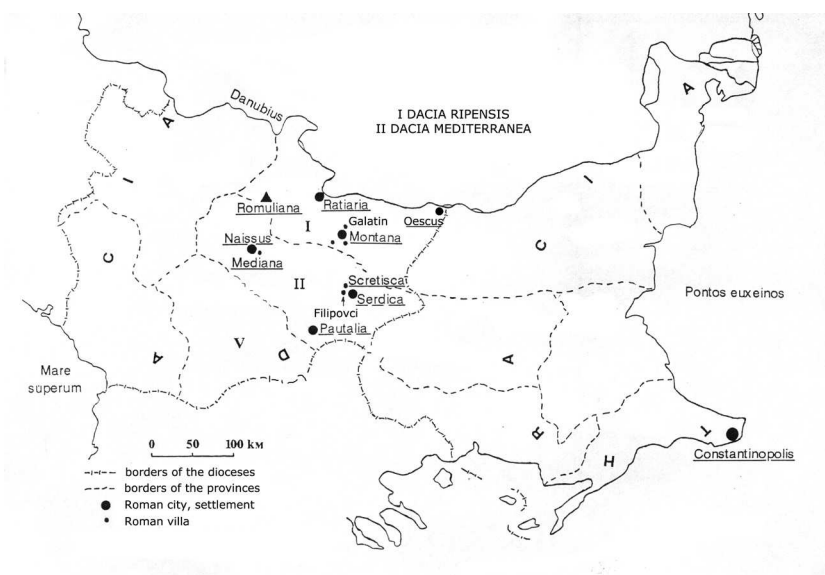
### Mosaic floors in *Dacia ripensis* and *Dacia mediterranea*

In Late Antique period, in the provinces of *Dacia ripensis* and *Dacia mediterranea*, eleven sites were registered, on which the remains of floor mosaics were discovered within eighteen different buildings (fig. 1).<sup>1</sup> Mosaics were decorating the floors of palaces (*palatium*) in Romuliana (palace I and the so-called *triclinium Romulae*) (Чанак-Медић 1978, 97-119; Гамзиџраг – касноантички царски дворац 1983, 37-43; Срејовић 1985, 51-67; Jeremić 2006a, 47-53), Ratiaria (the so-called governor's palace) (Kuzmanov 2000, 27-43; Valeva 2000, 45-57) and Naissus (the building

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<sup>1</sup> This paper is restricted to the analysis of floor mosaics in the mentioned provinces, since no buildings with what are definitely wall mosaic decorations were registered so far. This is mainly due to the poor preservation of buildings themselves, mainly only the foundation or socle zones were discovered, with the preservations of walls being rarely above the level of 1-1,5 m. The presence of wall mosaics (*opus musivum – proprie dictu*) in some of the buildings of *Dacia ripensis* and *Dacia mediterranea* is confirmed by single finds of glass tesserae of small dimensions, found in layers above building floors, often with coating from golden leaves on one side.





**Fig. 1** Map of discovered mosaics in provinces *Dacia ripensis* and *Dacia mediterranea* (adapted after: Dintchev 2006, fig. 1)

**Sl. 1** Karta nalazišta mozaika u provincijama *Dacia ripensis* i *Dacia mediterranea* (prilagođeno prema: Dintchev 2006, fig. 1)

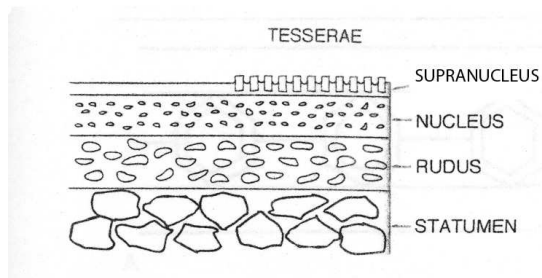
with octagon) (Jeremić 2007, 87-97) and luxurious and smaller villas (*villa urbana*, *villa suburbana*, *villa rustica*) in Naissus (villa on Konjsko groblje) (Гушић 1977, 91-96), Mediana (villa with peristyle, villa with octagon, villa with atrium and fortified villa on Vlaško brdo) (Jeremić 2006b, 145-154), Serdica (villa-palace with *thermae* below the hotel “Rila” and “Korekoma” building), Galatin, Montana, Oescus, Kostinbrod (Scretisca?) and Filipovci, in baths (*balnea*) in Romuliana and Mediana, a small Early Christian chapel from the late 4<sup>th</sup> century on Mediana (Jeremić 2006b, 155), as well as with-in the building of unknown function from Pautalia.<sup>2</sup>

