

The title of the thesis is " **Mosaic Construction Techniques of Philippopolis, Syria, during the Roman Age**".

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The thesis consists of an introduction, a geographical setting, Methodology, a historical frame, three chapters, and a conclusion. It also includes lists of illustrations, tables, and plans before the introduction and list of terms at the end.

The introduction begins by highlighting the importance of Syrian mosaics and the Philippopolis mosaic collection within the global mosaic heritage. It reviews previous research on Syrian mosaics in general and Philippopolis mosaics in particular, addressing the shortcomings of previous studies that have not explored the technical aspects of Syrian mosaics and the importance of further research on this field.

The introduction also outlines the main objectives of this study: to contribute new research to the study of ancient mosaic producing techniques in Philippopolis, to uncover the methods used to prepare the foundation layers, to conduct a comparative iconographic analysis of these mosaics with those discovered at other sites; and to highlight some dating conclusions that will benefit students and all those working in the field of conservation and preservation. Mosaics.

The geographical setting included the geography of the region, its nature, and the abundance of basic materials used in preparing mosaic pavement.

The methodology included previous studies that discussed the mosaics of Philippopolis, historical sources, and the writings of travellers who visited Philippopolis throughout history.

The historical frame discussed the status of Syria in general throughout history, the city of Philippopolis, the civilizations that passed through it, and the most important period in its history: the accession of Philip the Arab, son of Philippopolis, to the throne of the Roman Empire.

The first chapter of the thesis included the stages of development of mosaic art. It was divided into five sections that discussed the development of mosaic art in general, its development in Syria in particular, the techniques for producing mosaic floors in the Roman era, and a special section on the artistic aspects of the Philippopolis mosaic group and its characteristics within the general framework of Roman mosaics. The final section included an iconographic study of the Philippopolis mosaic collection.

The second chapter included an analytical study of the production techniques of the Philippopolis mosaic collection. It is also divided into five sections.

The first section addresses the paving techniques of the Philippopolis mosaics and places them within the general framework of paving techniques in the Roman era. The second section covers the fieldworks conducted at the sites where the Philippopolis mosaic floors were discovered during 2014-2015. The third section includes an analytical study of the workshops producing the Philippopolis mosaics, based on iconographic studies and fieldworks. The fourth section includes an analytical study of the type of tile the Tesserae used in producing the Philippopolis mosaic pavements, and the fifth section includes an analytical study of the nature of the materials used in preparing the foundation layers for the Philippopolis mosaics and their availability in the region.

Chapter Three includes laboratory analyses of samples of the Philippopolis mosaic pavements collected from the sites where the mosaic pavements were discovered. It is divided into three sections. The first section includes an analytical study of the execution techniques of each mosaic in Philippopolis within the framework of Roman styles. The second section includes the results of the analysis of the samples performed in the laboratories of the Russian Academy of Sciences in Moscow, and the laboratories of the Conservation Department at the Hungarian University of Fine Arts in Budapest. The third section included a comparative study of the mosaics under investigation, based on the results of analyses of samples taken from mosaic fragments and preparatory layers of the Philippopolis mosaics.

Conclusion: The conclusion included all the results obtained through the iconographic and analytical study and sample analysis, in addition to proposing a date for one of the mosaics that has not yet been published.

conclusion

Although the city of Philippopolis did not rise only after Philip the Arab assumed the throne of Rome (244 - 249 AD) and transformed his hometown from a small village into a Roman colony, the mosaic pavements found in this city are among the important discoveries in the Levant, in terms of originality, quality and composition.

Artistic characteristics:

The collection of mosaic pavements in Philippopolis is characterized by many notes that are considered among the hallmarks of mosaic art and one of the most important collections in Syria and the Levant. Through its originality and the themes are considered among the subjects of the Greco-Roman mythology, which contributed to drawing a true picture of the beauty of this art. It is represented by the density of artistic elements, imaginative expression, and uncommon quality in the implementation of the designs of those mosaics' schemes and their various human, animal, geometric, and plant formations. It is considered a phenomenon superior in terms of quality and artistic value that it provided and refer the profound and great transformation that took place in this part of the empire during the period of Philip the Arab. The mosaic heritage reflects the thought, traditions and arts of the Syrians in that era, and the extent of the intellectual and cultural depth and the local artistic taste of a Hellenistic character isolated from local influences.