Although the corpus of buildings decorated with mosaic floors is relatively high, unfortunately, most of these monuments are not adequately published or researched with sufficient details. Most researchers focused their works on stylistic, chronological and questions related to workshops, while technical aspect of the production of mosaics (analyses of the substructures – stone, bricks, plaster, admixtures, *tesserae*) is absent in most of the cases.<sup>3</sup>

<sup>2</sup> More on these villas cf. Jeremić 2010, 67-92, 147-164, with earlier references

<sup>3</sup> The data on mosaic substructures are mainly found only as part of the report of the conservator in the technical documentations or in the field documentation from excavations; in more detail, cf. *infra*.

Before we turn to the analyses of mosaic floors in buildings of *Dacia ripensis* and *Dacia mediterranea*, we will offer a short reminder on the data from Antique written sources, which give recommendations for placing mosaics on firm ground. Behind a visually beautiful product such as mosaics, there was a complex process of making the substructure and the very mosaic floor. Placing a mosaic floor represents final works in a building, *domus*, temple, public building. Vitruvius gives the most detailed data on the methods for their placing (Vitr. *De arch.* VII, 1, 1).<sup>4</sup> According to this architect, firstly, one was to establish the firmness of the soil; it was dug over and levelled, then pebbles were placed, for draining (fig. 2). They represent the first layer of the substructure – *statumen*, with the thickness of 9 *digiti* (about 17 cm, 1 *digitus* = 1,85 cm). Over that came a layer of non-used stones, mixed with lime in ratio 3:1, or secondary used stones, with lime in ratio 5:2. This layer, *rudus*, should be 6 *digiti* thick (about 11,6 cm), as well as the following layer – *nucleus*, from triturated bricks or *tegulae* and lime, in ratio 3:1. The final layer in which tesserae were emerged was 0,5–1 cm thick and consisted of fine plaster (*supranucleus*) (Moore 1968, 66). For nuancing the substructure, marble dust was used. While making the mosaics, if they were planned during the construction works, the organisation of construction area and schedule of diverse tasks were calculated. The floors in back chambers were decorated first, then in those in rooms up front, following the floors on porches and finally the ones at the entrance of the building (Baum-vom Felde 2003, 395–396).



**Fig. 2** The substruction of Roman mosaic floor (adapted base from Dunbabin 1999)  
**Sl. 2** Podloga rimskog mozaičkog poda (dopunjena osnova iz Dunbabin 1999)

In the Roman world, judging from Late Antique written sources, people who were making mosaics were classified as craftpersons, in several categories, depending on the complexity of their tasks, and were paid

<sup>4</sup> We note that his recommendations and experiences refer to the top works of Early imperial craftpersons from the capital city. Cf.: Moore 1968, 57.

accordingly. There was specialist for stone and earth floors *faber pavimentarius* (or *structor pavimentarius*), expert for placing mosaic floors – *faber tessellarius* (*tesserarius*), for wall mosaics – *museiarius* (*musivarius*), and *vermiculator* – the artisan for meticulous mosaic representations (Dunbabin 1999, 275). *Tessellarii* were in charge of the preparatory works (stone cutting, preparing the plaster, measuring, preliminary drafts and sometimes even placing simple geometrical motives). *Musivarii* were in charge of more complex works – making more complicated geometrical and especially figural motives.<sup>5</sup> In the process of making mosaics a painter was also involved – *pictor imaginarius*, who took care of figural compositions (Dunbabin 1999, 276). In the Edict by emperor Constantine from 337 AD mosaic craftsmen (*tessellarii* and *musivarii*) were mentioned as artisans, same as architects, medics, painters, sculptors, carpenters and other. They were relieved of the obligation of public work, so they could improve in their vocation, and, most importantly – so that they could teach their sons their crafts, and thus, we have here, in fact, a direct confirmation of the existence of family mosaic ateliers (Dunbabin 1999, 276).

However, the mosaics that were discovered in different parts of the Roman empire have shown that these recommendations and experiences from the capital city were not always followed. Placing *tesserae* into plaster required a lot of time, so the substructure was usually made in phases. Mosaic craftsman, depending on the complexity of the motive, would place during one day a fresh plaster base on a certain surface above the nucleus, than make a sketch, and this surface was usually the size of one modulus. Before placing *tesserae*, a concept of motives that will be applied must have existed, as well as exact measures of the room that was to be decorated. Metrical analyses have shown that for 25 m<sup>2</sup> of mosaic approximately 200.000 *tesserae* were needed, i. e., almost half a ton of stone (Allen and Fulford 2004, 33). The capacities of Roman stone industry could meet the needs of a large market in a relatively short period, and the remoteness of certain customers was not particularly important.

### Construction of mosaic floors

Studying sporadic data on substructures of mosaic floors from the above mentioned provinces of Dacia diocese, we can learn that Vitruvius'

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<sup>5</sup> In the Edict on prices by Diocletian (from 303 AD) there was a difference in wage for ordinary mosaic craftsman, who received 60 *denari*, similar to masons or artisans for interior works in buildings, unlike the figure drawers (*museariori imaginario ut supra diurni*), who had better wages and were earning 150 *denari* on daily basis. Cf. Leake 1826, 19

recommendations were largely ignored. Instead of 40 cm thick bases, mosaics were placed on much reduced groundwork. Among better prepared substructures are those with geometrical motives from palaces in Naissus, villas in Mihaylovgrad (*Montana*), Kostinbrod (*Scretisca?*) and Mediana, in the province of *Dacia mediterranea*, as well as mosaics from palatial complex in Gamzigrad (*Romuliana*) in *Dacia ripensis*. All the mentioned mosaic floors were made in the first half or mid-fourth century.

In general, mosaic floors can be divided into three categories:

- a. bases placed directly on the ground,
- b. bases placed on hypocaust pilasters,
- c. bases for cut marble plates, with a different final layer from the above two.

#### *A. Bases placed directly on the ground.*

These are in fact the bases that Vitruvius was writing about. Some of the mosaics from the imperial complex in Gamzigrad and villas from Mediana, Kostinbrod and Mihaylovgrad, were resting on substructures that were about 20-25 cm thick. They were made in a very similar way, although there is some forty years between them.<sup>6</sup> The common trait of all these mosaics is the reduction of rudus and nucleus, or a different combining of elements. In Gamzigrad (fig. 3-4), the statumen is made from broken bones and there was a layer of plaster with triturated bricks<sup>7</sup> over it, while in Mediana (fig. 5), in the villa with peristyle (porches), in the substruction, i. e., in the statumen, pebbles with fragmented bricks were used, and there was a layer of nucleus from triturated bricks and plaster over it.

In Montana, a large room with mosaic floor with a geometrical motif was discovered in a large villa rustica, with a total surface of approximately 5 m<sup>2</sup>. Below the mosaic there were three layers of substructure: one layer of pebbles and fragmented bricks and *tegulae*, 10-15 cm thick, a layer of packed clay and white lime, of a total thickness of 12 cm, on which a 3 cm thick layer of lime was posted that contained a lot of sand, thus giving to the mosaic a greyish-brownish colour, but which could not conjoin