The remarkable studies about the mosaic pavements discovered in Syria that dated back to the Roman period, focused on the artistic and historical side in general with some comparisons with other mosaics in other regions in terms of classical components, dating and manufacturing workshops.

All the previous studies which concerned with the ancient Syrian mosaic pavements neglected the technical sides that are considered important factors and deserve scientific research. The new research in this field represents a suitable way to know more about the original techniques and the nature of the materials used to create these mosaics and to discover more about the characteristics of their preparatory layers.

Paving techniques and types:

By studying the execution techniques of these pavements, we found that they were created by using Vermiculatum type in the main scenes that include the main characters and the accompanying characters around which the legendary story revolves, in small scenes that include animals, birds, and masks and in some frames surrounding the main scene on some pavements which includes the inhabited plants and the personification of the four seasons.

While the artist relied on the use of the Tessellatum type in the geometric frames surrounding the main scene on some pavements, and in implementing the background of the main scene and the light, monochrome spaces around the central panel on other pavements. The differentiation in the use of these methods is common in depictions of characters, gods, and heroes in the Roman period.

Tesserae:

Marble and limestone were mainly used in the production of all Philippopolis mosaic pavements, which were brought from outside Philippopolis and in various colors. It is important to note the use of tesserae of a volcanic nature which quite similar to some rocks and the volcanic raw material found in Philippopolis, the presence of

volcanic tesserae was present in the mosaics of the house of Jādū al-Matnī. Because of the limited number and the small dimensions of the tesserae, more samples and further analysis would be needed.

The use of glass cubes in some of the mosaic pavements discovered in the House of al-Qabbānī, in some details of the mosaics of Justice, Education and Philosophy, also in some details of the mosaic discovered in 1965 and 2014. The blue glass tessera sample from the piece of the Damascus Museum collection, the *Justice, Education and Philosophy* mosaic seems to be a special example to the Syrian glass production by the detection of Chromium. The presence of this element can be a significant fingerprint, it can derive from the sand used during the glassmaking, and not present as an additive, which would be only possible in a modern glass.¹ We are planning the further investigation of the blue glass material accurately, because it can be a clue concerning the provenance if the circumstances let us continue the work.

The size and thickness of the tesserae differed according to the place, the pavement, and the scene, the use of glass tesserae is detected only in two mosaics derive from the al-Qabbānī House.

One of the pavements was distinguished by the use of black tesserae in paving the background of some scenes, unlike all the pavements where “white” tesserae were used in paving the background of the main scenes and frame scenes. The black tesserae were used in paving the background of the scenes within the frame surrounding the main scene in the mosaic of Gaia Plutus and the Giveaways of the Four Seasons, which included scenes of inhabited plants in the shapes of cupids chasing different animals, in addition to human heads in the four corners representing the four seasons.

Architectural space:

The group of mosaics of al-Qabbānī House and the Jādū al-Matnī House, which were discovered in the period from 1965-1970, showed us that these mosaics used to decorate the floors of halls that differ in terms of function, and with larger areas necessitated by the functional requirements of these halls, such as reception rooms or dining rooms.

Field work results

Jādū al-Matnī house mosaic:

Through the technical and artistic study, it became clear that the mosaic of Jādū al-Matnī house was produced by a first-class artistic workshop, and through the scenes and dimensions, it was found that it was the floor of a large hall, and we suggested that it might cover the floor of Triclinium or Tablinum in a Roman villa.

One of the most important results of our recent excavation at the site was the discovery of a previous mosaic pavement under the firstly excavated mosaic pavement. Also, we were able to suggest a date for the upper mosaic, where through comparisons of the scenes within this mosaic pavement with similar scenes discovered in other sites, especially the mosaic that was unearthed in Bulgaria and displayed in the Devnya Museum of Mosaic which dates back to the early of the fourth century AD. Some of the framing decorations of the Jādū house mosaics are

¹ Moretti 2001, p. 102.

similar to some of those found in the Three Graces mosaic discovered in Philippopolis and dated to the second half - the end of the third century AD.

All of these comparisons and evidence gave us the possibility to suggest that this mosaic pavement might be dated to the end of the third century, middle of the fourth century AD.

Al-Qabbānī house mosaic:

From the results of excavations in al-Qabbānī house is a discovery on the remains of wall paintings, the first of their kind in the city of Philippopolis. Also, colored stones were found that were apparently used as raw materials of paints used in the coloring of the wall paintings and were bright red and ochre colors.