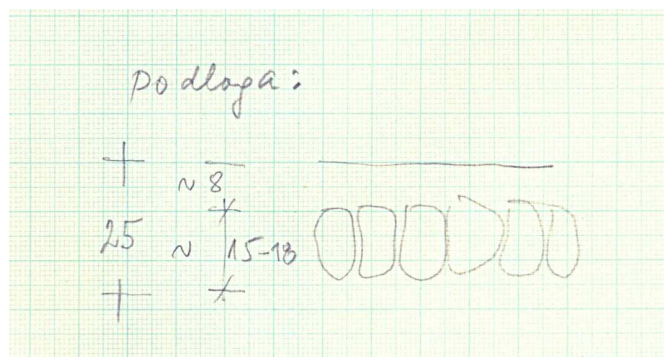
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<sup>6</sup> The mosaics from Gamzigrad were most likely made after the palace in Thessaloniki was decorated, during the last years of life of the emperor Galerius, 309-311 AD, while the mosaics from Mediana and those from the palace with octogon from Naissus were most likely made in 350s. For mosaics from Mihaylovgrad and Kostinbrod, *cf. infra*.

<sup>7</sup> This indormation was noted indirectly on the basis of the field drawing of the conservator M. Medić, documentation of the Archaeological institute in Belgrade. On mosaic floors in the room D of palace I, where pannels with figural representations of *venatores* and exotic animals were discovered, does not mention the drainage layer of stones, but a „layer of coarse plaster, lime and powder from bricks, and over it a fine layer of plaster 1-2 cm thick“, *cf. Popović 1961, 152.* .



**Fig. 3** Romuliana, the substruction of the mosaic (photo M. Medić, adapted by N. Borić)  
**Sl. 3** Romulijana, podloga mozaika (foto M. Medića, obradio N. Borić)



**Fig. 4** Romulana, the substruction of the mosaic in the atrium (drawing M. Medić, figures 3-8, 11-13: archives of the Institute of Archaeology, Belgrade)  
**Sl. 4** Romulijana, podloga mozaika u atrijumu (crtež M. Medića; slike 3-8, 11-13: dokumentacija Arheološkog instituta, Beograd)

properly without organic substances (eggs, blood). On this layer benzidine examination was performed, which determined that in this mixture of a small amount of lime and a lot of sand there was a large quantity of animal blood (Александров 1974, 6). Above this layer was a fine plaster coating, 1 cm thick, into which *tesserae* of white, blue, rose and black colour were placed. Mosaic from Kostinbrod, from the large villa with peristyle, in the vicinity of Serdica (period of the reign of Constantine), the base was somewhat differently made: first a layer of stones for drainage was placed, about 10 cm thick, over it a layer of plaster with triturated bricks, 12 cm thick, then bricks emerged into plaster, 5 cm thick, and over it a plaster coating with *tesserae* (Božilova 1987: 79).



Among the least carefully made Late Antique mosaics are those from the floors of villas in Galatin, in the vicinity of Montana. A mosaic floor, surface 10 x 6 m, had a semi-circular annex covered by *tesserae*, placed in rows, without ornament (Машов 1983, 85). According to the findings of statistical analyses, this mosaic was made in the period between the last decades of third–mid-fourth century (Машов 1983, 91). Here, little care was taken on the proper substructure making. Statumen and rudus were completely left out and a nucleus from clayey plaster was directly placed on the soil, a nucleus of uneven thickness 4-8 cm, over which a thin layer (0,8-1,6 cm thick) was placed, a mixture of lime and sand, without adding triturated bricks, into which, while it was still wet, *tesserae* were placed.

The latest example from this group is a small mosaic field, from the Early Christian chapel from Mediana, end of the 4<sup>th</sup> century (Јеремић 2006б, 155). The mosaic, i. e. Christogram, was placed directly on the earth floor in the chapel. *Tesserae*, probably secondarily used from the villa with peristyle, or, perhaps, taken from an un-localized garbage deposit place that remained after mosaic craftsmen from mid- fourth century, were simply emerged into a thin plaster coating (Васић 2004, 291). It is obvious that this was not made according to mosaic craftsmen principles, but it represents instead one *ad hoc* work of artisans of some other sorts, hired for the construction on this chapel.



**Fig. 5** Mediana, the substruction of the mosaic of the peristyle of the villa (photo M. Medić 1972)

**Sl. 5** Medijana, podloga mozaika peristila vile (foto M. Medića 1972)

### *B. Bases placed on hypocaust pilasters.*

When it comes to mosaics that were placed on hypocaust pilasters, instead of a stone drainage layer, the first layer were large bricks (dim. generally 56 x 55 x 5,5-6 cm), with touching corners laid on pilasters (fig. 6). These examples were noted in Gamzigrad, Naissus and Mediana. Here there was no need for draining, but for conducting the heating. According to the field documentation from the research of the palace with octagon in Naissus, the mosaic was placed on two layers of hydrostatic plaster, with a total thickness of 10 cm, below which there was a substructure 10 cm thick, made of broken stones and lime mortar (*rudus*). This is a later flooring, under which an older one was discovered, made from bricks, which were placed on a layer of pebbles and plaster (Čerškov 1987, field journal for 28.10-04.12.1987).



**Fig. 6** Romuliana, concha of the triclinium, the base of the mosaic on hypocaust (adapted by N. Borić)

**Sl. 6** Romulijana, konha triklinijuma, podloga za mozaik na hipokaustu (obradio N. Borić)

### *C. Bases with cut marble plates.*

The third type of bases were those where in the final layer cut marble plates were applied (*sectilia pavimenta*). This was the most valued type of the mosaic floors in the Roman world and was reserved only for limited areas within most representative rooms – mainly middle sections of aulæ, or for *triclinia*, as in palace I in Gamzigrad (hall G and rooms O and P – tetraconchal and triconchal triclinium) (fig. 7) and a luxury villa that was at 1 km north from fortifications of Late Antique Naissus.<sup>8</sup> *Sectilia pavimenta* in Gamzi-

<sup>8</sup> For this bases, due to limited research, there are no more specific data.



grad were placed on hypocaust pilasters, therefore, there were two layers of plaster mixed with triturated bricks over square bricks, and in the upper layer of plaster broken marble plates, secondarily used (fig. 8). Cut marble plates were applied onto this surface by means of a thin plaster coating. The plates themselves were of diverse motives and schemes (motive consisting of square and rectangular bands in diagonal order cf. Vitti 2005, 697, fig. 4 (motive B), or simple motives of rows of squares and squares on points, cf. Vitti 2005, fig. 8 (motif L).)



**Fig. 7** Romuliana, concha of the triclinium, the base for sectilia pavimenta (adapted by N. Borić)

**Sl. 7** Romulijana, konha triklinijuma, podloga za sectilia pavimenta (obradio N. Borić)



**Fig. 8** Romuliana, the hall – room G, detail of secondary used plates for the base for sectilia pavimenta (adapted by N. Borić)

**Sl. 8** Romulijana, aula – dvorana G, detalj sekundarno korišćenih pločica za podlogu za sectilia pavimenta (obradio N. Borić)

## Discussion

In this paper, we aim to give an overview, based on the available field documentation for as many sites as possible, and on the autopsy of buildings with mosaics from Naissus, Mediana and Gamzigrad, on mosaic substructures prepared for making both simpler and more complex mosaic floors and panels in Late Antique buildings in the provinces of *Dacia ripensis* and *Dacia mediterranea*. The rules, set out in imperial times for the mosaics in the capital city, were not strictly followed in the Late Antique period, and the thickness of layers and their elements were reduced. Instead of an ideal base, 40 cm thick, mosaics were now placed on much thinner pillars, in luxurious buildings they were 20-25 cm thick, and in some extreme cases they were just 10-12 cm.