Also, one of the results of the excavations in al-Qabbānī house was the finding of white stones the size of a fist, circular, oval, or polygonal, the dimensions or diameter of each of which does not exceed 10-12 cm, distributed within an earthen floor, and also interspersed with some red and yellow stones.

The presence of these stones of a calcareous nature in this house within the city of Philippopolis, in which there are only basalt stones, allowed us to suggest that they are from a group of limestone that were brought by the workshop to be used for the manufacture of tesserae used in the production of mosaic pavements in this house, or for preparing quicklime (by burning limestone) as binding agent for the mortars.

Among the results shown by the data provided by the excavations in al-Qabbānī house in 2014, and the mosaic pavements which found in 1925 in other rooms, and according to researcher Oussama Nofal, the field manager of the excavation team at the site, that through the parts of the mosaic pavement that covered the floor of the north hall, and the excavation data, we were able to suggest that the architectural plan is one of the models of the plans of luxurious Roman houses or villas that appeared in each of the cities of Rome and Pompeii, which is known as (*Domus Romaine*), with the presence of the Atrium, followed by a reception hall known as (Tablinum), and the presence of a room dedicated to the dining and is mainly known as (Triclinium).

Foundation layers' materials:

Through the archaeological sondages we noticed differences in each site from the other site, in terms of the preparation of the foundation layers, and clear difference is visible also between the components of the foundation layers in Philippopolis mosaic pavements and those in other Syrian sites.

This is definitely related mainly to the nature of the materials and their available sources in Philippopolis, which differ from those features in other Syrian sites, in addition to the different workshops. We noticed a heavy use of volcanic gravel available in the area whether it was within the foundation layers separately or within the lime mortar.

The sondages showed that the preparation of the foundation layers is different in some pavements than the common system in the Roman period described in detail by Vitruvius in the 1st century BC, and Pliny in the 1st century AD. According to the Latin author the soil was rammed and levelled and then four foundation layers were made on top of it under the Tessellatum.

The presence of sixth layer under the Statumen layer of the mosaic pavement in the house of al-Qabbānī can be considered unique, which is a layer of stones of a smaller size than those of the Statumen layer with a thickness of up to 30 cm.

Another specialty was the discovery of the remains of a previous mosaic pavement under the mosaic excavated at the house of Jādū al-Matnī. The first paved mosaic was made of large whitish tesserae of limestone, all around a lost main scene. The workshop that paved the upper mosaic seems to re-use the colored tesserae preserved of the first pavement. In preparing the foundation layers of this second pavement, the artists used large pieces of basalt in the Rudus and in the Nucleus.

A particular feature was the application of a five-centimeters-thick layer of black volcanic gravel instead of the Rudus layer in the mosaic stratigraphy of the al-Ḥarfūsh site. According to our identification it may be used as an insulation layer.

Results of the analyses

The view of the Roman city of Philippopolis is determined by the presence of the cinder cones of surrounded volcanic hills. The geological features highly influenced the type of building materials on this site.

The volcanic context envisages the use of mostly local raw materials or that of nearby by the ancient mosaicists. In all the cases examined volcanic materials are present in the composition of the mortars, and we can detect them among the tesserae as well, although most of the tesserae are compact limestone.

All the examined mortar samples are of calcium carbonate binders containing minerals from the group of clays. In the main carbonate matrix pieces of volcanic fragments and rarely organic residues are present.

The characteristics of the X-ray diffraction (XRD) and Scanning Electron Microscopy (SEM) measured components are similar, and we can diagnose that the results can only confirm and point out the presence of typical, site-specific compounds. The real, delicate differences can be better found by the analyses of microscopic and on-site features.

The results of the analyses showed intensive use of local materials present on the site. The microscopic examination of the polished cross-sections made from each sample demonstrated the use of red and black volcanic material in the form of vesicular pyroclastics (lapilli and/or agglomerates) as filler and grinding of lapilli and/or volcanic ash as hydraulic component within the lime mortar.

One of the most important results is that there is no trace of use of pottery powder in the foundation layers of the examined mosaic pavements from Philippopolis which we can see frequently in general and typical to the Syrian mosaics.

Also, one of the important results is that in the main scene of the Jādū al-Matnī mosaic we can detect the volcanic stone as tesserae (red, brownish, deep red) although most of the tesserae are of compact limestone.