The preservation level of these mosaics varies. Their preservation depended mainly on the conditions of burial – whether the building was abruptly, violently brought down, forgotten afterwards and not endangered by large vegetation or the human factor, that may have used the ruins as a quarry for high quality building material – bricks and stones. Another important factor was the use of buildings in Late Antiquity, whether they were in use for just one or several generations, or perhaps lasted over centuries. Important segment in observing the quality of manufacture and preservation of mosaics is also the very spot where they were placed. Of course, the mosaics that decorated the *auditoria* for imperial or other official admissions were of highest quality (Romuliana, hall G, Naissus – octagon, Mediana – the room with apse in the villa with peristyle), as well as small, more private *triclinia* added to these halls (Gamzigrad, rooms O and P, Mediana, eastern and western triclinium, Ratiaria, auditorium) (fig. 9-10). In these rooms, the mosaics were very carefully made, most often in combination of two or more techniques – *opus tessellatum*, usually along the side walls in the halls, while *opus vermiculatum* and *sectilia pavimenta* were in the central part of the room, to emphasize its luxurious and ceremonial character. Somewhat simpler mosaics, made from larger *tesserae* and of simpler geometrical ornament, the mosaic craftsmen placed in areas that were used often, such as corridors, porches, bathroom dressing rooms, etc.

Certain number of buildings was used in longer periods, and in these cases mosaics were damaged, sometimes the substructures too. One of the examples of damaged mosaic in Late Antique period and its repairs while the building was still in use we may observe on the mosaics of the eastern porch of the villa with peristyle on Mediana. Along the eastern edge of the mosaic – on the edge with border-ornament, we may see in two places that



**Fig. 9** Romulana, hall – room G, aero-photo (adapted by N. Borić, after Gamzigrad 2010, fig. 55)

**Sl. 9** Romulijana, aula – dvorana G, aerosnimak (N. Borić, prema: Gamzigrad 2010, sl. 55)



**Fig. 10** Romuliana, triconchal and tetraconchal triclinium, aero-photo (adapted by N. Borić, after Gamzigrad 2010, fig. 57)

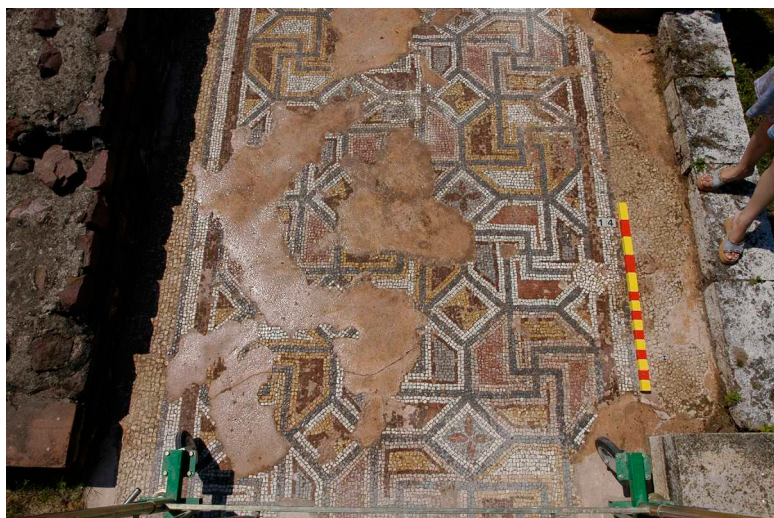
**Sl. 10** Romulijana, trikonhalni i tetrakonhalni triklinijum, aerosnimak (N. Borić, prema: Gamzigrad 2010, sl. 57)

the floors were deliberately pierced and later plastered and filled with white mosaic pieces (fig.11).<sup>9</sup>

Thirdly, in times when some of the buildings were abandoned, another population, that did not have a developed culture of living in built environment, where buildings are richly decorated and made of solid materials, brought its own customs into these buildings, i. e., into rooms with

<sup>9</sup> Regular distances and the size of perforations in the mosaic could point to the possibility that that was an intervention of craftsmen hired to work on the villa, whose work may not have been properly coordinated with the works of mosaic craftsmen, so there were some masonry interventions after the mosaic was placed, as well as some corrections of errors made, though possibly without the presence of the main mosaic craftsman. This is suggested by the fact that the perforations were not filled in by motives planned.





**Fig. 11** Mediana, eastern porch of the villa with peristyle, damage on mosaic (photo V. Rašić, 2005)

**Sl. 11** Medijana, istočni trem vile sa peristilom, oštećenje na mozaiku (foto V. Rašić, 2005)

mosaic floors, by building modest dwelling places from light materials and using these areas for diverse economic activities. Among the most drastic examples of mosaic destruction is the case of the mosaic from the octagonal room of the palatial complex in Naissus, where, most likely at the end of the 6<sup>th</sup> or the beginning of 7<sup>th</sup> century, newly arrived inhabitants – Slavs, made over mosaics eaves, supported by pillars, pierced directly through the mosaic floor (fig. 12).<sup>10</sup> The use of mosaic floors as temporary living places was registered in 2004, during archaeological excavations on the northern part of the villa with peristyle (western triclinium – *stibadidum B*),<sup>11</sup> where outlines of a circular fireplace and damages caused by placing wooden posts into the plaster mosaic base, at regular distances, were clearly noted, thus creating a regular rectangular shape (fig. 13). Unfortunately, archaeological material that might help the dating is missing, therefore, it may only be assumed that it belongs either to the last horizon of the villa (after 378 – before 441 AD) (Vasić 2005, 169) or later, in the Middle Ages, that was also confirmed by sporadic finds on Mediana.

<sup>10</sup> This level is closed by a layer containing burnt debris from building material, into which citizens of Niš were buried during the Middle Ages. Cf. Čerškov 1987, graves 1–4. Those graves correspond to the burial levels noted on a wider area of Gradsko polje.

<sup>11</sup> Јерemiћ 2006b, 152-153 (preliminarily called „the earlier villa ?“ due to insufficient research and a level lower compared to the aula on the eastern side); Vasić 2013, 101.



**Fig. 12** Naissus, building with octogon, damage on mosaic (photo T. Čerškov, 1988)

**Sl. 12** Naisus, građevina sa oktagonom, oštećenja na mozaiku (foto T. Čerškov, 1988)



**Fig. 13** Mediana, stibadium B (western triclinium), damage on mosaic (photo G. Jeremić, 2004)

**Sl. 13** Medijana, stibadijum B (zapadni triklinijum), oštećenja na mozaiku (foto G. Jeremić, 2004)

In general, those mosaic floors that were not exposed to destructive human activities,<sup>12</sup> either in Late Antiquity (as we can see from the examples of Naissus and Mediana), or in recent times (by building modern infrastructures, or more bizarrely, by competing in deep ploughing on

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<sup>12</sup> The consequences of earthquakes in Late Antiquity were not recorded on buildings taken into account in this paper.

the triclinium areas of the luxury villa with octagon from Mediana, which were severely damaged this way) (Jeremić 2006b, 153, fig. 12), have demonstrated their longevity and solidity due to substructures on which they were placed. In some cases, when mosaics decorated the *triclinia* or halls of palaces or villas (Romuliana, Naissus, Mediana, Kostinbrod) or special places for depositing imperial *insignia* or clothes (room D in palace I in Romuliana), mosaic bases were on hypocaust pilasters. However, despite that, their stability was not endangered and among these mosaics we do not have any examples of mosaics collapsing into the interspace between pilasters. Although they were reduced to the thickness of 20-25 cm, in comparison with the Early Roman patterns of 40 cm (recommendations by Vitruvius, *cf. supra*), it is evident that they were sufficiently solid for mosaics not only during their lifetime, but also in later periods when they, along with the buildings in which they were placed, fell into oblivion.

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## TEHNOLOGIJA IZRADE PODNIH MOZAIČKIH PODLOGA U KASNOJ ANTICI U PROVINCIJAMA *DACIA MEDITERRANEA* I *DACIA RIPENSIS*

U rimskom svetu, mozaik je predstavljao skup proizvod, koji je bio tvorevina više različitih majstora-zanatlija. Mozaički podovi krasili su javne i privatne zgrade, a bili su naručivani od različitih patrona (cara, vlasnika luksuznih vila, kolegija, municipalnih, verskih zajednica i drugih). Za izradu mozaika, bilo da je rađen u tehnici *opus tesellatum* (geometrijski ili vegetabilni motivi, rađeni u svežem malteru *in situ*), *opus vermiculatum* (posebni paneli, najčešće sa figuralnim scenama, koji su izrađivani u ateljeu, a potom postavljeni u predviđeno mesto u podlozi) i *sectilia pavimenta* (luksuzna tehnika popločavanja prostorija sečenim mermernim pločicama), neophodna je bila kvalitetna podloga. Podloga je postavljana nakon svih drugih građevinskih radova u zgradi.