Also, one of the most important results is that the general appearance of the mortar matrices of the Orpheus mosaic from the Roman villa looks more homogeneously greyish due to not only the small particles of the black

volcanic material but the presence of charcoal remnants. The bedding mortar is mainly composed of lime containing pure lime lumps and clayish particles.

The finding of charcoal in the Orpheus mosaic matrices in the Roman Villa site is important evidence of its production by a workshop different from that of the other examined sites and it can also indicate difference in the execution period. These mosaic pavements were stylistically dated to the second quarter of the fourth century by the Belgian scholar Janine Balty, but from the analyses we can surely assume the diversity of the Roman Villa site mosaics' also by their construction from the other examples of Philippopolis.

Workshops:

Although some previous studies suggested that the workshops producing the Philippopolis mosaics came from Homs, technical comparisons and laboratory analyses support our hypothesis that these workshops rather came from Antioch.

Artistic studies have provided us with sufficient information about the distribution of motifs within the different areas of the mosaics. This distribution is similar in most cases to many examples found in mosaics of Antioch, and shares with them many features in terms of depicting main scenes, motifs, shapes, patterns, frame decorations, the style of human figures, the technique of light and shadow, and other features that characterized Antiochian mosaics in the second and third centuries AD and the first half of the fourth century AD.

Through our field work in the Philippopolis, the study of the sequence of the preparatory layers for the mosaics discovered in these sites and by the results of laboratory analyzes of the materials of these foundation layers, we found a great similarity in terms of the use of local materials. The volcanic context envisages the use of mostly local raw materials or that of nearby by the ancient mosaicists, where in all the examined cases pyroclastics are present in the composition of the mortars.

But the difference is clear in the way they are prepared, sequenced, distributed and used. Each site gave clear indications of the difference in the workshop that carried out the mosaic pavements discovered within it, even those that were implemented in the same period. Through surveys and fieldwork, and through the results of laboratory analysis, it appears that there was more than one workshop that executed the Philippopolis mosaic group, with the need to focus on the difference in location and period.

It seems that all workshops, in different time periods, have benefited from local materials in producing the pavements, but each workshop has harnessed these local materials in its own way.

Al-Qabbānī house:

The presence of the fifth foundation layer of volcanic stones under the Statumen layer as the first bottom layer within the constituent layers of the mosaic pavements was discovered in al-Qabbānī house.

The special case in the mosaic pavements of the al-Qabbānī house in particular and in the Philippopolis mosaic pavements in general, which is represented by the use of glass tesserae in the mosaic of Justice, Education and Philosophy in the details of the hair, clothes and the names of the characters in the main scene. Also the use of the glass tesserae was in the fourth mosaic that discovered in 1965 and 2014 in some details of the birds and plants within the small panels.

Using the glass tesserae gives us the opportunity to suggest that the mosaics of the house of al-Qabbānī were executed by a different workshop.

The Roman villa:

The results of laboratory analysis proved the discovery of charcoal only in the mortar samples used in preparing the foundation layers of the mosaics discovered in the Roman villa, and it was not used in preparing the foundation layers of the mosaic pavements discovered in other sites, which is clear evidence of the difference in the workshop that produced these mosaics. This is consistent with previous research studies that dated Roman villa mosaics to the second quarter of the fourth century AD.

Al-Harfūsh house:

The presence of an atypical layer of black vesicular pyroclastics as an insulation layer instead of the Rudus layer within the foundation layers of the mosaic pavements discovered in al-Harfūsh house. This kind of layer was also found in some underlayers of limestone pavements found in the house of al-Qabbānī. The previous research studies that dated the mosaic pavements of the house of al-Harfūsh and that of al-Qabbānī to the same time period- the second half of the third century AD-, give us the opportunity to suggest that the mosaics of the two houses were produced by the same workshop or suggest us a working habit which can origin in the site-specific needs to create the adequate foundation.

Jādū al-Matnī house:

Among the clear features of the foundation layers prepared in the mosaic pavement discovered in Jādū al-Matnī house was the use of large basalt stones in the preparation of the Rudus layer, also were interlaced within the Nucleus layer and in some cases directly under the Tessellatum. Some of the stones were similar in size to those used in the Statumen layer. While it is common to use only smaller stones and pebbles in the layer of Rudus and particularly in the Nucleus, which we generally found during our work in other Philippopolis sites and Syrian sites. In addition to the use of tesserae of the local volcanic nature is also significant, while the majority is the use of tesserae of a calcareous nature.