Na tlu kasnoantičkih provincija *Dacia ripensis* i *Dacia mediterranea*, mozaici su otkriveni na 11 nalazišta u 18 građevina (palate, vile, terme, ranohrišćanska crkva), iz perioda kraja III – IV vek. Zavisno od namene prostorije, registrovane su različite vrste podloga, kojih je izdvojeno tri osnovne vrste: a. podloge koje su počivale direktno na zemlji, b. podloge koje su počivale na hipokausnim stubićima, v. podloge za *sectilia pavimenta*, koje su se u odnosu na prethodne dve pomenute grupe jedino razlikovale u završnom sloju, koji je služio za lepljenje sečenih pločica.

Preporuke ranorimskog arhitekta Vitruvija, da je za kvalitetan mozaik potrebna podloga debljine 40 cm, u kasnoj antici se nije poštovala. Mozaici iz najreprezentativnijih građevina iz pomenutih provincija, kao što su carska palata u Gamzigradu, palata u Naisusu, reprezentativna vila sa peristilom na Medijani i drugi, imali su podlogu debljine prosečno 20-25 cm, bilo da je počivala na hipokausnim stubićima, bilo da je bila direktno postavljena na nabijenu zemlju. Redukovanje podloge u odnosu na carski period ogleda se ponekad u izbegavanju postavljanja statumena od lomljenog kamena, pa je prvi sloj mogao da čini rudus od kamena vezanog malterom (debljine 15-18 cm), preko kog je stavljan nukleus, često u dva premaza, ukupne debljine 8-10 cm, na koji je dolazio tanak premaz od svežeg maltera za direktno uranjanje tesera. Analizama mozaika iz vile u Montani registrovano je prisustvo organskih supstanci (jaje, životinjska krv), koje su

korišćene kao vezivni materijal za kreč. Primeri nemarnije postavljanih mozaičkih podloga veoma su retki, i reč je samo o dva slučaja: vile s kraja III ili iz IV veka iz Galatina, gde je podloga od blatnog maltera, debljine svega 4-8 cm, kao i manje ranohrišćanske kapele s kraja IV veka na Medijani, gde je na zemljanom podu načinjena tanka malterna košuljica u koju su uronjene krupnije tesere.

Podloge, zajedno sa završnim slojem mozaičkog tepiha, u kasnoantičkim građevinama u provincijama *Dacia ripensis* i *Dacia mediterranea*, očigledno su bile dovoljno kvalitetne za dugotrajnije korišćenje, jer reparacije iz kasnoantičkog doba gotovo da su retke (primer Medijana, trem vile sa peristilom). Prilikom arheoloških otkrića najčešće se mozaici nalaze u dobrom stanju. Izuzetak čine oni mozaici koji su bili na meti novopridošlih stanovnika u poslednjim fazama života na nalazištima, kada dolazi populacija koja ima sasvim drugačije stambene i estetske navike (Naisus, Medijana) ili kada su oštećeni prilikom savremenih mehaničkih ili infrastrukturnih radova.

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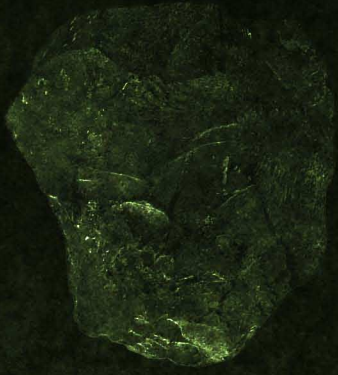
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