These features support the suggestion of a different workshop that performed the mosaic pavements discovered in Jādū al-Matnī house, from the workshops that executed the mosaic pavements in other Philippopolis sites.

The existence of two layers of mosaic pavements indicates difference in time and probably in function or in owner as well. The reuse of the colorful stone material of the first mosaic shows us a practical but also an economical decision.

Future strategies for Philippopolis mosaic pavements:

The mosaic pavements discovered in Philippopolis are part of a group of mosaic pavements of a Roman city that marked by all the features of Roman cities with its official, administrative, religious, service and residential buildings. It is certain that there are many undiscovered or known and undeclared pavements by their owners.

We are facing with a big problem in Syria in the way how the local community to understand the importance of preservation of the cultural heritage. There is no realization that the protection of cultural heritage is the responsibility of everyone from individuals, institutions and government, also the process of expropriating archaeological areas by the archaeological authorities in Syria follows an old system and has not been modified so far.

The compensation paid to the owners of the archaeological properties upon expropriation is very little compared to its real price. Therefore, citizens in archaeological regions and cities such as Philippopolis, in which the ancient city overlapped with modern buildings, hide the fact that there are archaeological monuments or mosaic pavements in their houses for fear of their appropriation by the government and compensating them with small amounts, or because they do not have an alternative to this house as a residence for them. Even the expropriation process sometimes takes a long time due to the specificity of the place or the complex composition of the ancient and modern city together.

This is what we noticed during our work in the city in the 2014-2015 seasons, as some of the homeowners, especially in the residential area of the old city in the northeastern part of the city, have told us with all honesty that even if their houses have mosaic pavements, they will not inform the governmental archaeological authorities about that, for the above mentioned fears.

At that time, we tried to convince the governmental archaeological authorities of the importance of the site of the city of Philippopolis in general, and these houses, which contain mosaic pavements in particular.

The idea was to present ideas for similar cases in the world and the possibility of their application in the city of Philippopolis, or to convince governmental authorities to agree to make the citizen benefit from his property even if it is expropriated. Where after the expropriating of the property, the archaeological level of the site prepared and opened as a museum site linked with the neighbouring properties. Following this idea permission is given to the property owner to take advantage of the upper floors of the property to build his house and the houses of his children, and thus we have obtained the approval of both parties.

To put forward these ideas, in 2014 in the city of Shahbā (Philippopolis) we held a meeting for the archaeological authority, representatives of the government and the people of Philippopolis. There was acceptance by the people of the proposed ideas, but because of the crisis and difficult conditions in Syria during that period, - the deteriorated financial conditions, the state budget became less than before, and to support other issues more important, which are considered a priority in the current period - all of this made the project just idea not actually implemented.

One of the first future work strategies for the city of Philippopolis is to reactivate this project and educate the local community to understand and realize the importance of cultural heritage, as the followings: the responsibility of preserving it is the responsibility of everyone, government institutions and individuals, and linking the modern city with the ancient city within an integrated project to be one of the important archaeological, historical and touristic sites in Syria.

Among our works in the General Directorate of Antiquities and Museums in Syria was the restoration of parts of the mosaic pavement discovered at the site of Jādū house in Philippopolis. These parts were discovered in 1970 and preserved in warehouses until 2014, in that year we removed them from the warehouses for restoration and at

the same time excavations works were carried out in the same site for the discovery of the potentially connecting parts. It has already been found that there are further sections of the same mosaic pavement, as they were removed from the site in order to also be restored and added to the previously discovered parts displayed in the Shahba (Philippopolis) city museum. Where a plan was drawn up to restore and display the mosaic pavement within the museum's garden and within a building and shelter to be built with traditional materials similar to the nature of the Philippopolis region.

Due to the difficult circumstances and the current situation in Syria, the museum was closed, the artifacts displayed in it were preserved. Therefore, the works of displaying the mosaic pavement in the museum was postponed until the end of these conditions, the return of life to its previous state, and the reopening of the museum.

Also, among our works in the city of Philippopolis was preserving the parts of the mosaic pavement discovered at the site of al-Qabbānī house by re-burial within the site to be exposed in the future and displayed on the same site with the previous parts discovered in 1965. It is part of the plan of the General Directorate of Antiquities and Museums to rehabilitate the site of al-Qabbānī house and the mosaic pavement, and to include it in paths of archaeological visitation and tourism in the city of Shahba (Philippopolis).